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Table of Contents • Table des matières

2015 ACADEMIC SECTION PROCEEDINGS

ABSTRACTS

INDEXES

CAEP | Canadian Association of Emergency Physicians
ACMU | Association canadienne des médecins d'urgence

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CAEP Academic Symposium Papers

CAEP 2015 Academic Symposium: Leadership within the emergency medicine academic community and beyond

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ABSTRACT

Objectives: A panel of emergency medicine (EM) leaders endeavoured to define the key elements of leadership and its models, as well as to formulate consensus recommendations to build and strengthen academic leadership in the Canadian EM community in the areas of mentorship, education, and resources.

Methods: The expert panel comprised EM leaders from across Canada and met regularly by teleconference over the course of 9 months. From the breadth of backgrounds and experience, as well as a literature review and the development of a leadership video series, broad themes for recommendations around the building and strengthening of EM leadership were presented at the CAEP 2015 Academic Symposium held in Edmonton, Alberta. Feedback from the attendees (about 80 emergency physicians interested in leadership) was sought. Subsequently, draft recommendations were developed by the panel through attendee feedback, further review of the leadership video series, and expert opinion. The recommendations were distributed to the CAEP Academic Section for further feedback and updated by consensus of the expert panel.

Results: The methods informed the panel who framed recommendations around four themes: 1) leadership preparation and training, 2) self-reflection/emotional intelligence, 3) academic leadership skills, and 4) gender balance in academic EM leadership. The recommendations aimed to support and nurture the next generation of academic EM leaders in Canada and included leadership mentors, availability of formal educational courses/programs in leadership, self-directed education of aspiring leaders, creation of a Canadian subgroup with the AACEM/SAEM Chair Development Program, and gender balance in leadership roles.

Conclusions: These recommendations serve as a roadmap for all EM leaders (and aspiring leaders) to build on their success, inspire their colleagues, and foster the next generation of Canadian EM academic leaders.

RÉSUMÉ

Objectif: Un groupe de chefs de file en médecine d'urgence (MU) s'est employé à définir les principaux éléments du pouvoir d'influence et de ses modèles, en plus de formuler des recommandations consensuelles visant à établir et à renforcer ce pouvoir universitaire au sein de la communauté intéressée par la médecine d'urgence au Canada dans les domaines du mentorat, de la formation et des ressources.

Méthode: Le groupe d'experts se composait de chefs de file en MU qui provenaient de toutes les régions du Canada, et il a tenu régulièrement des réunions par téléconférence sur une période de neuf mois. S'appuyant sur la diversité de leur bagage de connaissances et de leur expérience ainsi que sur l'examen de la documentation et sur l'élaboration d'une série de vidéos sur le pouvoir d'influence, les membres ont présenté les grands thèmes autour desquels s'articuleraient les recommandations sur l'édification et le renforcement de ce pouvoir en MU, à l'occasion du symposium sur les affaires universitaires de l'ACMU de 2015, qui s'est tenu à Edmonton, en Alberta. On a demandé aux participants (environ 80 médecins d'urgence intéressés par le pouvoir d'influence) de faire part de leurs observations sur le sujet. Le groupe d'experts a, par la suite, élaboré des recommandations préliminaires en tenant compte des observations des participants, d'un nouvel examen

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de la série de vidéos sur le pouvoir d'influence et de l'opinion d'experts. Après cela, les recommandations ont été transmises à la division des affaires universitaires de l'ACMU pour d'autres observations, puis ont finalement été mises à jour par le groupe d'experts après l'atteinte d'un consensus.

Résultats: Le groupe, éclairé par la démarche, a formulé des recommandations sur quatre grands thèmes : 1) la préparation au pouvoir d'influence et la formation; 2) l'autoréflexion et l'intelligence émotionnelle; 3) les qualités de chef en milieu universitaire; et 4) l'équilibre dans la représentation des sexes au sein de la sphère d'influence en MU, dans le milieu universitaire. Les recommandations visaient à soutenir et à encourager la nouvelle génération de chefs de file en MU, dans le milieu universitaire, au Canada, et elles portaient sur le mentorat en matière de pouvoir d'influence, l'offre de cours de formation et de programmes structurés dans le domaine, la formation autodirigée de chefs de file potentiels, la formation d'un sous-groupe canadien rattaché à l'AACEM/SAEM Chair Development Program et la représentation équilibrée des sexes dans les rôles de direction.

Conclusions: Ces recommandations servent de feuille de route à tous les chefs de file en MU (et aux chefs potentiels) afin qu'ils misent sur leur réussite, qu'ils soient source d'inspiration pour leurs collègues et qu'ils insufflent la confiance à la nouvelle génération de chefs de file en MU au Canada.

Keywords: leadership, emergency medicine, mentorship, education, training

INTRODUCTION

The Academic Section of the Canadian Association of Emergency Physicians (CAEP) was officially formed in 2013 and consists of working groups on education scholarship, research, and leadership. Each working group was charged with presenting a symposium at a CAEP Annual Scientific Meeting and publishing their findings and recommendations.[1-7] For CAEP 2015, the Leadership Working Group formed three panels on leadership, governance, and funding, to articulate the issues, structure recommendations, and plan interactive 1-hour symposia during the CAEP 2015 annual meeting. The purpose of the leadership panel was to describe the key elements of leadership and develop recommendations to strengthen leadership for academic activity in emergency medicine (EM). At the symposium, a framework for leadership and videos of opinions of well-known, successful leaders in EM was presented. This paper is meant to offer recommendations, stimulate debate, and ultimately strengthen the academic output in EM in medical schools across Canada.

In the challenging, chaotic environment of EM, a deliberate, thoughtful approach to leadership skill development is essential for success. Academic medicine provides its own dimension to leadership, because university culture can be very distinct from that of the health system. Academic medical leaders find themselves at the point of intersection between these two systems, systems that may frequently have conflicting priorities while relying on a common resource base.

Many leaders in EM have learned their leadership skills through experience and have extensive tacit knowledge with respect to successful strategies. Traditionally, EM leaders have thought about specific tasks and roles as leadership and not understood or been able to articulate the more important "soft skills" of effective leaders. In a recent article defining education for EM leaders, only 5 of 64 competencies could be categorized as "leadership skills" with the vast majority being managerial tasks, such as managing the schedule, developing the disaster plan, and so forth.[8]

The goal of the leadership panel was to define the key components required for academic EM leaders, find the most suitable leadership model for academics, if one existed, and make recommendations to enhance and nurture leadership skill development in Canada.

Methodology: Review of current leadership resources

Eight established medical leaders were identified from across Canada for their contributions to the EM community and were asked to form a leadership panel. The panel met by teleconference four times and was supported by the Academic Section of CAEP. All members reviewed the literature and discussed individual leadership experiences to identify core leadership skills, models, resources, and challenges.

The panel developed a list of eight questions in four categories designed to engage an audience and develop a framework to discuss leadership and leadership models (Figure 1). The questions were pilot-tested among the panel members and updated for focus and clarity. Six medical leaders, who originally worked within EM but had moved on to leadership positions in health care outside of EM, were invited to participate in the leadership video series. The interviewees submitted videos (see supplementary material) that were reviewed and edited from 107 to 24 minutes for highlights that

Training and Career Development
1. What formal and informal preparation did you do to achieve your current leadership position?
2. What training/preparation would you recommend to aspiring leaders? Why?

Current Leadership Position
3. Do you have a leadership model that you currently use?
4. What has surprised you in your leadership role?
5. What is your succession plan?

Challenges and Opportunities
6. Describe a major success in your role as leader and the keys to that outcome.
7. What are your concerns about gender balance in leadership?

Final Comments for Up-and-coming Leaders
8. What advice do you have for aspiring leaders?

Figure 1. Structured questions for the leadership video series.

Table 1. NHS Leadership Program's nine dimensions of leadership

1. Inspiring shared purpose
2. Leading with care
3. Evaluating information
4. Connecting service
5. Sharing the vision
6. Engaging the team
7. Holding to account
8. Developing capability
9. Influencing for results

played during an hour-long session at the Academic Symposium, held on May 30, 2015, in Edmonton, Alberta. The videos served as rich data sources and assisted the panel in generating an active discussion at the Academic Symposium. Feedback collected at the symposium and further discussion by the panel culminated in six recommendations. The recommendations were distributed to the Academic Section in August 2015 for further feedback and updated by panel consensus. During the development of the recommendations, the panel attempted to be as specific as possible, while recognizing that the academic environment is varied at the 17 medical faculties across Canada.

Review of leadership models

After a literature search and discussion by the leadership knowledge of this group, the panel determined that there were two leadership models in health care worth the consideration: 1) the National Health Service (NHS) Leadership Program[9] in the United Kingdom and 2) LEADS leadership capabilities framework[10] used by a number of Canadian hospitals and endorsed by the Canadian Medical Association (CMA).

The panel reviewed in detail both the NHS and LEADS program. The NHS leadership program was developed in response to failures in leadership at many levels in the NHS. The program is a generic health care model and competency-based. For each dimension, various levels of competencies are defined: essential/proficient/strong/exemplary. Its nine dimensions of leadership are inspiring shared purpose, leading with care, evaluating information, connecting service, sharing the vision, engaging the team, holding to account, developing capability, and influencing for results (Table 1). Focused on high-level leadership skills, this program is appealing. However, the panel considered that its recommendation would face challenges on two fronts: adaptation to a Canadian context and obtaining engagement from the academic EM community.

The second model reviewed was the LEADS leadership capabilities framework. *LEADS* stands for "lead self, engage others, achieve results, develop coalition, and systems transformation." The LEADS framework was developed through a collaborative partnership between the Canadian College of Health Leaders, the Canadian Health Leaders Network (CHLnet), and Royal Roads University, in response to the growing interest across Canada in the adoption, integration, and sustainability of a common leadership capabilities framework. It has been endorsed by the CMA and incorporated into many leadership courses offered through the Physician Management Institute (PMI). LEADS has also been adopted as the evaluation framework for the Canadian Certified Physician Executive credential offered jointly by the CMA and Canadian Society for Physician Leadership and is used with increasing frequency by health organizations across Canada in leadership performance evaluation. Although its utility as a standardized leadership capability framework has been established, LEADS provides little insight into what approaches that leaders may take to achieve the desired capabilities. In practice, most leaders apply multiple strategies or models while trying to achieve the broad competencies outlined in LEADS. In light of this, the panel was concerned that the adoption of LEADS, in isolation, may not strengthen leadership in academic EM in Canada.

Review of educational resources for leadership development

There are a number of short-term and long-term education offerings in leadership/management at many

Table 2. Leadership course list for those aspiring to leadership roles as recommended by the 2015 Academic Symposium panelists

Course/Series	URL
Academic Leadership Development Program (UBC)	http://aldp.ubc.ca/
CAME's (Canadian Association for Medical Education) Canadian Leadership Institute for Medical Education (CLIME)	http://www.came-acem.ca/mededconferences_clime_en.php
Leadership Development for Chairs and Chair-like Academic Leaders (University of Alberta)	http://www.hrs.ualberta.ca/en/Learning/Programs/Leadership/LeadershipDevelopmentforChairs.aspx
PMI Physician Leadership Courses	https://www.cma.ca/En/Pages/pmi-physician-leadership-courses.aspx
Queen's University School of Business: Executive Education: Leadership	http://business.queensu.ca/executiveeducation/programs/leadership.php
Society of Academic Continuing Medical Education (SACME) [Leadership Course for CME Deans]	http://www.sacme.org/

universities in Canada. In most academic centres, both the Master of Health Administration (MHA) and/or the Master of Business Administration (MBA) with an emphasis in health are available, with many offering an executive option for learning while employed full-time. Through the PMI, the CMA runs 2-day courses on various aspects of leadership. These courses receive very positive evaluations and are useful to physician leaders in practice. The CMA also offers a Physician Leadership course, which uses the LEADS framework. The panel cannot recommend any single leadership model or course; however, there was strong endorsement for individuals planning an administrative career path to seek additional training in the field. The panel has developed a partial listing of leadership courses in Canada relevant to physicians (Table 2). Reading about leadership (including models, strategies, and practical guides) emerged as an important means of education, and a list of recommended reading was compiled by collating all of the suggestions (Table 3).

Other key factors identified in leadership development

During the process of discussing leadership models and skill sets, it was discovered that each panel member has had a very different leadership journey with both formal and informal education supporting and developing leadership skills. There are lessons in each of the leadership paths that were taken.[11] The panel also recognized a significant gender issue in academic EM and felt this was important to incorporate into the recommendations.

RECOMMENDATIONS

Leadership theme 1: Leadership preparation and training

Recommendation 1: The CAEP Academic Section should maintain an up-to-date listing of leadership education courses/programs on the CAEP website without specific endorsement of any particular program.

Recommendation 2: The CAEP Academic Section should develop a leadership mentorship framework and offer formal mentorships to any interested academic EM leader.

Among the panelists and expert interviewees, there were two MBA graduates but no MHA graduates. Opinions were mixed on the value of these types of formal programs and designations. All panelists agreed that in order to be an effective leader, one must extensively read the leadership literature to understand leadership styles to best develop one's own skills. It was felt that a working knowledge of management fundamentals, leadership skills, their language, and other perspectives were essential to interact effectively at a high level. We agreed that these skills may be assimilated more easily through formal programs. Many of the interviewees made suggestions with respect to useful books or publications, such as the Harvard Business Review (see Table 3). As far as formal educational courses, there was general agreement on the value of the CMA PMI courses, but no specific endorsement of a program, due to the large number and continued evolution of these programs. In planning programs for knowledge and skills development, it is

Table 3. Reading list for those aspiring to leadership roles as recommended by the 2015 Academic Symposium panelists

Author	Title/Series
Annis, Barbara	Gender Intelligence: Breakthrough Strategies for Increasing Diversity and Improving Your Bottom Line
Atchison, Tom	Followership: A Practical Guide to Aligning Leaders and Followers
Barash, David P., and Lipton, Judith E.	The Gender Gap: The Biology of Male-Female Differences
Blanchard, Ken, and Spencer, Johnson	The One Minute Manager
Bryson, John M.	Strategic Planning for Public and Nonprofit Organizations: A Guide to Strengthening and Sustaining Organizational Achievement
Bungay, Stephen	The Art of Action: How Leaders Close the Gaps between Plans, Actions, and Results
Cain, Susan	Quiet: The Power of Introverts in a World That Can't Stop Talking
Cameron, Kim	Positive Leadership: Strategies for Extraordinary Performance
Carnegie, Dale	How to Win Friends and Influence People
Carnegie, Dale	How to Win Friends and Influence People in the Digital Age
Christensen, Clayton M.	The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business
Collins, Jim	Good To Great: Why Some Companies Make the Leap...And Others Don't
Covey, Stephen	Seven Habits of Highly Effective People
Drucker, Peter F.	The Essential Drucker: The Best of Sixty Years of Peter Drucker's Essential Writings on Management (Collins Business Essentials)
Fisher, Roger; Ury, William L.; and Patton, Bruce	Getting to Yes: Negotiating Agreement Without Giving In
Gardner, Howard E.	Leading Minds: An Anatomy of Leadership
Gawande, Atul	The Checklist Manifesto: How to Get Things Right
Gladwell, Malcolm	Blink: The Power of Thinking Without Thinking
Goleman, Daniel; Boyatzis, Richard; and McKee, Annie	Primal Leadership, Learning to Lead with Emotional Intelligence
Harvard Business Review; Drucker, Peter D.; Christensen, Clayton M.; Goleman, Daniel; and Porter, Michael E.	HBR's 10 Must Reads Boxed Set (6 Books)
Heath, Chip, and Heath, Dan	Switch: How to Change Things When Change Is Hard
James, Aaron	Assholes: A Theory
Kotter, John P.	Leading Change
Kouzes, James M., and Posner, Barry Z.	The Truth about Leadership: The No-fads, Heart-of-the-Matter Facts You Need to Know
Kouzes, James M., and Posner, Barry Z.	The Leadership Challenge: How to Make Extraordinary Things Happen in Organizations
Kuhn, Thomas S., and Hacking I.	The Structure of Scientific Revolutions
Laloux, Frederic, and Wilber, Ken	Reinventing Organizations: A Guide to Creating Organizations Inspired by the Next Stage of Human Consciousness
Lencioni, Patrick	Death by Meeting: A Leadership Fable...About Solving the Most Painful Problem in Business
Maxwell, John	The 21 Irrefutable Laws of Leadership: Follow Them and People Will Follow You
Maxwell, John	Leadership 101: What Every Leader Needs to Know
Maxwell, John	Good Leaders Ask Great Questions: Your Foundation for Successful Leadership
Patterson, Kerry; Grenny, Joseph; and Switzler, Al	Crucial Confrontations: Tools for talking about broken promises, violated expectations, and bad behavior
Patterson, Kerry; Grenny, Joseph; McMillan, Ron; and Switzler, Al	Crucial Conversations: Tools for Talking When Stakes Are High
Pink, Daniel H.	Drive: The Surprising Truth About What Motivates Us
Rath, Tom, and Conchie, Barry	Strengths-Based Leadership
RoAne, Susan	How to Work a Room, 25th Anniversary Edition: The Ultimate Guide to Making Lasting Connections – In Person and Online
Rutledge, Tim, and Sinclair, Doug	Your Profession Needs You (Lessons in Medical Leadership)
Sandberg, Sheryl	Lean In: Women, Work and the Will To Lead

Table 3. (Continued)

Author	Title/Series
Senge, Peter M.	The Fifth Discipline: The Art & Practice of The Learning Organization
Sinek, Simon	Start with Why: How Great Leaders Inspire Everyone to Take Action
Sinek, Simon	Leaders Eat Last: Why Some Teams Pull Together and Others Don't
Sutton, Robert I.	The No Asshole Rule: Building a Civilized Workplace and Surviving One That Isn't
Templar, Richard	The Rules of Work, Expanded Edition: A Definitive Code for Personal Success
Waitkins, Michael D.	The First 90 Days: Proven Strategies for Getting Up to Speed Faster and Smarter, Updated and Expanded
Wall Street Journal	Management Series
Zimmerman, Brenda; Lindberg, Curt; and Plsek, Paul	Edgeware: Lessons from Complexity Science for Health Care Leaders

worth pointing out that leadership and management are distinct, although interrelated, disciplines. Not all good leaders are good managers, and vice versa. Whereas leadership is about vision, strategy, and inspiring people, management is about getting things done. Management skills include planning, organizing, setting SMART goals (goals that are specific, measurable, achievable, relevant, and time-bound), monitoring progress with indicators, and taking corrective actions when necessary. Management also involves managing resources, which often includes financial resources. Most physicians have little training in financial management, yet financial acumen is highly valuable to those who take on leadership roles that involve managing budgets. There are countless courses available to develop the various management skills.

The importance of getting involved in task forces or committees at an early stage of one's career was emphasized. Starting small was a focus mentioned by both the video interviewees and the panelists. This approach allows an aspiring leader to learn from senior leaders in a safe environment, demonstrate interest, and develop mentorship relationships. These opportunities often led to further, more formal roles. All of the panelists and interviewees emphasized the importance of mentorship, both formal and informal. Many of these experienced leaders only realized the importance of mentorship later in their careers and, upon reflection, recognized that they had informal mentors that they could have used more extensively in their leadership journey. Many universities now recommend formal mentors for all new faculty members and have a template to be signed off by the mentor and mentee to guide this process.

Leadership theme 2: Self-reflection/emotional intelligence

All of the panelists and external interviewees emphasized the importance of self-reflection and understanding their personal values, strengths, and weaknesses, as key criteria to being an effective leader. All had anecdotes of leaders with excellent academic credentials who failed at leadership due to poor communication skills and limited emotional intelligence. Many new leaders in medicine focus on the management aspects and neglect the leadership component of their roles.

A number of strategies are helpful to address this leadership theme, including focused reading, leadership workshops, feedback from mentors, personality assessment tools, 360-degree feedback, and executive coaching. Among other self-directed educational opportunities, (aspiring) academic leaders should consider coaching and formal mentorship as key components of their personal leadership development while they familiarize themselves with the relevant policies and procedures (e.g., promotion) at their universities (Recommendation 3).

Leadership theme 3: Academic leadership skills

Recommendation 3: Aspiring leaders should direct their careers by educating themselves about their own strengths and weaknesses, finding opportunities to learn/improve, learning about the promotion policies, as well as understanding how to navigate the decision-making policies affecting EM units/departments in their university. A local mentor may be an asset in these aspects of leadership development.

Recommendation 4: The CAEP Academic Section should forge a relationship and develop a subgroup of the AACEM/SAEM Chair Development Program to meet the needs of Canadian EM department chairs.

There are unique leadership skills required of an academic leader due to their extensive interaction with university structures and processes. Most EM leaders are familiar with hospital and health care system structures, while their knowledge of academic promotion criteria, faculty appointment requirements, and university decision-making, and funding structures may be limited. The panel felt that a specific recommendation for skills development and content knowledge was important to address this specific leadership competency.

Individuals interested in a career path in academic EM leadership must develop a good understanding of the university environment and the varied interactions that an academic program requires to flourish. Within a medical faculty, these include undergraduate and postgraduate medical education programs, research programs, as well as faculty governance structures, budgeting, and decision-making processes. Junior faculty should be encouraged to participate in key faculty committees in these various areas, because this exposure provides essential learning opportunities.

As an academic leader in EM, an individual will be responsible for representing the institution's program in key processes within the faculty and university. For example, an academic chair in EM must be knowledgeable in the specifics of the promotion and tenure review processes to facilitate appropriate mentoring and developmental steps for junior faculty, to guide development of documentation to support an individuals' promotion application, and to navigate the nuances of the formal review processes to provide the best chance for a successful outcome. A functional knowledge of the academic institution's policies, procedures, and guidelines is essential to success as an academic leader.

There is a variety of formal academic leadership development programs available. Many Canadian universities have formal leadership development programs available to their faculty (e.g., at the University of Alberta[12] and University of British Columbia[13]). The Association of Academic Chairs in Emergency Medicine (AACEM) offers a Chair Development Program.[14] The Association of American Medical Colleges Leadership Development Series offers a variety of educational options.[15] Informal academic mentoring opportunities are also worthwhile. Interactions with academic EM chairs and leaders offer chances to learn from others' experience. The AACEM offers an online forum for relevant discussions amongst members and an annual meeting highlighting a variety of relevant topics.[16]

The AACEM[14] (which is a concomitant committee of SAEM) is highly valued by its members and was recommended by Academic Symposium speakers who are active members. Therefore, the panel recommends the creation of a Canadian Section of Academic Chairs that would develop a liaison with the AACEM over time.

Leadership theme 4: Gender balance in academic EM leadership

Recommendation 5: The CAEP Academic Section should develop a plan to improve gender balance in academic EM leadership across Canada. This could begin with surveying members to document the numbers of women in junior and senior leadership positions and what they perceive as the barriers and facilitators to entering and continuing in leadership roles. Universities should ensure that women have ample opportunity to participate in leadership training.

The panelists and interviewees were concerned with respect to the limited number of female academic EM leaders. With the evolving demographic of EM physicians[17] and the changing work-life balance across generations,[18] leadership development in both sexes will be increasingly important. This issue, of course, is not unique to EM and exists in other leadership areas both inside and outside of medicine. Nonetheless, women have been shown to be as competent as men as business leaders, and to excel in many of the qualities required of a leader – notably taking initiative, displaying integrity, driving for change, and so forth.[19] Although progress has been made, growth in the numbers of women leaders at the higher ranks has been slow. The panel noted through their own experience that only a small portion of leadership positions in EM are held by women. For example, there are currently only two female department/division/section heads in academic EM in Canada. Now that many medical schools admit more women than men and there are increasing numbers of women in EM, it would be desirable to work towards a greater gender balance among EM leaders.

While a gender balance could be achieved in time as growing numbers of women reach the stage of becoming leaders, the panel was concerned that this may not necessarily follow. More women than men appear not to aspire to a leadership role. In part, this is because women in mid-career often feel caught in the sandwich generation, caring for children and for aging parents and therefore unable to commit the time that it takes to be a successful leader. In part, it may also be because of a perception that leadership involves typically male behaviors, and the lack of female role models forms a self-fulfilling prophecy and makes it hard to see themselves in the role. They may not have built the same networks of support that their male colleagues have, and there is a perception that hiring committees favor men.[20]

The panel felt that the leadership skill set would be enriched with a better gender balance. A challenge here is the paucity of female mentors to promote early development in young female leaders. Younger generations of EM physicians seeking greater work-life balance may serve to recalibrate this imbalance. The issue of gender balance must be addressed.

Advice for future EM leaders

Recommendation 6: The CAEP annual meeting should offer an annual leadership track covering pathways to leadership in EM and developing a strong national mentorship network. Topic selection should be tied to a needs assessment drawn from engaged leaders and leaders in development.

The final question for the panel and interviewees was on advice for future leaders. Universally, the advice was positive. Leadership is personally rewarding, and EM leaders can contribute very significantly to both improving health care systems and the advancement of knowledge. An annual track at the CAEP conference is recommended so that all new and experienced leaders can learn from their EM colleagues.

CONCLUSION

The panel is optimistic about the future of academic EM leadership in Canada and recognizes plenty of young talent. It is hoped that current leaders will endeavour to further inspire and mentor the next generation of EM leaders. The panel feels strongly that the recommendations provided herein will allow the EM community within Canada to reach its full potential. The Leadership Working Group of the CAEP Academic Section will be addressing each of these recommendations over the next few years and will present an update at its next Academic Leadership Symposium to be held in 2018.

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SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit https://vimeo.com/144135835

REFERENCES

1. Sherbino J, van Melle E, Bandiera G, et al. Education scholarship in emergency medicine part 1: innovating and improving teaching and learning. *CJEM* 2014;16(Suppl 1):S1-5.
2. Bandiera G, LeBlanc C, Regehr G, et al. Education scholarship in emergency medicine part 2: supporting and developing scholars. *CJEM* 2014;16(Suppl 1):S6-12.
3. Bhanji F, Cheng A, Frank JR, et al. Education scholarship in emergency medicine part 3: a 'how-to' guide. *CJEM* 2014;16(Suppl 1):S13-8.
4. Stiell IG, Artz JD, Perry J, et al. Executive summary of the CAEP 2014 Academic Symposium: "How to make research succeed in your department." *CJEM* 2015;17(3):328-33.
5. Calder LA, Abu-Laban RB, Artz JD, et al. CAEP 2014 Academic Symposium: "How to make research succeed in your department: Promoting excellence in Canadian emergency medicine resident research." *CJEM* 2015;17(5):591-9.
6. Perry JJ, Snider CE, Artz JD, et al. CAEP 2014 Academic Symposium: "How to make research succeed in your emergency department: how to develop and train career researchers in emergency medicine." *CJEM* 2015;17(3):334-43.
7. Vaillancourt C, Rowe BH, Artz JD, et al. CAEP 2014 Academic Symposium: "How to make research succeed in your department: How to fund your research program". *CJEM* 2015;17(4):453-61.
8. Thoma B, Poitras J, Penciner R, et al. Administration and leadership competencies: establishment of a national consensus for emergency medicine. *CJEM* 2015;17(2):107-14.
9. National Health Service. NHS Leadership Academy: programmes for every level of leadership responsibility. Available at: http://www.leadershipacademy.nhs.uk/programmes/.
10. Canadian College of Health Leaders. LEADS Collaborative: LEADS in a caring environmental framework. Available at: http://www.leadersforlife.ca/site/framework?nav=02.
11. Rutledge T, Sinclair D. Your profession needs you (lessons in medical leadership). *CJEM* 2013;15(2):67-72.
12. University of Alberta – Human Resource Services. Leadership development for chairs and chair-like academic leaders.

Available at: http://www.hrs.ualberta.ca/en/Learning/Programs/Leadership/LeadershipDevelopmentforChairs.aspx.

13. The University of British Columbia. Academic leadership development program. Available at: http://aldp.ubc.ca/.
14. Society of Academic Emergency Medicine. Chair development program. Available at: http://www.saem.org/education/chair-development-program.
15. Assocation of American Medical Colleges (AAMC). Leadership development series - member center. Available at: https://www.aamc.org/members/leadership/.
16. Society for Academic Emergency Medicine (SAEM). AACEM - Association of Academic Chairs of Emergency Medicine: Mission statement and membership. Available at: http://www.saem.org/membership/aacem.
17. National Physician Survey. 2013 Survey. Available at: http://nationalphysiciansurvey.ca/surveys/2013-survey/.
18. Twenge JM, Campbell SM, Hoffman BJ, et al. Generational differences in work values: leisure and extrinsic values increasing, social and intrinsic values decreasing. *J Manag* 2010;36(5):1117-42, doi:10.1177/0149206309352246.
19. Sherwin B. Why women are more effective leaders than men. *Business Insider*; 24 January 2014. Available at: http://www.businessinsider.com/study-women-are-better-leaders-2014-1.
20. Sherwin B. Why women vanish as they move up the career ladder. *Business Insider*; 27 January 2014. Available at: http://www.businessinsider.com/women-and-career-advancement-leadership-2014-1.

CAEP Academic Symposium Papers

CAEP 2015 Academic Symposium: Current State and Recommendations to Achieve Adequate and Sustainable Funding for Emergency Medicine Academic Units

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ABSTRACT

Objectives: To describe the current state of academic emergency medicine (EM) funding in Canada and develop recommendations to grow and establish sustainable funding.

Methods: A panel of eight leaders from different EM academic units was assembled. Using mixed methods (including a literature review, sharing of professional experiences, a survey of current EM academic heads, and data previously collected from an environmental scan), 10 recommendations were drafted and presented at an academic symposium. Attendee feedback was incorporated, and the second set of draft recommendations was further distributed to the Canadian Association Emergency Physicians (CAEP) Academic Section for additional comments before being finalized.

Results: Recommendations were developed around the funding challenges identified and solutions developed by academic EM university-based units across Canada. A strategic plan was seen as integral to achieving strong funding of an EM unit, especially when it aligned with departmental and institutional priorities. A business plan, although occasionally overlooked, was deemed an important component for planning and sustaining the academic mission. A number of recommendations surrounding philanthropy consisted of creating partnerships with existing foundations and engaging multiple stakeholders and communities. Synergy between academic and clinical EM departments was also viewed as an opportunity to ensure integration of common missions. Education and networking for current and future leaders were also viewed as invaluable to ensure that opportunities are optimized through strong leadership development and shared experiences to further the EM academic missions across the country.

Conclusions: These recommendations were designed to improve the financial circumstances for many Canadian EM units. There is a considerable wealth of resources that can contribute to financial stability for an academic unit, and an annual networking meeting and continuing education on these issues will facilitate more rapid implementation of these recommendations.

RÉSUMÉ

Objectifs: L'étude visait à décrire l'état actuel du financement des unités d'enseignement de la médecine d'urgence (MU) au Canada et à élaborer des recommandations sur l'accroissement et la durabilité du financement.

Méthode: Un groupe composé de huit chefs de file provenant de différentes unités d'enseignement de la MU a été formé. S'appuyant sur diverses méthodes de recherche (examen de la documentation, mise en commun d'expériences professionnelles, enquête menée parmi les directeurs actuels d'unité d'enseignement de la MU et étude de données provenant d'une analyse environnementale antérieure), le groupe a formulé 10 recommandations préliminaires qui ont été présentées au cours du symposium sur les affaires universitaires. Après avoir tenu compte des observations faites par les participants, le groupe a modifié en conséquence les recommandations préliminaires, qu'il a ensuite transmises à la section des affaires universitaires de l'Association canadienne des médecins d'urgence (ACMU) afin de recueillir d'autres observations avant d'en arriver à la rédaction définitive.

Résultats: L'exercice a donné lieu à la formulation de recommandations concernant les problèmes de financement

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qui avaient été cernés, et des unités d'enseignement de la MU rattachées à des universités de partout au Canada ont proposé des solutions. Le plan stratégique était perçu comme un élément faisant partie intégrante du bon financement des unités d'enseignement de la MU, tout particulièrement lorsque celui-ci est aligné sur les priorités des départements et des établissements. Par ailleurs, le plan d'activités, parfois négligé, était considéré comme un outil important de la planification et de la durabilité de la mission d'enseignement. Un certain nombre de recommandations ayant trait à la philanthropie consistait en l'établissement de partenariats avec des fondations existantes et en l'engagement d'un grand nombre d'intervenants et de communautés. La synergie entre les départements d'enseignement théorique et d'enseignement clinique de la MU était aussi perçue comme un facteur propice à l'intégration de leurs missions communes. Enfin, la formation et le réseautage aux yeux des chefs de file actuels et futurs étaient aussi considérés comme des éléments cruciaux d'optimisation des possibilités par l'établissement d'un pouvoir d'influence bien assis et par la mise en commun d'expériences afin de faire progresser encore davantage la mission de l'enseignement de la MU partout au pays.

Conclusions: L'élaboration de ces recommandations visait à améliorer la situation financière de nombreuses unités d'enseignement de la MU au Canada. Les ressources susceptibles de contribuer à la stabilité financière des unités d'enseignement ne manquent pas, et la tenue d'une réunion annuelle de réseautage ainsi que la formation continue sur les problèmes décrits faciliteront la mise en œuvre rapide de ces recommandations.

Keywords: emergency medicine, funding

INTRODUCTION

It is difficult to define an amount of funding that is appropriate for all academic units. It could be argued that all emergency medicine (EM) academic departments/divisions/sections (collectively referred to as "units") require more resources to offer ideal training and research environments. Counterarguments focus on the overall economy, societal priorities, and underfunding of all academia in general. EM is one of the newest academic disciplines and still struggles for full recognition of its contributions to the health care system and for equitable support within faculties of medicine. The observation of the academic funding disparities across Canada[1] argues for discussion, justification, and the provision of increased funding for EM in many, if not all medical schools. The level of funding must be aligned with the mission and goals of the medical school and the regional health authority, with the ultimate objective being the enhancement of emergency care delivery and patient outcomes.

Academic funding provides the support for the three key missions of any discipline in a medical school: undergraduate education, postgraduate education, and research. Although it is atypical to use the term "unit" for the EM academic department, this is being used pragmatically to reflect that not all medical schools have a formal departmental or divisional structure for EM.[1] The effective delivery of an academic mission requires that an EM academic unit have administrative support, infrastructure, and focused medical leadership, all of which require funding for individual staff and faculty positions. Recognition of the contributions that EM academic units provide to the training of emergency physicians, as well as to all other future physicians, is relevant to educational programs.

Herein, the current state of EM academic funding in Canada is summarized, and recommendations for its improvement are provided. The objectives of this panel were to: 1) report on funding for academic EM units across Canada; 2) compare academic unit support with expectations in the areas of administration, undergraduate education, postgraduate education, and research; and 3) recommend strategies to grow and establish sustainable funding across Canadian university EM units.

METHODOLOGY

Funding panel, data collection, and recommendations

A panel of eight leaders from EM was assembled and included representatives from across Canada. Five formal teleconferences were held over nine months leading up to the CAEP 2015 Academic Symposium[2-8] on Leadership. This panel reviewed the literature, drew from professional experience, conducted a survey of current EM academic heads, and reviewed the data from an environmental scan. Discussions culminated in five themes that facilitated the formulation of 10 recommendations, which were presented at the Academic Leadership Symposium on May 30, 2015, in Edmonton, Alberta. The 80 attendees, which included EM leaders, researchers, educators, administrators, attending clinicians, residents, and medical students,

Table 1. MeSH headings for literature search of MEDLINE and EMbase.

Search Number	Search	Result
1	(emergency physician* or emergency department* or emergency medicine).mp. [mp = title, original title, name of substance word, subject word heading, keyword heading word, protocol, supplementary concept word, rare disease supplementary concept word, unique identifier]	68,936
2	limit 1 to (English language and full text)	16,416
3	(funding or payment models or payment mechanisms or fee models or financial incentives or remuneration or fee for service or economic models or salaries).mp. [mp = title, original title, name of substance word, subject word heading, keyword heading word, protocol, supplementary concept word, rare disease supplementary concept word, unique identifier]	58,480
4	limit 3 to (English language and full text)	13,116
5	1 and 2 and 3 and 4	146

provided feedback as the recommendations were presented. The feedback was subsequently incorporated into revised recommendations that were distributed to the CAEP Academic Section electronically for final comment.

For the literature review, the search strategy combined predefined MeSH headings (Table 1) and searched MEDLINE and Embase using Ovid from 1946 to April 28, 2015 (with limitations set to English language and full text). An independent review by two authors agreed that none of the 146 identified articles were directly relevant to the topic of interest. Canadian Institute for Health Information (CIHI), Statistics Canada, and the Canadian Health Service Research Foundation (now called the Canadian Foundation for Health Improvement [CFHI]) websites were searched for academic funding information, but no such information was available.

Academic heads were surveyed about the qualitative issues related to current funding in academic units. This information complemented a broad environmental scan that addressed administration, education, research, and funding. For the qualitative issues, a 40-question survey specific to academic funding was developed, pilot tested, and refined by expert feedback. It asked about current unit funding sources, support for didactic and bedside teaching, support for research and administrative requirements, remuneration, philanthropic resources, funding challenges, and advice for funding the academic mission (Appendix 1). Recognizing the sensitivity of financial information, it was specified that none of the responses would be attributed to an individual or program. The electronic survey was hosted on FluidSurveys (Fluidware Corporation, Ottawa, ON). Each of the 17 heads of EM academic units was contacted electronically by a panel member to encourage participation. Data were collected over a one-month period from mid-April 2015 to mid-May 2015. Comments were collated for themes. Data were analyzed in Microsoft Excel 2013 (Microsoft Corp., Redmond, WA), and descriptive statistics were reported.

The environmental scan of Canadian EM units had been previously conducted and was an 84-question survey. The panel was allowed access to the blinded and collated data. The survey had been completed by electronically sending it to the heads (or equivalent) of each academic EM unit at the 17 Canadian medical schools. A follow-up call by the survey administrators ensured that questions were answered uniformly. The responses were recorded into a Microsoft Excel 2013 spreadsheet for analysis. The investigator (IS) validated the site data with each head (or equivalent) with a follow-up phone call to review each response. Descriptive statistics including proportions, means, medians, and ranges were calculated.

Overall academic unit leadership and administrative support

The majority of the academic heads (16/17) responded to the survey. The funding for the academic mission's leadership and administrative support comes from both internal and many external sources. Of the 16 respondents, all but one indicated that they had university-derived funds (Table 2). Eleven academic units cited research grants as a source of funds. The Ministry of Health (or Education Ministry), hospitals, physician groups, and alternative funding plans (AFPs) funded six of respondent academic units. Other sources of funding included: province-specific sources, philanthropic donations, and offshore resident fees.

Over half of respondents (9/16) reported that physicians on a fee for service or a mixed model contributed

a portion of their clinical earnings in order to support the academic mission of their EM unit. This was accomplished through mandatory percentage of earnings (e.g., 15%, 5%, 2%, $5 per hour, or $2 per hour), or through identified funds that are matched by the Ministry of Health.

Philanthropic sources appeared to be underused and were inconsistently sought to support the academic mission in half of respondents' units. The eight EM units that reported on philanthropic support identified their primary donor groups (including physicians, industry, hospital grants, endowments, patients, and pharmaceutical education grants), where the average gift ranged from $500 (commonly from physicians) to $100,000 (from private donors and endowment funds). Reasons for not using philanthropic resources included the effort required, difficulty in attracting EM donations, and failure to consider the option.

Upon the review of this manuscript, attention was brought to the roles of free open access medical education (FOAMed), social media, and novel teaching methods in the academic mission. The growth in these media is undeniable, and their effects on education and research are documented.[9-12] These freely available tools may be leveraged to reduce the costs of knowledge sharing and may potentially be a beneficial marketing tool to prospective philanthropic donors on the value of emergency medicine.

Table 2. Sources of current funding to support the academic mission for Canadian EM units.

Funding Source	*n* (*n* = 16)	%
University (via Faculty of Medicine or otherwise)	15	94
Research Grants	11	69
Ministry of Health or Education Ministry	7	44
Hospital	6	38
Physician Group	6	38
Other	6	38
AFP	4	25

Education funding

Respondents reported that bedside on-shift teaching of medical students and residents was financially supported in 10 and 12 of their centers, respectively. Didactic teaching to residents or medical students was also financially supported in 14/16 of respondents' units. The respondents described how financial support for didactic and bedside teaching was rewarded and included a points-based compensation system, honorarium (stipend), hourly fee, shift allowance, and previous contract stipulation. Over a third (6/16) considered the degree of financial support that remunerates educators (for teaching) in Canadian EM units to be inadequate.

Suggestions for the most appropriate funding for undergraduate and postgraduate education leadership and infrastructure support differed between respondents and indicated that appropriate funding depended on class size, number of rotations, number of electives, and other expectations (i.e., simulation or undergraduate medical education research). Respondent recommendations for how to appropriately support research faculty included grants, awards, medical school contributions, hospital foundation support, research institutes, and AFPs. Specific staffing recommendations varied by quantity and type of position (e.g., research director, research administrative support, and funded research faculty positions). Strategies suggested to obtain support for academic funding included negotiating with universities, government policy, arguing to better meet accreditation standards, and quantifying unit funding needs in alignment with specific and especially increasing demands. Opinions were evenly split on whether there was adequate support for program directors, clerkship leads, and simulation coordinators (Table 3).

Research funding

Many (13/16) reported that research had internal funding sources, which included grants, awards, practice plans,

Table 3. Opinions on whether clinician educators with leadership roles receive adequate financial support.

Clinician educators with leadership roles	Adequate financial support *n* (%)	Do not have adequate financial support *n* (%)	Not applicable *n* (%)	%
Program directors (*n* = 16)	9 (56)	7 (44)	0	94
Clerkship leads (*n* = 15)	6 (60)	6 (40)	0	38
Simulation coordinators (*n* = 16)	4 (25)	11 (69)	1 (6)	25

volunteered group clinical earnings, AFPs, university support, or unit-based research, education, and innovation funds.

A majority of respondents (13/16) considered the degree of financial support for research activities in their units to be inadequate. Similarly, 13/16 considered it important to have researchers that are university funded (without any external salary support). Suggestions to achieve improved salary support for researchers included having successful researchers (and research units), providing awards for researchers, and emphasizing that a unit of EM may have an unproportioned allocation (i.e., that start-up funds are often required to support a new and emerging research program). Alternatively, recommendations to achieve appropriate funding for EM research programs outside of salary support included developing endowments, philanthropy, matched funding, improved AFPs, and partnering with industry, which was similar to a very recently published Canadian academic research funding analysis.[8]

CHALLENGES TO ACADEMIC FUNDING

The funding survey explored opinions on the main challenges faced in obtaining appropriate funding for the academic mission. As a surrogate, "appropriate" was defined as an adequate level of financial support for the expected activities related to education, research, and other extra-clinical endeavors necessary to realize the vision and goals of the EM academic unit. Four main challenges emerged in maintaining the academic budget: 1) budget constraints with inflating costs and growing programs; 2) AFPs having low clinical/academic split or shrinking in size; 3) physicians not being a part of an AFP; and 4) lack of support from the government or Faculty of Medicine. To address these concerns, recommendations were formulated under themes focused on approaches to tackle these barriers to achieving optimal funding. The five themes included planning, philanthropic support, alignment of academic and clinical activities with academic mission, development of a leadership network, and leadership development.

RECOMMENDATIONS

Funding theme 1: Planning

Recommendation 1: Academic units should develop a strategic plan, including a vision, a mission, and goals, ideally aligning with university, hospital, and ministerial mandates.

Recommendation 2: Strategic plans should address both the clinical and academic missions and be interwoven in a way that optimizes synergy and mutual benefit.

Recommendation 3: Academic units should develop a business plan (as part of the strategic plan) that clarifies: 1) the financial resources needed to achieve the mission and goals; 2) the sources of income; and 3) effective spending of the resources.

Although seemingly a fundamental step in any academic EM unit, the panel felt that the development of a strategic plan was an extremely important but often overlooked step. The strategic plan must balance the needs of undergraduate education, postgraduate education, and research (and innovation). There is not a single roadmap that will accommodate all EM units. Consideration of the local funding environment is the first step in developing a strategic plan. Finding the balance between a mission that will excite, engage, and focus the unit, yet leave the door open for new opportunities, is challenging, and therefore the plan should be revisited on a regular basis.

Strategic plans should consider both the clinical and academic units for mutual benefit. Strategic plans are at risk if they are not seen as adding direct value to patients and the health delivery system. The development of most or all extra-clinical portfolios and activities should be relevant to the clinical and operational challenges of the clinical emergency departments and the broader emergency health delivery systems. Depending on the local environment, faculty members may have combined or separately-defined roles, as primarily clinical (usually associated with teaching responsibilities) or funded academics. A willingness from the faculty to actively support the strategic initiatives is necessary, since all are critical to the overall success of the academic unit.

A well-defined business plan clarifies the financial picture across the academic unit and is fundamental to the success of the academic mission. This potentially challenging exercise may often be based on incomplete data and best estimates, but it should demonstrate a necessary attention to specifics to ensure that any funder or potential funder can fully understand the reality and the gaps. Engaging a professional with a business background is essential to developing a business plan (and its budget) that will meet the scrutiny of stakeholders.

Funding theme 2: Philanthropic support

Recommendation 4: Philanthropic support for the academic mission of the EM unit should be pursued primarily through the current hospital and/or university fund development programs.
Recommendation 5: Clinician involvement in philanthropy, as spokespersons or liaisons with potential individual or group donors, should be encouraged and incentivized in both clinical and academic affairs as a prerequisite to effective partnering with fund development offices in hospitals and at the university.
Recommendation 6: Partners, including graduating residents, grateful patients, or wealthy givers, should be engaged (or invited) to share their vision for EM through direct feedback, project funding choices, leadership opportunities, and volunteering.

Philanthropy is often a part of the funding for the academic units in other disciplines, but EM is rarely engaged in garnering philanthropic support for both the clinical and non-clinical mission of the academic unit. Without this tradition of working with donors and institutional foundations, EM is often marginalized when it comes to philanthropy. Fund development offices in both university and hospital settings are likely to see this as untapped potential. Once they understand the many heart-touching stories that emanate from all emergency departments, there will be a willingness to support fundraising efforts for EM activities. Strengthening community engagement and the relationships with potential donors is hard work but can bring great rewards.

The involvement of clinicians in academics will facilitate effective partnering with philanthropic partners. Clinical emergency departments with a successful track record in obtaining philanthropic support have noted that fund development offices are more inclined to support the academic mission when their colleagues are visible and highly engaged in hospital and university activities. The larger the footprint of the emergency units on committees and other activities, the more likely that key stakeholders will draw on EM wisdom in planning fundraising activities, and hence support EM-specific initiatives. Specifically, fund development offices who see EM faculty as engaged and supported are more likely to foster meetings and interactions with donors who may be inclined to support EM-related projects.

Identifying partners with overlapping visions can expand fundraising opportunities. The pool of individuals who have benefited from EM academia and clinical care is large and often overlooked. Providing these potential donors with visible opportunities to learn about a unit's academic activity through high-quality media, and providing them with the opportunity to make earmarked donations, can be invaluable. Branding a unit's philanthropic resource can be linked to campaigns, fundraising activities, or everyday materials encountered in the emergency departments—for example, scrubs—to stimulate interest in potential donors.

Funding theme 3: Alignment of clinical activities and academic mission

Recommendation 7: Academic EM units should develop guiding financial policies that address: 1) the clinical group expectations for donated clinical earnings to the academic mission; 2) the expectations of the relative value of academic time to clinical remuneration.
Recommendation 8: When clinical income is sought to support the academic mission, academic activities should be aligned to the clinical department, considering continuing medical education, faculty development, and research.

Policies around the support of the academic units by donated clinical earnings and the expectations of academic times must be established. While often contentious and dictated by existing agreements with health ministries, universities, and institutions, most emergency physicians would agree that there are tangible benefits to working in an academic setting. These include resident support during clinical work and high-quality educational opportunities, to name a few. While not a universal phenomenon, most Canadian academic units draw on clinical earnings to some degree, to support the academic mission of the units. Coming to a consensus on this strategy and agreeing on how clinical earnings will support academics (i.e., salary support or project support) should be determined prior to development of a comprehensive business plan.

In order for clinical earnings to support the academic mission, it must be clear how these activities achieve both direct and indirect value to the members of the unit, including those who have a largely clinical focus to their practice. Funding these academic efforts may be essential to launch careers, to provide all unit members with academic opportunities, to develop skills

(e.g., bedside teaching), and to learn more about global health initiatives. Communicating the gamut of extra-clinical activities that the academic program supports, making opportunities for involvement by faculty through workshops, and showcasing events, like a research day, are essential to demonstrating this value.

Funding theme 4: Academic EM leadership networking

Recommendation 9: Canadian academic unit heads should meet on an annual basis to share, network, and grow.

There is a real opportunity for growth of EM, if the Canadian EM academic leaders met annually to share challenges and solutions. The Academy of Academic Chairs of EM is a network of department chairs, largely US-based, that participate in an email list-serv and meet annually at a two- to three-day retreat to share wisdom on a wide range of leadership topics. Vice-chairs or likely successors are also encouraged to attend as part of their leadership development activities. The funding panel views this type of forum as highly beneficial, despite the US health care focus.

Funding theme 5: Leadership development

Recommendation 10: The CAEP annual meeting should offer a leadership track covering key funding-related topics for both academic and hospital leaders that could include negotiation (with the university, hospital, and ministry), philanthropy, practice plans, entrepreneurship, etc. Topic selection should be tied to a needs assessment drawn from engaged leaders and leaders in development.

The CAEP annual conference is an ideal opportunity for the formal education of EM leaders on funding in domains of negotiation, philanthropy, and other opportunities. Leadership development, an area that has been addressed by the Canadian Medical Association (CMA), may be lacking in specific EM-oriented requirements. While leadership development in health care is likely to be similar among multiple disciplines, the nature of EM in society and health care institutions (including hospitals) poses unique challenges and opportunities. With this in mind, and potentially in conjunction with CMA support, an annual leadership track at the CAEP meeting was strongly endorsed.

NEXT STEPS

Support for the academic EM missions across Canada are varied and largely dictated through the local environments. There are tremendous opportunities in sharing and learning from these varied approaches. This panel strongly feels that the development of a long-term plan, leveraging the available resources, and partnerships will improve the financial circumstances for many Canadian EM units. In this exercise, it was also discovered that there is a wealth of untapped knowledge from colleagues, and that annual meetings and continuing education on these issues will be important for the future success of academic EM. The Leadership Working Group of the CAEP Academic Section is already in discussions with the CAEP 2016 Conference Organizers and Conference Chairs for the inclusion of a Leadership Track. A consultation service to engage single academic units in more in specific discussions with successful academic leaders is now established through CAEP. Leaders at each academic unit may find useful ideas in the three Leadership reports with recommendations (Leadership, Governance and Administration and Funding[13,14]). Finally, the working group will continue to discuss how it can best facilitate the recommendations and perhaps bring new information and insights at an update at its next Academic Leadership Symposium, to be held in 2018.

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SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit http://dx.doi.org/10.1017/cem.2016.16

REFERENCES

1. Stiell IG. Personal Communication - Academic EM Environmental Scan; 2015.
2. Sherbino J, Van Melle E, Bandiera G, et al. Education scholarship in emergency medicine part 1: innovating and improving teaching and learning. *CJEM* 2014;16(Suppl 1): S1-5.
3. Bandiera G, Leblanc C, Regehr G, et al. Education scholarship in emergency medicine part 2: supporting and developing scholars. *CJEM* 2014;16(Suppl 1):S6-12.

4. Bhanji F, Cheng A, Frank JR, et al. Education scholarship in emergency medicine part 3: a "how-to" guide. *CJEM* 2014;16(Suppl 1):S13-8.
5. Stiell IG, Artz JD, Perry J, et al. Executive summary of the CAEP 2014 Academic Symposium: How to make research succeed in your department. *CJEM* 2015;17(3):328-33.
6. Calder LA, Abu-Laban RB, Artz JD, et al. CAEP 2014 Academic Symposium: "How to make research succeed in your department: Promoting excellence in Canadian emergency medicine resident research". *CJEM* 2015;17(5):591-9.
7. Perry JJ, Snider CE, Artz JD, et al. CAEP 2014 Academic Symposium: "How to make research succeed in your emergency department: How to develop and train career researchers in emergency medicine". *CJEM* 2015;17(3):334-43.
8. Vaillancourt C, Rowe BH, Artz JD, et al. CAEP 2014 Academic symposium: "How to make research succeed in your department: How to fund your research program". *CJEM* 2015;17(4):453-61.
9. Purdy E, Thoma B, Bednarczyk J, et al. The use of free online educational resources by Canadian emergency medicine residents and program directors. *CJEM* 2015; 17(2):101-6.
10. Hayes BD, Kobner S, Trueger NS, et al. Social media in the emergency medicine residency curriculum: social media responses to the residents' perspective article. *Ann Emerg Med* 2015;65(5):573-83.
11. Sherbino J, Frank JR. @SirBill: the power of social media to transform medical education. *Postgrad Med J* 2014;90 (1068):545-6.
12. Thoma B, Joshi N, Trueger NS, et al. Five strategies to effectively use online resources in emergency medicine. *Ann Emerg Med* 2014;64(4):392-5.
13. Sinclair D, Worthington JR, Joubert G, et al. CAEP 2015 Academic Symposium: Leadership within the EM Academic Community and Beyond. *CJEM* 2016; doi:10.1017/cem.2016.9.
14. Petrie D, Chopra A, Chochinov A, et al. CAEP 2015 Academic Symposium: Recommendations for University Governance and Administration for Emergency Medicine. *CJEM* 2016; doi:10.1017/cem.2016.22.

CAEP Academic Symposium Papers

CAEP 2015 Academic Symposium: Recommendations for University Governance and Administration for Emergency Medicine

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ABSTRACT

Objective: 1) To identify the strengths and challenges of governance structures in academic emergency medicine (EM), and 2) to make recommendations on principles and approaches that may guide improvements.

Methods: Over the course of 9 months, eight established EM leaders met by teleconference, reviewed the literature, and discussed their findings and experiences to arrive at recommendations on governance in academic units of EM. The results and recommendations were presented at the annual Canadian Association of Emergency Physicians (CAEP) Academic Symposium, where attendees provided feedback. The updated recommendations were subsequently distributed to the CAEP Academic Section for further input, and the final recommendations were decided by consensus.

Results: The panel identified four governance areas of interest: 1) the elements of governance; 2) the relationships between emergency physicians and academic units of EM, and between the academic units of EM and faculty of medicine; 3) current status of governance in Canadian academic units of EM; and 4) essential elements of good governance. Six recommendations were developed around three themes, including 1) the importance of good governance; 2) the purposes of an academic unit of EM; and 3) essential elements for better governance for academic units of EM. Recommendations included identifying the importance of good governance, recognizing the need to adapt to the different models depending on the local environment; seeking full departmental status, provided it is mutually beneficial to EM and the faculty of medicine (and health authority); using a consultation service to learn from the experience of other academic units of EM; and establishing an annual forum for EM leaders.

Conclusion: Although governance of academic EM is complex, there are ways to iteratively improve the mission of academic units of EM: providing exceptional patient care through research and education. Although there is no one-size-fits-all guide, there are practical recommended steps for academic units of EM to consider.

RÉSUMÉ

Objectifs: 1) L'étude visait à cerner les forces et les faiblesses des structures de gouvernance dans les unités d'enseignement de la médecine d'urgence (MU) et 2) à formuler des recommandations sur les principes et les voies susceptibles de guider les améliorations.

Méthode: Sur une période de 9 mois, huit chefs de file bien établis en MU ont tenu des réunions par téléconférence, ont examiné la documentation et ont discuté des résultats de la recherche et de leurs expériences pour en arriver à l'élaboration de recommandations sur la gouvernance des unités d'enseignement de la MU. Les résultats et les recommandations ont été présentés au cours du symposium annuel sur les affaires universitaires de l'Association canadienne des médecins d'urgence (ACMU), après quoi les participants ont fait part de leurs observations. Les recommandations ont été modifiées en conséquence, puis transmises à la section des affaires universitaires de l'ACMU pour la collecte d'autres observations. Enfin, les recommandations définitives ont été le fruit d'un consensus.

Résultats: Le groupe a dégagé quatre grands champs d'intérêt relatifs à la gouvernance : 1) les éléments de la gouvernance; 2) les relations entre les médecins d'urgence et les unités d'enseignement de la MU, ainsi qu'entre ces unités et les facultés de médecine; 3) l'état actuel de la gouvernance

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des unités d'enseignement de la MU au Canada; et 4) les éléments essentiels d'une bonne gouvernance. L'exercice a donné lieu à la formulation de six recommandations articulées autour de trois thèmes, notamment : 1) l'importance d'une bonne gouvernance; 2) les buts visés par les unités d'enseignement de la MU; et 3) les éléments essentiels à une meilleure gouvernance de ces unités. Les recommandations portaient principalement sur l'importance d'une bonne gouvernance, aussi sur la nécessité d'adaptation aux différents modèles selon le milieu local; sur l'obtention du titre de département à part entière, pourvu que cette reconnaissance soit profitable aux unités d'enseignement de la MU et aux facultés de médecine (ainsi qu'aux autorités sanitaires); sur le recours à des services de consultation pour tirer des leçons de l'expérience d'autres unités d'enseignement de la MU et sur la tenue d'une rencontre annuelle des chefs de file en MU.

Conclusion: Certes, la gouvernance des unités d'enseignement de la MU est complexe, mais il est possible d'améliorer par réitération la mission de ces unités, soit la prestation de soins exceptionnels aux patients par la recherche et par la formation. Bien qu'il n'existe pas de panacée, plusieurs voies pratiques, recommandées s'offrent aux unités d'enseignement de la MU.

Keywords: emergency medicine administration, governance, leadership

INTRODUCTION

Along with funding and leadership, governance has an important impact on the performance of an academic department, division, or section of emergency medicine (EM). Governance structures and processes are a means to an end. They are not an end unto themselves. The purpose of an EM academic structure is to facilitate and enable excellence in the mission of academic medicine, including research, education, and, ultimately, patient care.[1] Different academic units of EM will put different emphasis on each element of the mission. (For the purposes of this article, departments, divisions, and sections of EM will be referred to collectively as *academic units* of EM.) Good governance facilitates meeting the strategic goals and fiduciary responsibilities of the academic units of EM, and creating the ability to respond to system challenges and opportunities[2] in an era of rapid change in academic medicine and health system reform.[3]

While there is an established matrix of governing bodies, institutions, and regulations with which an academic unit of EM must align and integrate, this paper will focus on two practical levels of governance: 1) the relationship between individual emergency physicians and their academic unit of EM; and 2) the relationship between the academic unit of EM and its parent faculty of medicine or academic health centre. Given that there is a significant cause-and-effect relationship between funding streams, local politics, and health systems organization, it is no surprise that there is a wide variation of governance structures in academic EM.

Table 1. Status of the 17 academic units of EM within the Canadian faculties of medicine

Academic units of EM status	*n* (%)
Full department	8 (47)
Division/section	4 (23)
Joint department with family medicine	3 (18)
No status	2 (12)

This paper aims to make sense of the strengths and challenges of the current governance structures, and make recommendations on principles and general approaches that may guide improvements in governance at both levels. Specific how-to steps will require significant context-dependent analysis, consultation, and understanding of specific university (or health authority models), and are beyond the scope of these recommendations. It is clear that no one size will fit all (Table 1).

METHODOLOGY

Expert panel and literature review on governance

Eight established medical leaders from across Canada were identified for their contributions to the EM community and were asked to form a governance panel. The panel met by teleconference four times and was supported by the Academic Section of the Canadian Association of Emergency Physicians (CAEP). All members reviewed the governance literature and discussed individual experiences to identify 1) the elements of governance; 2) the relationships between emergency physicians and academic units of EM, and between the academic unit of EM and faculty of medicine; 3) current status of governance in Canadian academic units of EM; and 4) essential elements of good governance. This discussion culminated into six

recommendations around three themes: 1) the importance of good governance; 2) the purposes of an academic unit of EM; and 3) essential elements for better governance for academic units of EM. The panel presented the findings at the CAEP Academic Symposium[4-10] held in Edmonton, Alberta, on May 30, 2015, to about 80 attendees, who were predominately emergency physicians with interests in governance, administration, and leadership. Their feedback, as well as comments gathered subsequent to the electronic distribution of the recommendations to the CAEP Academic Section, were discussed by the panel, and the recommendations were updated by panel consensus.

What is governance? How does it relate to funding and leadership in academic EM?

As soon as there are more than two people making a decision, especially if there is money involved, then there is a governance challenge. While the Institute on Governance (http://www.iog.ca) acknowledges that the complexity of governance is difficult to capture in a simple definition, they did stipulate that "governance determines who has power, who makes decisions, how other players make their voices heard, and how account is rendered."[11] In the context of academic EM, the academic unit becomes essential in organizational decision-making and accountability. Although effective governance models contribute to organizational performance, often "we don't think about or debate governing; we just do it." [2] In its simplest concept, the purpose of governance in academic units is to facilitate engagement (in the academic mission) and trust (in the decision-making by leadership) within the faculty.

The mission of academic medicine is supported by three foundational pillars: governance, leadership, and funding. For the purpose of this analysis and accompanying recommendations, governance has been differentiated from leadership development and funding, with respect to its influence on the academic unit's performance and effectiveness. In practice, it is difficult to separate these interdependent relationships. For example, local traditional funding streams have likely had a significant impact on an academic unit's decision-making around resource allocations, while institutional leadership precedence has shaped the evolution of governance structures and processes. Nonetheless, the three elements together provide the wherewithal to optimally improve the performance of the academic unit of EM.

Two separate, but interdependent levels of governance

For these recommendations, two levels of governance were considered. The first level governs the relationship between individual physicians and the academic unit of EM. The second governs the relationship between the academic unit of EM and the faculty of medicine. It is important to recognize that good governance of internal affairs (i.e., decision-making around the academic unit structures and processes) does not require independent academic departmental status at the university level. Conversely, full academic departmental status does not guarantee good governance over the practical day-to-day performance and decision-making of the department. Excellence in academic performance may be achieved by an academic unit of EM operating from any position (Figure 1). The obstacles to achieving full independent academic departmental status may differ from those that affect internal performance regardless of the academic unit governance model.

As individual academic units of EM evaluate their own status (see Appendix 1: Self-evaluation questions) and identify in which quadrant they fit (see Appendix 2: Key aspects list for good internal governance), more customized strategies and advice can be generated to improve governance in service of academic excellence. The how-to steps from C→A will be different from D→B, which, in turn, will be different from B→A (see Figure 1).

Governance theme 1: Governance is important to the academic units of EM

Governance is important because it determines who makes what decision, and how these decisions are made.[11]

		Status of EM within the university faculty of medicine	
		Full academic department	Division, section, or other
Governance of internal affairs	Good	A	B
	Challenged	C	D

Figure 1. The levels of governance and their influence on full EM departments or divisions/sections/units of EM.

In an effort to give governance some practical relevance, it has been reframed as an aspect of leadership.[2] This framework should be kept in mind as this question is asked: Do the structures and processes of the governance of academic EM support the ability of the academic unit of EM to make fiduciary, strategic, and generative (adaptive) decisions in the service of the academic mission?

Fiduciary decision-making is the stewardship of tangible assets in alignment with financial and legal obligations, accountability to senior organizations (i.e., payers, partners, stakeholders), and accountability to individual members and constituent interests. Strategic decision-making involves setting the academic units' course and priorities (i.e., mission, vision, values), and deploying resources appropriately. Generative (or adaptive) decision-making refers to the role of framing problems and making sense of ambiguous situations, as well as ensuring that academic units can evolve, adapt, and respond to uncertainty and changing environments.[2]

As with the codification of corporate memory, group values, and organizational culture, the governance structure and policies become the user's manual for the chair (or chief) of the academic units of EM, and its other leaders. If this user's manual is well thought out and robustly structured, this can create the conditions of trust and engagement necessary for the academic unit. If this is not the case, the chair (with or without a leadership team) must create or improve those aspects of internal governance that do not align with the mission and values.

In a recent article entitled, "Predictors of Workplace Satisfaction for U.S. Medical School Faculty in an Era of Change and Challenge,"[12] it was found that departmental (and medical school) organization, governance, and transparency were highly consistent predictors of faculty satisfaction across all surveyed schools and models. The authors suggested "that a culture characterized by open communication, consistency in decision-making, and opportunities for faculty input contributes to faculty perceptions of their worth to their institution and of institutional equity, all of which foster satisfaction."[12]

Along with leadership and funding, governance can have an important impact on the academic unit of EM policy development, decision-making, and effectiveness. Governance must not be taken for granted.

Recommendation 1: There should be a deliberate approach to defining, implementing, and reviewing governance structures, processes, and desired outcomes.

Governance theme 2: The purpose of the academic unit of EM

Because governance is a means to an end, the goals of an academic unit of EM must be defined before clear recommendations can be made around the best governance model to achieve the desired outcomes. For the sake of this discussion, the vision of the CAEP Academic Section of EM will be used to articulate that purpose. The vision of the Academic Section is to promote high-quality emergency patient care by conducting world-leading education and research in EM (caep.ca/AcademicSectionOverview). By extension and for the development of recommendations, the *raison d'être* of any given academic unit of EM is to improve patient outcomes through better education and impactful research (Figure 2). This aligns with the arguments made by the "One future, three missions" white paper on the future of Academic Health Science Networks in Canada.[1] As academic units within those academic health science networks, EM must have aligned roles and responsibilities.

That is not to say that all academic units of EM across the country will, or should, put equal emphasis on the three missions (see Figure 2). In some medical schools, the chair of the academic unit of EM is separated from any direct patient care oversight or

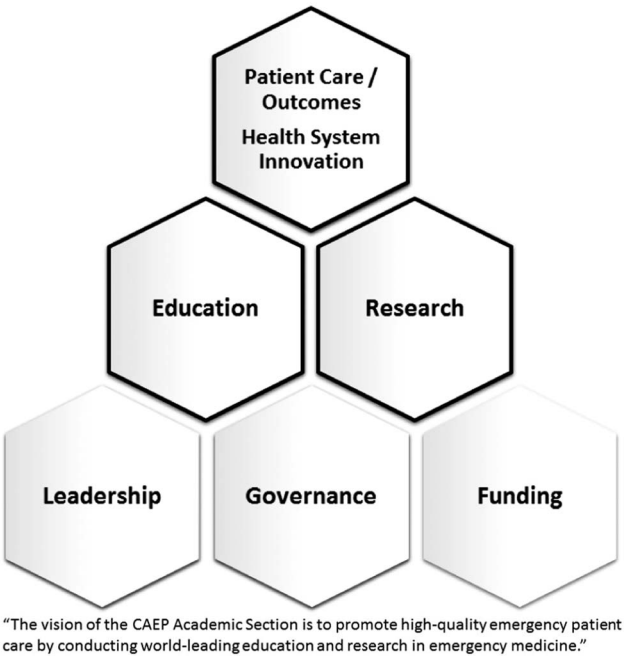

Figure 2. The relationship between the tripartite mission of academic medicine (outlined in *black*) and its leadership, governance, and funding.

responsibility, whereas, in others, the health authority (or university by-laws) has intentionally combined the roles in a joint appointment, albeit with site chief positions responsible for day-to-day clinical operations. Even in settings focused solely on academic leadership, the ultimate goal will always be to improve patient care. It is understood that different universities will put more or less emphasis on the elements of the academic mission and have different governing by-laws. There is no standard formula for governance structures in academic EM. This limits the ability to make specific recommendations about what governance structure will work best for academic EM.

Further preventing such recommendations is that academic units of EM are evolving in an era of accelerating change in academic medicine and health care reform.[3,13-17] The expectations of an academic unit of EM now exceed the traditional scholarship of education and research roles.[18] This is having a significant effect on the imperative to acquire novel leadership skills and must be considered when designing resilient and adaptive governance models.[19-23] Elner et al. in a recent article entitled, "Health Systems Innovations at Academic Centers: Leading in a New Era of Health Care Delivery," argued that with the increasing imperative to improve patient experience, population outcomes, and reduce or stabilize system costs, academic health care centres have an opportunity "to create new approaches to service delivery and to nurture leaders of transformation." They argued that an increasingly important role of academic medicine is to foster health systems innovation (as distinguished from biomedical research and continuous quality improvement), and that this should be recognized through more inclusive promotions criteria, valued through more robust funding opportunities, and embedded in new curricula for trainees.[14]

The implications of this are twofold: 1) Because EM is now seen as an active partner and positive catalyst for change, a strong and mature voice at the decision-making and problem-solving tables will be required, and 2) the traditional differentiation between the strategic priorities of the clinical department and the academic department will require more integrated and synergistic governance structures.

The current calls for leadership and structures to support the new opportunities for academic medicine[24] were entirely predicted (and likely influenced) by Boyer's report on "Scholarship Reconsidered."[18] In many ways, academic EM has been a leader in moving towards these more integrative and less traditional forms of scholarship. Boyer defined scholarship as more than just-publish-or-perish research, and more than just teaching and curriculum development for education. He emphasized the importance of the scholarship of integration (i.e., giving meaning to isolated facts, putting them in perspective, making connections across disciplines, placing the specialties in a larger context, illuminating data in a revealing way) and the scholarship of application (i.e., applying knowledge to consequential problems to help individuals and institutions, problems themselves become the scholarly agenda).[18]

Given the previous, the academic unit may not be easily separated in purpose (and therefore governance structure) from the clinical unit. Whether the health authority and university by-laws formally recognize this, the practical implications that this will have on the future academic unit of EM organization and decision-making must be considered.

Recommendation 2: No two academic units of EM are the same. The ideal governance structure for any given academic unit of EM should be aligned with the local institutional by-laws, organizational cultures, and relative emphasis that the academic unit of EM puts on the interdependent missions of academic EM (patient care/health system innovation, research, and education).

Current governance models in Canadian academic units of EM

During 2014 and 2015, a survey of the chairs of EM in the 17 medical schools was conducted. A structured 84-question survey was followed up by clarifying questions and probes to determine various aspects of each academic unit of EM's governance status and management structure. A full report on the results of this survey is being prepared[25] and forms the background context of these recommendations. The data were informative with respect to administrative structures (e.g., program leadership positions and funding) to describe how various academic units of EM are organized across the country. As the academic chairs/heads evolve their collaboration in the near future, there may be more opportunities to share and publish information about how each academic unit of EM determines who has power, who makes what decisions,

Table 2. Number of education and research directors at 17 academic units of EM across Canada

Director	Funded, *n* (%)	Unfunded, *n* (%)
Education		
EM education	4 (24)	1 (6)
EM scholarship	4 (24)	
Continuing professional development	8 (47)	1 (6)
Research and support		
Research	14 (82)	
Resident research facilitator	13 (76)	

Table 3. The affiliations for the divisions and sections of EM (*n* = 4) (X having multiple affiliations)

Division/section affiliation	*n* (%)
Medicine	3 (75)
Pediatrics	2 (50)
Family medicine	2 (50)
Surgery	0
Not specified	1 (25)

how other players make their voice heard, and how account is rendered.[11] Along with Figure 1, other highlights about Canadian academic units of EM from the CAEP environmental scan include the number of directors in education and research (Table 2) and the listing of division and selection affiliations (Table 3).

The three pathways to credentialing in the discipline of EM (FRCP, CCFP[EM], and FRCP PedsEM) must be considered as EM academics move towards better governance models. These distinct pathways have contributed to some of the fragmentation of the academic mission in EM at various medical schools. They have also contributed to the complicated matrix of reporting to parent departments that some academic units of EM are still navigating (see Table 3). As EM works towards better clinical care, innovative systems of EM, and better research and education, the governance model of academic EM can be used as a catalyst to integrate the academic mission, vision, and values of EM under one umbrella. Ideally, this would not be seen as a threat to any one group, but rather as an opportunity for integration and collaboration.

Governance theme 3: Essential elements of good governance

In general, there are five elements of good governance (legitimacy and voice, strategic direction, performance, equity and fairness, transparency and accountability),[26] which can be adapted to the academic unit of EM. Appendix 1 illustrates practical examples of these five principles and what they might mean at the two levels of academic unit of EM governance (with a sixth category of general [and other] questions of governance to consider).

Better governance at both levels for academic units of EM

Revisiting Figure 1, it is important for academic units of EM leadership and faculty to reflect upon where they may sit in the 2×2 table in order to best improve their governance. With regards to internal governance, consideration should be given to the key aspects list of governance principles that may come into play at this level (see Appendix 2).

Recommendation 3: Internal governance structures govern the relationship between the academic unit of EM and the constituent academic programs, and the individual physicians. The academic unit of EM should consider implementing the key aspects of good internal governance in their design (while modifying to local contexts).

When it comes to the question of whether a division or section of EM should become a full academic department (see Appendix 3), there are several considerations.[27] The overarching prerequisite is knowledge of the local context and culture of the university and faculty of medicine. Several questions[27] must be asked:

1) Would the academic unit of EM have advantages as a full department? Is the performance of research and education, as well as the likelihood of future academic opportunities, likely to improve by establishing this formal structure?
2) How effective are current resources and influence with parent departments(s)? Will they be improved as a department, or is there too much political or fiscal risk?
3) Is the current unit sufficiently mature to meet the criteria for a department? Does the academic unit of EM have a good track record? Does the academic unit of EM's research and education output need to improve first? Would the current chief qualify as a chair or would a new search and survey be required?

4) Is the internal governance organization optimized to ensure academic excellence with the current funding streams and leadership?
5) Is now a good time, or are there political or fiscal realities that make this a risk or too large of an endeavor (at this time)? If not now, when?

If the reasons to become a department (see Appendix 3) are felt to be compelling,[27,28] and the initial questions do not dissuade, then the hard work starts. There is no algorithm for how to become a full academic department, but there are some strategies[27] to create the conditions for the emergence of an EM department.

1) Build the respect for, and reputation of EM over time, especially in research and education, but also in clinical care, one patient at a time.
2) Articulate a vision of improved patient care, population outcomes, and innovative system design fostered by excellence in EM education and research.
3) Become a student of the culture at the university faculty of medicine and health science centre.
4) Know the criteria and process of your application to the university.
5) Understand the priorities and values of the dean and the CEO of the health science centre(s), and frame the prospective department's priorities with these.
6) Build coalitions (especially with the chairs of surgery, medicine, family medicine, and pediatrics) that emphasize mutual advantages of departmental status.

Recommendation 4: Divisions and sections of EM should seek to become academic departments as a means to develop, sustain, and grow strong academic programs (provided that careful analysis supports mutual benefits to EM and the mission of the faculty of medicine and health sciences centre).

Recommendation 5: The CAEP Academic Section should organize and support a consultation service to provide experience, analysis, and advice to chairs, because there is no established blueprint for an academic unit of EM to construct, implement, and improve their governance.

Recommendation 6: Many of the leadership, governance, and funding issues as well as challenges facing academic emergency medicine have similar patterns and drivers (even if contexts and details may differ between universities). The academic chair should establish a formal and regular forum for meeting and sharing experiences and approaches to common issues.

NEXT STEPS

The governance of academic EM is relatively complex, although the goal of good governance is straight forward: constantly improving academic performance. It is essential that governance structures and processes (along with leadership and funding) are iteratively improved over time in service of the education and research mission of academic EM, better patient care, and optimal population health outcomes. Given the significant variation in starting points and contexts across the country, there is no simple guide that all academic units of EM can use. These recommendations on the governance of the academic units of EM aim to support the evolution of academic EM and complement the recommendations provided by the funding and leadership panels.[29,30] The Leadership Working Group of the CAEP Academic Section will be addressing each recommendation and will present an update at its next Academic Leadership Symposium to be held in 2018.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit http://dx.doi.org/10.1017/cem.2016.22

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REFERENCES

1. Brimacombe GG, Association of Canadian Academic Healthcare Organizations & Academic Health Sciences Centres National Task Force (Canada). *Three missions, one future: optimizing the performance of Canada's academic health sciences centres*. Ottawa: Association of Canadian Academic Healthcare Organizations; 2010.
2. Chalt RP, Ryan WP, Taylor BE. Governance as leadership: bringing new governing mindsets to old challenges. *Governance Magazine, BoardSource* 2004;13(4):8-10.
3. Daschle TA. Academic medicine in a transformational time. *Acad Med* 2015;90(1):11-3.

4. Sherbino J, Van Melle E, Bandiera G, et al. Education scholarship in emergency medicine part 1: innovating and improving teaching and learning. *CJEM* 2014;16(Suppl 1): S1-5.
5. Bandiera G, LeBlanc C, Regehr G, et al. Education scholarship in emergency medicine part 2: supporting and developing scholars. *CJEM* 2014;16(Suppl 1):S6-12.
6. Bhanji F, Cheng A, Frank JR, et al. Education scholarship in emergency medicine part 3: a "how-to" guide. *CJEM* 2014;16(Suppl 1):S13-8.
7. Stiell IG, Artz JD, Perry J, et al. Executive summary of the CAEP 2014 Academic Symposium: How to make research succeed in your department. *CJEM* 2015;17(3):328-33.
8. Calder LA, Abu-Laban RB, Artz JD, et al. CAEP 2014 Academic Symposium: "How to make research succeed in your department: Promoting excellence in Canadian emergency medicine resident research". *CJEM* 2015;17(5):591-9.
9. Perry JJ, Snider CE, Artz JD, et al. CAEP 2014 Academic Symposium: "How to make research succeed in your emergency department: How to develop and train career researchers in emergency medicine". *CJEM* 2015;17(3): 334-43.
10. Vaillancourt C, Rowe BH, Artz JD, et al. CAEP 2014 Academic Symposium: "How to make research succeed in your department: How to fund your research program". *CJEM* 2015;17(4):453-61.
11. Institute on Governance. Defining governance: what is governance. Available at: http://iog.ca/defining-governance/.
12. Bunton SA, Corrice AM, Pollart SM, et al. Predictors of workplace satisfaction for U.S. medical school faculty in an era of change and challenge. *Acad Med J Assoc Am Med Coll* 2012;87(5):574-81.
13. Borden WB, Mushlin AI, Gordon JE, et al. A new conceptual framework for academic health centers. *Acad Med J Assoc Am Med Coll* 2015;90(5):569-73.
14. Ellner AL, et al. Health systems innovation at academic health centers: leading in a new era of health care delivery. *Acad Med* 2015;90(7):872-80.
15. Krupat E, Pololi L, Schnell ER, et al. Changing the culture of academic medicine: the C-change learning action network and its impact at participating medical schools. *Acad Med* 2013;88(9):1252-8.
16. Pati S, Reum J, Conant E, et al. Tradition meets innovation: transforming academic medical culture at the University of Pennsylvania's Perelman School of Medicine. *Acad Med J Assoc Am Med Coll* 2013;88(4):461-4.
17. Ferris L, Singer P, Naylor C. Better governance in academic health sciences centres: moving beyond the Olivieri/Apotex Affair in Toronto. *J Med Ethics* 2004;30(1):25-9.
18. Boyer EL. *Scholarship reconsidered: priorities of the professoriate*. Princeton: Carnegie Foundation for the Advancement of Teaching; 1997.
19. Kastor JA. Chair of a department of medicine: now a different job. *Acad Med J Assoc Am Med Coll* 2013;88(7): 912-3.
20. Heitz C, Hamilton GC. The academic chair in emergency medicine: current demographics and survey results identifying the skills and characteristics desired for the role. *Acad Emerg Med Off J Soc Acad Emerg Med* 2011;18(9):981-7.
21. Sheldon GF. Embrace the challenge: advice for current and prospective department chairs. *Acad Med J Assoc Am Med Coll* 2013;88(7):914-5.
22. Lieff S, Banack JG, Baker L, et al. Understanding the needs of department chairs in academic medicine. *Acad Med* 2013;88(7):960-6.
23. Thoma B, Poitras J, Penciner R, et al. Administration and leadership competencies: establishment of a national consensus for emergency medicine. *CJEM* 2015;17(2):107-14.
24. Wartman SA. The academic health center in a disrupted world. *Pharos Alpha Omega Alpha-Honor Med Soc Alpha Omega Alpha* 2015;78(2):2-9.
25. Stiell IG, Artz JD, Lang ES, et al. CAEP 2015 Academic Symposium: An Environmental Scan of Academic Emergency Medicine at the 17 Canadian Medical Schools: Why Does this Matter to Emergency Physicians? *CJEM* 2016; forthcoming.
26. Sheng YK. What is good governance? United Nations Economic and Social Commission for Asia and the Pacific. Available at: http://www.unescap.org/sites/default/files/good-governance.pdf.
27. Hamilton GC, Nelson BK, Scalea TM, et al. Establishing the Academic Department of Emergency Medicine: commentary on five phases of development. Association of Academic Chairs in Emergency Medicine; 1999. Available at: http://elearning.saem.org/sites/default/files/Establishing%20the%20Academic%20Department%20of%20Emergency%20Medicine.pdf.
28. Derlet RW. Organization of emergency medicine at medical schools: compelling reasons for departmental status. *Acad Emerg Med Off J Soc Acad Emerg Med* 2000;7(10):1145-6.
29. Lang E, Artz JD, Wilkie RD, et al. CAEP 2015 Academic Symposium: Current state and recommendations for improvement for funding emergency medicine academic units. *CJEM* 2016; epub, doi: 10.1017/cem.2016.16.
30. Sinclair D, Worthington JR, Joubert G, et al. CAEP 2015 Academic Symposium: Leadership within the EM academic community and beyond. *CJEM* 2016; epub, doi: 10.1017/cem.2016.9.

CAEP/ACMU 2016 Scientific Abstracts, June 5th to June 8th, 2016, Québec City, Québec

Research in emergency medicine (EM) affects all aspects of emergency patient care. Research helps to standardize care and promotes optimal care for all emergency patients to improve their outcomes.

Fostering a rich research environment requires funding, education, and a rigorous peer-review process. The CAEP Research Committee is pleased to support the development of EM-related research skills across Canada by administering two programs: an annual CAEP Grant Competition and the CAEP Abstract Competition.

Abstracts are the core of the annual research competition. This year for CAEP 2016 in Québec City, we received an astounding 300 abstracts from EM researchers from across Canada and internationally. The top-ranked abstracts will present at the plenary session, and the best resident, pediatric, new investigator, education innovation, and medical student abstracts submitted by CAEP members are awarded financially to subsidize conference travel expenses. The promotion and dissemination of high-quality research, like that submitted to the annual CAEP Conference, is integral to the enhancement of Canadian EM research.

CAEP has endeavoured to expand its grants program, by launching the EM Advancement Fund (www.TheEMAF.org). With the support of generous donors who consist of our EM colleagues, we added two additional grants of $10,000 this year. As in previous years, five CAEP research grants were also awarded for the best proposals submitted by residents, fellows, and junior investigators. Two studies of CAEP grants have shown that these grants have successfully launched new projects and the careers of EM researchers by providing funding support at a pivotal career point.[1,2] These modest grants are important to the development of EM research and physician-scientists. We hope to continue to expand the grants program and are looking to you for support, so remember to support your EM research colleagues through the EM Advancement Fund.

The hours of work of that our volunteer reviewers contribute is critical to the success of the Research Committee activities during the busy abstract and grant competitions. Each submission is thoroughly read, reviewed, and scored by at least three experienced reviewers. The Research Committee would like to thank the reviewers for their contribution and recognize their commitment to support EM research.

Disclaimer: The large number of submitted abstracts and the deadlines associated with publication do not permit the author communication, abstract revisions, or *CJEM* editorial review. The abstracts are presented, as they were submitted to the Research Committee. Only the author affiliation supplied by the presenting author is specified.

Note: The CAEP 2016 Final Program contains the scheduled times for the abstract presentations.

Jeff Perry, MD, MSc
CAEP/ACMU Research Committee Chair

Jennifer D. Artz, PhD
Senior Manager, Academic Section and Research
CAEP/ACMU

[1] Artz JD, Erdogan M, Green RS. A national survey on small research grants and the scholarly productivity of emergency medicine physicians in Canada. *Research Evaluation* 2016; doi: 10.1093/reseval/rvv046. First published online: January 14, 2016.

[2] Bawden J, Manouchehri N, Villa-Roel C, Grafstein E, Rowe BH. Important returns on investment: an evaluation of a national research grants competition in emergency medicine. *CJEM* 2010;12(1):33-8.

Abbreviations
PL = Plenary; OP = Oral presentation; LO = Lightning oral; MP = Moderated poster; P = Poster

CAEP/ACMU 2016 Research Abstract Awards

First place, Plenary Presentation, Grant Innes Research Paper and Presentation Award
Andrew McRae
PL001 Derivation of a 2-hour high-sensitivity troponin T algorithm for rapid rule-out of acute myocardial infarction in emergency department chest pain patients

Second place, Plenary Presentation
Samina Ali
PL002 A randomized controlled trial on oral analgesic utilization for children presenting with a musculoskeletal trauma in the emergency department

Third place, Plenary Presentation
Alexander Leung
PL003 Impact of process improvements on measures of emergency department efficiency

Fourth place, Plenary Presentation, Top Resident Abstract Award
Sameer Masood
PL004 A population-based analysis of outcomes in patients with a primary diagnosis of hypertension in the emergency department, using linked datasets

Top New Investigator Award
Catherine Varner
LO084 Text messaging research participants as a follow-up strategy to decrease emergency department study attrition

Top Pediatric Abstract Award
Samina Ali
LO049 Ibuprofen or oxycodone? An observational cohort study of post-emergency department discharge management of children's fracture pain

Top Medical Student Project Award
Nicole Beckett
LO040 A Do combined electrocardiogram rhythm and point of care ultrasound findings predict outcome during cardiac arrest? The second Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED 2) Study

Top Education Innovation Abstract Award
Fareen Zaver
LO102 ALiEM AIR-Pro Series: Identifying quality content from blogs and podcasts for the senior emergency medicine resident

CAEP Resident Research Abstract Awards

Cristian Toarta
LO004 Short-term risk of arrhythmias among syncope patients presenting with atrial fibrillation/flutter to Canadian emergency departments

Neil Dattani
LO005 Association between emergency department chest pain volume and outcomes among patients presenting with chest pain

Audrey-Anne Brousseau
LO034 Does head injury matter? Comparison of functional outcomes in elderly who have sustained a minor trauma with or without head injury: a prospective multicenter cohort study

Alexis Cournoyer
LO041 Predicting the return of spontaneous circulation using near-infrared spectroscopy monitoring: a systematic review and meta-analysis

Kyle McGivery
LO074 Point of care ultrasound for lung B-lines in the early diagnosis of acute decompensated heart failure in the emergency department: a systematic review.

Robert Ohle
LO075 Clinical exam for acute aortic dissection: a systematic review and meta-analysis

Nicholas Costain
LO099 Colchicine in acute and recurrent pericarditis: a meta-analysis

CAEP/ACMU 2016 Grant Awards

2016 EMAF Grant Awardees
Simon Berthelot
Feasibility assessment of two activity-based costing methods for value-based analysis in the emergency department

Jocelyn Gravel
Should we use oral Valacyclovir in acute herpetic gingivostomatits in children? A randomized controlled trial

2016 Junior Investigator Awardees
Dennis Cho
Optimizing practice for learning emergency department transthoracic echocardiography using an ultrasound simulator

Véronique Dion
Définition des valeurs normales de la veine cave inférieure en pédiatrie à l'échographie au département d'urgence

Jean-Simon Letourneau
Acceptabilité et adaptation pour l'urgence d'un outil d'aide à la prise de décision partagée dans le recours à l'antibiothérapie pour traiter les infections respiratoires aigues

Laurie Robichaud
The use of point-of-care ultrasound in the diagnosis of acute infectious mononucleosis in the emergency department

Brent Thoma
The METR:IQ (Medical Education and Translational Resources: Indicators of Quality) Study: Assessing the quality of novel educational resources

Abbreviations:
PL = Plenary; OP = Oral presentation; LO = Lightning oral; MP= Moderated poster; P = Poster

*Corresponding authors are underlined.

Plenary Oral Presentations

PL001

Derivation of a 2-hour high-sensitivity troponin T algorithm for rapid rule-out of acute myocardial infarction in emergency department chest pain patients

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Introduction: Chest pain and symptoms of acute coronary syndrome are responsible for a large proportion of ED visits and acute hospitalizations. However, only about 15% of patients presenting to the ED with high-risk symptoms do, in fact, have an acute coronary syndrome. The objective of this study is to derive a 2-hour high-sensitivity Troponin T (hsTnT) testing algorithm with outcome based-cutoffs to rapidly rule out acute myocardial infarction (AMI) in a large proportion of ED chest pain patients. **Methods:** Patients included consecutive ED patients with a chief complaint of cardiac chest pain who had an hsTnT assay performed at ED arrival and 2 hours after ED arrival. Administrative databases were queried to identify troponin results and major adverse cardiac outcomes (MACE) including death, MI, and revascularization. Test characteristics of iterative combinations of initial troponin level and absolute change in troponin level were quantified in order to identify the testing algorithm that identified the greatest proportion of patients eligible for early discharge while maintaining a target sensitivity of 98.5% for the primary outcome of 7-day AMI. **Results:** 755 eligible patients had hsTnT assays performed at ED arrival and at 2 hours. 91 patients (12.1%) had a 7-day AMI while 108 (14.0%) had 7-day MACE. An initial hsTnT level of less than 14 ng/L, in combination with a 2-hour absolute change of less than 10ng/L had a sensitivity of 98.9% (95% CI 94.0,99.8) and an NPV of 99.8% (95% CI 98.7, 100.0) for 7-day AMI. This identified 58.5% of all patients as being suitable for early discharge. Sensitivity and NPV for 7-day MACE were 90.0% (95% CI 83.3, 94.2) and 97.3% (95% CI 95.3,98.4) respectively. Sex-specific differences in test characteristics were not clinically important. Rule-in hsTnT cutoffs were also evaluated, with specificities ranging from 85-95%, although cutoffs with higher specificity had less ability to rapidly rule-in AMI, leaving more patients with indeterminate results after 2 hours. **Conclusion:** A hsTnT algorithm can safely and accurately rule out AMI in 58.5% of ED chest pain patients within 2 hours of ED arrival. The lower sensitivity of this algorithm for MACE compared to AMI speaks to the importance of clinical assessment and ECG findings in identifying patients at risk for acute coronary syndromes.

Keywords: troponin, acute coronary syndromes, acute myocardial infarction

PL002

A randomized controlled trial on oral analgesic utilization for children presenting with a musculoskeletal trauma in the emergency department

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Introduction: Background: A single-agent approach to children's moderate to severe pain is often inadequate. To date, no studies have evaluated the combined use of oral morphine and ibuprofen for optimal pain management of children presenting to an Emergency Department (ED) for musculoskeletal (MSK) trauma. Objective: To assess the efficacy of a combination of oral morphine and ibuprofen for pain management in children with MSK trauma in the ED. **Methods:** A double-blind, placebo-controlled, multi-centered, three-arm, randomized clinical trial of 500 patients was conducted at three pediatric tertiary care EDs. Patients 6 to 17 years of age, who presented to the ED with a MSK trauma, and a score > 30 mm on the 100 mm Visual Analogue Scale were eligible to participate. Patients were randomized (in a 2:1:1 ratio) to receive (orally): (a) morphine (0.2mg/kg) + ibuprofen (10mg/kg) (Group MOR + IBU) or (b) morphine (0.2 mg/kg) + placebo (Group MOR) or (c) ibuprofen (10mg/kg) + placebo (Group IBU). Primary outcome was pain intensity score under 30 mm (mild pain) at 60-minutes (T-60) after treatment administration. **Results:** A total of 456 patients were included in analyses: 177 (MOR + IBU), 188 (MOR), 91 (IBU). Mean age was 11.9 + 2.7 years, with a majority of boys (55.3%) and soft tissue injuries (62%). There were no differences in baseline characteristics in the three groups. Baseline mean pain score was 60.9 + 16.2 mm. Only 30% (MOR + IBU), 29% (MOR) and 30% (IBU) of patients reached a pain score under 30 mm at T-60 ($p = 0.83$). Mean pain scores at T-60 were 42.3 + 23.2 mm (MOR + IBU), 43.8 + 23.1 mm (MOR) and 42.3 + 23.3 mm (IBU) ($p = 0.83$). No severe adverse events were observed in any of the groups, at any of the study measurement points. **Conclusion:** Combination of morphine with ibuprofen did not provide any additional pain relief for children with MSK injuries, in the ED. None of the study medication provided optimal pain management, as the majority of children did not reach the WHO definition of mild pain. Alternative analgesic combinations should be investigated to optimize pain relief of children who present to the ED with MSK injuries.

Keywords: pain, pediatric, clinical trial

PL003

Impact of process improvements on measures of emergency department efficiency

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Introduction: The objective was to study the operational impact of an intervention comprised of simultaneous process improvements to triage, patient inflow, and physician scheduling patterns on emergency department (ED) patient flow. The intervention did not require any increase in ED resources or expenditures. **Methods:** A 36-month pre-/post-intervention retrospective chart review at an urban community emergency department from January 2010 to December 2012. The ED process improvements started on June 6, 2011 and involved streamlining triage, parallel processing, flexible nurse-patient ratios, flexible exam spaces, and flexible physician scheduling. The main outcomes were ED length-of-stay (LOS). Secondary outcomes included time to physician-initial-assessment (PIA), left-without-being-seen (LWBS) rates, and left-against-medical-advice (LAMA) rates. Segmented regression of interrupted time series analysis was performed on Canadian Triage and Acuity Scale (CTAS) 2 to 5 patients to quantify

the immediate impact of the intervention on the outcome levels, and whether there were changes in the trend between pre-intervention and post-intervention segments. **Results:** 251,899 patients attended the ED during the study period. Daily patient volumes increased 17.3% during the post-intervention period. Post-intervention, for CTAS 2-5 patients, there was a reduction in average LOS by 0.64 hours ($p < 0.001$), and 90th-percentile LOS by 0.81 hours ($p = 0.024$). When separated by acuity and disposition, there were reductions in LOS for non-admitted CTAS 2 (-0.58 hours, $p < 0.001$), 3 (-0.75 hours, $p < 0.001$), 4 (-0.32 hours, $p = 0.002$), and 5 (-0.28 hours, $p = 0.008$) patients. For secondary outcomes, there was a decrease in overall average PIA by 43.81 minutes ($p < 0.001$), and 90th-percentile PIA by 91.39 minutes ($p < 0.001$). LWBS and LAMA rates decreased by 35.2% ($p < 0.001$) and 61.9% ($p < 0.001$), respectively. **Conclusion:** A series of process improvements meant to optimize flow in the ED without the addition of resources was associated with clinically significant reductions in LOS, PIA, LWBS and LAMA rates for non-resuscitative patients.

Keywords: efficiency, patient flow, length of stay

PL004

A population-based analysis of outcomes in patients with a primary diagnosis of hypertension in the emergency department, using linked datasets

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Introduction: Patients seen primarily for hypertension are common in the emergency department. The outcomes of these patients have not been described at a population level. In this study we describe the characteristics and outcomes of the patients making these visits, as well as changes over time. **Methods:** This retrospective cohort study used linked health databases from the province of Ontario, Canada, to assess emergency department visits made between April 1, 2002 and March 31, 2012 with a primary diagnosis of hypertension. We determined the annual number of visits as well as the age and sex standardized rates. We examined visit disposition and assessed mortality outcomes and potential hypertensive complications at 7, 30, 90, 365 days and 2 years subsequent to the ED visit. **Results:** There were 206,147 qualifying ED visits from 180 sites. Visits increased by 64% between 2002 and 2012, from 15793 to 25950 annual visits, respectively. The age- and sex-standardized rate increased from 170/100,000 persons to 228/100,000 persons over the same time period, a 34% increase. Eight percent of visits ended in hospitalization, but this proportion decreased from 9.9% to 7.1% over the study period. Mortality was very low, at less than 1% within 90 days, 2.5% within 1 year, and 4.1% within 2 years. Among subsequent hospitalizations for potential hypertensive complications, stroke was the most frequent admitting diagnosis, but the frequency was still <1% within 1 year. Together hospitalizations for stroke, heart failure, acute myocardial infarction, atrial fibrillation, renal failure, hypertensive encephalopathy and dissection were <1% at 30 days. **Conclusion:** The number of visits made primarily for hypertension has increased dramatically over the last decade. While some of the increase is due to aging of the population, other forces are contributing to the increase. Subsequent mortality and complication rates are low and have declined. With current practice patterns, the feared complications of hypertension are extremely infrequent.

Keywords: hypertension, stroke, emergency department

Oral Presentations

LO001

The prevalence of low back pain in the emergency department: a systematic review and primary study in the Charles V. Keating Emergency and Trauma Centre, Halifax, Nova Scotia, Canada

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Introduction: Low back pain (LBP) may be having a significant impact on emergency departments (ED) around the world. Two analyses conducted in the USA and Australia suggest that LBP is one of the leading causes of emergency department visits. However, in the peer-reviewed literature, there has been limited focus on the prevalence and management of back pain in the ED setting. Furthermore, the applicability of the available research to our local ED setting is unclear. **Methods:** This project includes two studies to investigate the prevalence of LBP in the ED: 1. a comprehensive **systematic review** of the published literature to gather a comprehensive and global perspective about the prevalence of LBP in the ED setting, and 2. a **retrospective cross sectional analysis** using six years of data from our local ED, the Charles V. Keating Emergency and Trauma Centre, Halifax, Nova Scotia. **Results:** Searches from multiple databases including PubMed (392 citations), resulted in 3024 citations, of which 20 studies were found to have prevalence data for LBP. Studies were reported between 2001–2015 and used mixed methods of data collection, including electronic databases, surveys and patient charts. Ranges for prevalence estimates were 1.9% to 17% of patient visits. Results indicated there are many gaps in the literature, for example research in rural EDs and in Canada. In our primary study, we have identified a sample of 10 000 patients presenting with LBP to our local ED. Analysis of this data will be completed prior to the CAEP conference. **Conclusion:** This project is the first systematic review; comprehensive search strategy to examine the prevalence of LBP in the ED. It is also the first project to assess the prevalence of LBP in a Canadian ED. Results from this study will inform healthcare providers, as well as administrative and policy decision-makers, of the global and local impact of LBP in the ED, and will identify opportunities for further research to enhance care pathways of patients suffering from LBP.

Keywords: low back pain, prevalence

LO002

Improving safety of patients in respiratory distress: identifying preventable adverse events related to care provided in the emergency department

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Introduction: Patients with acute exacerbations of heart failure (HF) or chronic obstructive pulmonary disease (COPD) may be at high risk for preventable adverse events (AEs). Preventable AEs are ED care-associated complications due to medical error. Our objective was to identify and characterize preventable AEs among ED patients over 50 presenting with dyspnea from an acute exacerbation of HF or COPD; who were subsequently admitted or discharged. **Methods:** We conducted a multicentre health records review from six academic centers in Ontario and Alberta. We analysed health records for all prospectively enrolled patients who experienced flagged outcomes: relapse to ED within 14 days requiring admission; admission to a monitored unit (AMU), cardiac care unit(CCU), or intensive care unit(ICU); intubation

(ETI); non-invasive ventilation(NIV); diagnosis of acute myocardial infarction(AMI); or death within 30 days. Using a validated approach, an ED physician analyzed case summaries for flagged outcomes that were associated with ED care, designated as AEs. Preventable AEs had contributing errors in diagnosis, management, procedure, medications or unsafe disposition decisions. We analyzed these data using thematic coding and descriptive statistics. **Results:** Of 2,515 patients enrolled (1,100 HF and 1,415 COPD), 210 patients experienced flagged outcomes, 47.1% of which were female, 64.3% had HF and the remaining COPD. The majority (86.2%) of flagged outcomes were related to underlying disease, but 13.8% of cases met criteria for AE and all were deemed preventable. Of the identified AEs, 72.4% returned to the ED and required admission to hospital; 17.2% were admitted to ICU, CCU, or AMU; 6.9% of patients died; 3.4% were intubated; 3.4% had a diagnosis of AMI and 0% required NIV. We found 75.8% of preventable AEs resulted from a management error (eg. not prescribing steroids on discharge for moderate COPD exacerbation); 31.0% from an unsafe disposition decision and 10.3% of AEs resulted from diagnostic error. **Conclusion:** Patients with acute exacerbations of HF and COPD are at high risk of preventable AEs directly related to care provided in the ED. Management and disposition decisions were a concerning source of error and should compel and focus future quality improvement efforts.

Keywords: heart failure, chronic obstructive pulmonary disease patient safety

LO003

Outpatient referrals from the emergency department - a retrospective review

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Introduction: While a majority of patients presenting to the emergency department (ED) are discharged home without need for inpatient hospitalization, many require outpatient follow-up. Currently, outpatient referrals from our ED are made via a complex and error-prone series of manual steps which have the potential to be unreliable and negatively impact quality of care. We sought to perform a current state analysis of our outpatient referral processes across the hospital's specialties. **Methods:** We conducted a retrospective health records review at a tertiary academic centre (>160,000 ED visits/year) from January 1 to January 7, 2015. All consecutive outpatient consultation requests triggered by an ED physician were identified and included for chart review. All cases were subsequently followed up to 11 months. A single reviewer extracted data on demographics, actual referral attendance rates, incomplete referrals, return ED visits, and time intervals. The top 3 and bottom 3 performing services were identified for further analysis of their outpatient referral mechanisms and processes. We present descriptive statistics. **Results:** A total of 251 outpatient referrals to a broad range of specialty services were identified during the study period. 216 (86.1%) of patients attended the intended appointment, while 35 (13.9%) of referrals were incomplete at 11 months post index ED visit. The overall median time to successful outpatient follow-up appointments was 8.5 days [IQR = 3.8-24.2]. 8 (3.2%) patients had a return ED visit for a related complaint prior to being seen at their outpatient appointment. The top 3 performers were Ophthalmology [Median = 1.0 day, IQR = 0.0-1.0, Incomplete = 2.8%], Plastic Surgery [Median = 5.0 days, IQR = 2.8-6.0, Incomplete = 7.7%], and Orthopedics [Median = 8.0 days, IQR = 7.0-10.0, Incomplete = 0.0%]. The bottom 3 performers were Dermatology [Median = 52days, IQR = 41.5-92.5, Incomplete = 25.0%], Neurology [Median = 40.0 days, IQR = 2.5-43.5, Incomplete = 56.3%], and Urology [Median = 14.0 days, IQR = 10.5-48.0, Incomplete = 33.3%]. **Conclusion:** We found a tremendous range of variability in both the waiting times and actual reliability of outpatient referral processes from the ED. Future phases of this project will focus on examining specific processes of the top and bottom performing specialties in order to improve and standardize all outpatient referrals.

Keywords: outpatient referrals, follow-up, quality improvement

LO004

Short-term risk of arrhythmias among syncope patients presenting with atrial fibrillation/flutter to Canadian emergency departments

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Introduction: Short-term risk of arrhythmia or death among emergency department (ED) syncope patients with atrial fibrillation/flutter (AFF) has not been reported in the literature. Our objectives were to assess the incidence and the independent risk of 30-day arrhythmia or death for syncope patients with AFF after ED disposition. **Methods:** We conducted a prospective study at 6 Canadian academic EDs to include adults with syncope. We collected demographic, clinical and ECG characteristics while our outcome assessments were completed by medical records review and by telephone follow-up of patients after 30 days. Primary outcome was arrhythmia or death within 30-days after ED disposition and secondary outcomes included non-arrhythmic cardiac and non-cardiac outcomes. We performed descriptive and logistic regression analyses. **Results:** We enrolled 4,266 patients: mean age 53.4 years, 55.4% females, and 8.5% with AFF. After excluding those with outcomes in the ED, lost to follow-up and those with other non-sinus rhythms, 3,417 patients in the sinus and 280 patients in the AFF groups were analyzed. The incidence of arrhythmia or death was significantly higher in the AFF group (Relative Risk 5.1; 95% CI 3.1-8.4; $p < 0.0001$) but there were no significant differences in secondary outcomes between the groups. The unadjusted odds ratio for 30-days arrhythmia or deaths among ED syncope patients with AFF was 5.4 (95% CI 3.2- 9.2). After adjusting for important baseline risk factors by multivariable analysis, the odds ratio for arrhythmia or death in patients with AFF was 1.5 (95% CI 0.8-2.7). **Conclusion:** The risk of AFF for 30-day arrhythmia or death among syncope patients after ED disposition is higher but is attenuated when adjusted for important patient characteristics. Future research should assess long-term outcomes among syncope patients with AFF to guide follow-up after ED discharge.

Keywords: arrhythmia, atrial fibrillation/flutter, syncope

LO005

Association between emergency department chest pain volume and outcomes among patients presenting with chest pain

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Introduction: Chest pain is one of the most common reasons for emergency department (ED) visits in developed countries. Patients discharged after ED assessment remain at risk for adverse cardiac events. Although a volume-outcome relationship has been shown for myocardial infarction, it is uncertain whether a similar relationship exists with ED chest pain volume. Accordingly, we aimed to determine whether ED chest pain volume influences outcomes of patients presenting to the ED with chest pain who were discharged home. **Methods:** This was a retrospective cohort study using population-based

data from Ontario, Canada. Patients who were discharged home from an ED in Ontario with a primary diagnosis of chest pain from April 1, 2004 to March 31, 2010 were included. High-risk patients were defined as the presence of diabetes or pre-existing cardiovascular disease, while low-risk patients were defined as the absence of these conditions. ED volume was categorized as low, medium, or high, based on tertiles of annual chest pain patient volume. The primary outcome of this study was all-cause mortality one year after the index ED visit. Mantel-Haenszel Chi-Square was used to compare crude outcome rates. **Results:** There were 56,767 high-risk patients. The average age was 66 years and 53% were male. All-cause mortality rates were 6.8%, 6.3%, and 6.0% ($p = 0.028$), and rates of hospitalization for acute coronary syndrome were 5.8%, 4.6%, and 4.0% ($p < 0.001$) among low, medium, and high volume EDs respectively. There were 216,527 low-risk patients. The average age was 64 years and 42% were male. All-cause mortality rates were 2.0%, 1.9%, and 1.6% ($p < 0.001$), and rates of hospitalization for acute coronary syndrome were 1.5%, 1.4%, and 1.0% ($p < 0.001$) among low, medium, and high volume EDs respectively. **Conclusion:** Higher volume EDs were associated with decreased rates of all-cause mortality and admission for acute coronary syndrome among chest pain patients who were discharged home. Future research should study the reasons for this finding and attempt to improve outcomes in lower volume EDs.
Keywords: chest pain

LO006

Interarm blood pressure differential as a clinical marker for acute aortic dissection in the emergency department

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Introduction: Acute Aortic Dissection (AAD) is life threatening, requiring early diagnosis. Although previous literature suggest interarm BP differential is an independent predictor of AAD, up to 20% of a healthy population can have a significant differential. Our objectives were to assess the rate of bilateral BP measurement in acute non-traumatic truncal pain patients, and the association of BP differential with non-traumatic AAD. **Methods:** This is a historical matched case control study: participants were adults >18 years old presenting to two tertiary care EDs with a triage diagnosis of truncal (i.e. chest, abdominal, flank, back) pain. Cases were selected based on an ED or in-hospital diagnosis of non-traumatic AAD confirmed by CT or Echo. Controls were from a single calendar year matched in a 1:1.5 ratio by sex and age within 5 years. ED and referral consult BP measurements were used. Exclusion criteria: clear diagnosis on basic investigation (i.e. UTI, pneumonia, pneumothorax, acute fracture) or pain >14 days/no pain. Sample size of 126 cases and 183 controls was calculated based on 20% exposure in controls (80% power and alpha of 5%), to detect an OR >2. P-values were calculated using chi square analysis. **Results:** A total of 294 (119 cases, 175 controls) patients were included (mean 66+/-14.5yrs, 59.5% male). Cases (199 potential: 119 included; 80 excluded). Controls (8239 potential: 305 reviewed; 175 included; 130 excluded). Bilateral BP was measured in 70.6% of cases (n = 84, mean difference = 15.5mmHg) versus 31.3% of controls (n = 55, mean difference = 10.9mmHg). Among included controls, most common diagnoses were: Unspecified Chest (36.0%) or Abdominal (9.7%) Pain, ACS (12.6%), Muscular Back Pain (5.1%), and Renal Colic (4.0%). BP differential >10mmHg was found in 58.8% of cases and 40.7% of controls ($P = 0.10$). A BP differential >20mmHg was found in 31.3% of cases and 22.2% of controls ($P = 0.37$). BP differential >20mmHg did not significantly increase the odds of AAD (OR 2.0 (95%CI 0.82-4.90), $p < 0.129$). **Conclusion:** Interarm BP differential is not routinely measured in ED patients with acute non-traumatic truncal pain, and there is no significant difference in the presence or magnitude of differentials in patients with or without AAD. Therefore, physicians should not rely on BP differentials to aid in their diagnosis or exclusion of AAD.
Keywords: aortic dissection, blood pressure

LO007

A pragmatic randomized and controlled evaluation of nurse-initiated protocols

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Introduction: Emergency department (ED) overcrowding is a common and complicated challenge for EDs worldwide. Nurse-initiated protocols, diagnostics and/or treatments implemented by nurses prior to patients being seen by a physician or nurse practitioner, have been suggested as a potential strategy to improve patient flow. **Methods:** This randomized, pragmatic, controlled evaluation of 5 nurse-initiated protocols occured in a crowded inner-city ED. Six physicians and 44 registered nurses, 3 clinical nurse educators and 3 unit managers were involved in revising 5 patient-complaint focused protocols prior to evaluation. Thirty (30/180) emergency nurses were provided 1 hour of training on inclusion and exclusion criteria, procedure and evaluation methods. Data was abstracted in a manner concealing patient allocation. Primary outcomes evaluated included time to diagnostic test, treatment, consultation or ED length of stay. This evaluation was completed following both the CONSORT and SQUIRE guidelines. **Results:** Time to acetaminophen for the intervention group (n = 11) was 1h:04 min on average (95%CI 30min to 1h:37min) whereas the control group (n = 9) was 3h:35min (95%CI 2h:21min to 4h:48min). The average length of stay of a suspected fractured-hip in the intervention group (n = 5) was 3h:34min (95%CI 1h:49min to 5h:19min) and 7h:34min for the control group (n = 4) was (95%CI 5h:26min to 9h:42min). Time to troponin in the intervention group (n = 29) was one quarter (average 48min, 95% CI 32min to 64min) of the time it was in the control group (n = 14) (average 3h:16min, 95%CI 1h:53min to 4h:39min; $p < 0.001$). The vaginal bleeding in pregnancy protocol reduced length of stay by roughly fifty-percent; the intervention group (n = 11) had a length of stay of 4h:57min (95%CI 3h:46min to 6h:08min) compared to 8h:33min (95% CI 6h:23min to 10h:44min) for the control (n = 7) ($p < 0.001$). There was no statistical difference in the length of stay for patients who received protocolized diagnostics for abdominal pain. **Conclusion:** Targeting specific patient groups with carefully written protocols can improve the timeliness of care. A cooperative and collaborative interdisciplinary group are essential to success. Having a system in place to ensure ongoing quality in protocol application and interdisciplinary support has proven more difficult than improving the primary outcomes in this evaluation.
Keywords: nurse protocols, standing orders, order sets

LO008

Assessment of the need for diagnostic imaging in extremity injuries by advanced care paramedics

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Introduction: Emergency department (ED) crowding is a national challenge. Initiatives to help address this at our ED include the use of a six-bed fast-track unit staffed by advanced-care paramedics (ACPs). Institutional byelaws only allow diagnostic imaging (DI) ordering by

physicians (MD). An ACP requesting DI at the time of first assessment would likely improve patient flow. We investigated whether ACPs can safely and cost-effectively request DI for extremity injuries without increasing cost or exposing patients to unnecessary radiation. **Methods:** A prospective evaluation of a convenience sample of patients presenting with an extremity injury sustained within 48 hours of presentation. At time of initial assessment, the ACP, following specific guidelines, recorded whether or not they believed an x-ray was indicated, and if so, what DI views they felt appropriate. Their opinion was blinded from the physician subsequently assessing the patient. An ACP opinion of the need for DI was compared with the subsequent test ordered by the MD. The MD decision to order DI was considered 'gold standard'. Opinions were considered "matched" if the MD ordered DI of the same body part that the ACP believed was indicated. Sensitivity, specificity, positive predictive and negative predictive values (PPV, NPV) were calculated. Using data from our ED information system, we estimated the time that would have been saved by allowing ACPs to order DI. **Results:** Of 199 patients 192 images were ordered and 89 fractures were diagnosed. ACPs and MDs agreed that DI was necessary 94.70% of the time (95% CI: {90.6%, 97.4%}). There were 8 x-rays the ACP did not order that the MD did order, of which one showed a fracture. Twice, the ACP would have ordered an x-ray that the MD did not. In terms of identifying the need for DI, ACPs were 95.8% sensitive and 71.4% specific. The PPV was 98.9% (95% CI: {95.8%, 99.8%}), and the NPV was 38.5% (95% CI: {15.1%, 67.7%}). On average, ACP opinion of DI indication was made 54.1 minutes (95% CI: {48.0, 60.2}) earlier that of the MD. **Conclusion:** The overall agreement between MDs and ACPs was almost 95%. ACPs are more likely to under-order x-rays than to over-order them, lowering the risk of increasing radiation exposure and cost. ACP DI ordering may decrease the time of processing of patients with extremity injuries by almost an hour.

Keywords: paramedic, diagnostic imaging, emergency department

LO009

Impact of physician navigators on measures of emergency department efficiency

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Introduction: The Physician Navigator (PN) is a novel position created to manage patient flow in real-time at a very-high volume emergency department (ED). When paired with an emergency physician, PNs actively track patient wait times, and direct the physician to see and re-assess patients in a particular order to improve measures of emergency department efficiency, and maximize patient flow. Anecdotal evidence has shown that PNs decrease length-of-stay times for non-resuscitative patients in the setting of increased patient volumes, and without additional nursing or physician hours. The objective was to study the operational impact of PN on emergency department patient flow. **Methods:** A 48-month pre-/post-intervention retrospective chart review at an urban community emergency department from September 2011 to September 2015. The PN program started on March 1, 2013. The main outcome is emergency department length-of-stay (LOS). Secondary outcomes include time to physician-initial-assessment (PIA), left-without-being-seen rates (LWBS), left-against-medical-advice (LAMA), and physician satisfaction rates. Autoregressive integrated moving average models were generated for Canadian Triage and Acuity Scale (CTAS) 2 to 5 patients to quantify the immediate impact of the intervention on the outcome levels, and whether the impact was sustained over time. **Results:** Interim results are provided. 399,958 patients attended the ED during the study period. Daily patient volumes increased 11.2% during the post-intervention period. There were no significant increases in the number of physicians shifts/day, and physician hours/day during the post-intervention period. Post-intervention, for CTAS 2-5 patients, there was a reduction in average LOS by 0.04 hours/PN ($p < 0.05$), and 90th-percentile LOS by 0.14 hours/PN ($p < 0.05$). For secondary outcomes, there was a decrease in overall average PIA by 6.37 minutes/PN ($p < 0.05$), and 90th-percentile PIA by 8.29 minutes/PN ($p < 0.05$). LWBS rates decreased by 40.8% ($p < 0.05$). There were no significant changes in LAMA rates. **Conclusion:** The implementation of Physician Navigators is associated with significant reductions in LOS, PIA, and LWBS rates for non-resuscitative patients at a very-high volume emergency department.

Keywords: patient flow, efficiency

LO010

Clinical assessment of transient ischemic attack patients for symptomatic carotid disease in the emergency department

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Introduction: TIAs precede about 30% of strokes, with 4-10% having a stroke within 90 days of their TIA. In patients with a TIA due to symptomatic carotid disease, diagnosis and treatment within 2 weeks has been shown to have much better outcomes, while delay beyond 12 weeks no longer reduces subsequent stroke risk. The objective of this study was to determine the clinical findings associated with symptomatic critical disease following an ED visit for TIA to indicate patients requiring prompt carotid imaging. **Methods:** We performed a prospective Canadian multicenter cohort study, at 13 academic sites, of ED patients with TIA or non-disabling stroke from 2006-2014. Treating ED physicians indicate clinical features on standardized data collection forms. Symptomatic carotid disease was carotid stenosis 50-99%, or carotid dissection, adjudicated by stroke neurology to be the etiology of the index event. Patients were followed by medical review and telephone up to 90 days. Univariate analysis was conducted for clinical features associated with patients who were eventually found to have symptomatic carotid disease as a cause for their TIA. **Results:** The cohort included 305 patients with and 5,277 without symptomatic carotid disease. Positive predictors of symptomatic carotid disease included older age (74.0 yrs vs 68.0 yrs $p < 0.0001$), male sex (62.9% vs 47.9%; $p < 0.0001$), history of weakness (63.3% vs 41.4%; $p < 0.0001$), language disturbance (52.1% vs 40.0%; $p < 0.0001$), weakness on physical exam (25.5% vs 17.1%; $p = 0.0002$), history of hypertension (74.8% vs 59.5%; $p < 0.0001$), and known history of carotid stenosis (18.9% vs 3.1%; $p < 0.0001$). Negative predictors of symptomatic carotid disease included first ever TIA (56.8% vs 68.8%; $p < 0.0001$), history of altered sensation (39.4% vs 45.8%; $p = 0.0322$), lightheadedness (13.0% vs 22.4%; $p = 0.0002$), and vertigo (3.6% vs 12.7%; $p < 0.0001$). **Conclusion:** TIA patients with older age, male sex, weakness, language disturbance or history of carotid stenosis need to be promptly imaged to assess for symptomatic carotid disease.

Keywords: diagnostic imaging, clinical assessment, transient ischemic attack (TIA)

LO011

Identification of mild acute cerebrovascular syndrome (ACVS) in the emergency department: validation of an ACVS clinical classifier to help distinguish mimics

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Introduction: National guidelines (NICE, AHA) for management of Acute Cerebrovascular Syndrome (ACVS) in the Emergency Department (ED) recommend the use of ABCD2 score to risk stratify patients despite its poor specificity and low diagnostic accuracy. The SpecTRA project previously developed a clinical classifier for ACVS vs. Mimic derived from historical clinical data collected during a 5-year period at an outpatient stroke clinic (Victoria, BC). Here we present a prospective evaluation of the performance of our clinical classifier on prospectively collected ED patient data compared to the industry-standard ABCD2. **Methods:** The prospective cohort consisted of ED patients (N = 555, Male = 54%, Mean (SD) Age = 68.7(15.5), ACVS = 70%) enrolled between Jan 2014 and May 2015 at Victoria General Hospital (BC) and Foothills Medical Centre (Calgary, AB). ABCD2 and clinical classifier scores were calculated from clinical data from the ED. We compared the performance of the two classifiers using DeLong's test of Dependent Receiver Operating Curves (ROC). In keeping with national guidelines, we used a score of 4 or more to assess sensitivity, specificity and accuracy (sens/spec and acc) of the ABCD2; for our clinical classifier, we used the cut point previously determined to maximize agreement between predictions and true class labels in the historical data. **Results:** Our new clinical classifier significantly outperformed the ABCD2 ($z = 2.44$, $p = 0.015$) with an AUC of 0.72, (95% CI: 0.68, 0.77) vs. 0.66 (0.61, 0.71). In terms of sens/spec and acc, our classifier achieved 0.78/0.55 with acc 71% compared to 0.75/0.46 with acc 66% for the ABCD2 (using the previously specified cut points). **Conclusion:** Our ACVS clinical classifier showed better performance than the ABCD2 score on a prospective sample of ED patients. The improved specificity of the clinical classifier relative to existing prognostic tools would reduce the number of non-ACVS patients referred for early treatment as well as conserve medical resources. Our ongoing multi-site study will evaluate the utility of the ACVS classifier embedded in a logic-enabled e-fillable form. This form will also provide risk-based thresholds guiding timely ordering of CTA as well as links to clinical treatment guidelines. Longer-term, the e-form and classifiers will be further enhanced to include plasma-based protein biomarker data.

Keywords: acute cerebrovascular syndrome, clinical decision rule, transient ischemic attack (TIA)

LO012

High-risk investigation findings for symptomatic carotid disease in ED TIA patients

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Introduction: About 20% of TIAs are due to large vessel disease. Carotid stenosis >50% which is causing a TIA or stroke needs to be definitely managed quickly in order to benefit. Alternatively, dual antiplatelet therapy may be considered. The objective of this study was to determine high-risk diagnostic findings associated with symptomatic carotid disease in ED patients with TIA to indicate patients requiring urgent carotid imaging. **Methods:** We performed a prospective Canadian multicenter cohort study, at 13 academic sites, of ED patients with TIA or non-disabling stroke from 2006-2014. Study research nurses recorded imaging findings on standardized data collection forms from the final reports of all imaging tests ordered in the ED on prospectively enrolled patients by treating emergency physicians. Symptomatic carotid disease was defined as carotid stenosis 50-99% or carotid dissection and was adjudicated by stroke neurology to be the etiology of the index event. Patients were followed by medical review and telephone up to 90 days. Univariate analysis was conducted for investigation results with our primary outcome. **Results:** The cohort included 305 patients with and 5,277 without symptomatic carotid disease. Positive predictors of symptomatic carotid disease included platelet count over 400 x 10^9/L (15.3% vs 7.6%; $p = 0.0095$), blood glucose >15 mmol/L (11.4% vs 4.4%; $p < 0.0001$), CT evidence of acute infarction (9.8% vs 4.1%; $p < 0.0001$), CT evidence of old infarction (35.7% vs 24.1%; $p < 0.0001$), and CT evidence of any infarct (43.3% vs 26.7%; $p < 0.0001$). There were no negative predictors of symptomatic carotid disease. **Conclusion:** High-risk investigation findings suggestive of symptomatic carotid disease in ED TIA patients include platelet count over 400 x 10^9/L, blood glucose >15 mmol/L, CT evidence of any infarction. Patients with any of these findings should be considered for rapid carotid imaging.

Keywords: transient ischemic attack (TIA), diagnostic imaging, carotid stenosis

LO013

Can you trust administrative data? Accuracy of ICD-10 codes for diagnosis of pulmonary embolism

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Introduction: Administrative data is a useful tool for research and quality improvement; however, the validity of research findings based on these data depends on their reliability. Diagnoses are recorded using diagnostic codes, as defined by the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10). Several groups have reported coding errors associated with ICD-10 assignments to patient diagnoses; these errors have serious implications for research, quality improvement, and policymaking. As part of a quality improvement project targeting emergency department (ED) diagnostic appropriateness for pulmonary embolism (PE), we sought to validate the accuracy of ICD-10 codes for studying ED patients diagnosed with PE. **Methods:** Hospital administrative data for adult patients (age ≥18 years) with an ICD-10 code for PE (I26.0 and I26.9) were obtained from the records of four urban EDs between July 2013 to January 2015. A review of medical records and imaging reports was used to confirm the diagnosis of PE. In the case of discrepancy between ICD-10 coding and chart review, the diagnosis obtained from chart review was considered correct. The physicians' discharge notes in the administrative database were also searched using 'pulmonary embolism' and 'PE', and patients who were diagnosed with PE but not coded as PE were identified. Coding discrepancies were quantified and described. **Results:** 1,453 ED patients had a PE ICD-10 code during our study period. 257 (17.7%) of these patients' diagnoses were improperly coded. 211 patients assigned an ICD-10 PE code had ED discharge diagnoses of 'rule-out PE' or 'query PE'. 64 other patients were miscoded as having a PE and should have been assigned an alternate code, such as chest pain, hypoxia, or dyspnea. The physician did not include a discharge diagnosis in 4 of the 64 miscoded patients; however, triage and physician assessment notes indicated no suspicion of PE. Furthermore, 117 patients who had an ED discharge diagnosis of PE were not assigned a PE code, meaning that 8.91% of true PEs were missed by using ICD-10 codes alone. Thus, 1,313 ED patients truly had a PE. **Conclusion:** Our work suggests the need for more accuracy in ICD-10 coding of ED diagnoses of PE. Caution should be exercised when using administrative data for studying PE, and validation of the accuracy of ICD-10 coding prior to research use is recommended.

Keywords: pulmonary embolism, ICD-10

LO014

What ultrasonography characteristics predict surgical intervention for testicular torsion in adults?

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Introduction: Testicular torsion is a time sensitive condition for which there can be significant delays to surgery or transfer to definitive care while trying to obtain an ultrasound to confirm the diagnosis. This study determines the test characteristics for each individual sonographic sign of testicular torsion associated with the patient requiring surgical intervention. **Methods:** A retrospective health records review of adult patients with acute, non-traumatic scrotal pain or swelling (defined as under 24 hours since onset) presenting to one of two Canadian academic tertiary care emergency departments between November 2009 and March 2013 was performed. A single data abstractor completed a case report form for each patient including demographics, individual ultrasound findings, final diagnosis, and need for surgical intervention. The sensitivity and specificity of each ultrasonographic sign (including testicular heterogeneity, decreased colour doppler, and decreased pulsed wave doppler) at predicting surgical intervention during the same hospital visit was calculated along with 95% confidence intervals. **Results:** During the study period there were a total of 876 emergency department visits for scrotal pain, of which 198 patients met our inclusion criteria. The included patients had a mean age of 36.2 years. Decreased blood flow to the painful testicle on colour doppler showed the best overall test characteristics with a sensitivity of 82.4% (95% CI 55.8%-95.3%) and specificity of 100% (95% CI 96.3%-100%) for predicting a need for surgical intervention for testicular torsion. Other ultrasound findings for testicular torsion included a heterogeneous appearance of the painful testicle (sensitivity 47.1% [95% CI 23.9%-71.5%], specificity 77.4% [95% CI 68.9%-84.2%]), and decreased arterial or venous flow on pulsed wave doppler (sensitivity 76.5% [95% CI 49.8%-92.1%], specificity 100% [95% CI 96.3%-100%]). **Conclusion:** Decreased blood flow to the painful testicle on colour doppler showed excellent specificity and can rapidly "rule-in" a need for surgical intervention for testicular torsion. Given that colour doppler is relatively easy to learn and perform, future studies should assess the use of colour doppler using point of care ultrasound to expedite surgical consultation.

Keywords: testicular torsion, point-of-care ultrasound (PoCUS), ultrasound

LO015

A multi-centered regional emergency department study of renal colic management using medical expulsion therapy

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Introduction: Patients with renal colic present frequently to the emergency department (ED). Existing literature suggests management with medical expulsion therapy (MET) may improve outcomes, especially for those with stones > 5 mm in size. This study evaluates the use of MET in the management of adult patients seen in regional EDs with a diagnosis of renal colic. **Methods:** A multi-centered medical chart review study was conducted in seven Edmonton-Zone EDs. Approximately 100 cases from each site were randomly selected from administrative data from the 2014 calendar year, no repeat cases were permitted. Using a standardized data collection process and trained research assistance, data were abstracted from medical charts. Medians and inter-quartile ranges (IQR), proportions, and odds ratios (OR) with 95% confidence intervals (CIs) are reported. **Results:** Overall, 656 patient charts were included in the review; median age was 46 years (IQR: 35, 46) and 249 (38%) were female. Few (10%) arrived by ambulance or were on MET therapy at presentation; however, many (51%) reported a previous episode of renal colic. Many (191 {29%}) received no initial ED imaging; CT (236 {36%}) was favoured over ultrasound (39 {6%}) for initial imaging, either alone or with plain radiographs (8%). Plain radiographs were frequently ordered (204 {31%}). Only 198 (31%) of charts contained documentation of the use of MET at discharge and the median duration of therapy was 10 days (IQR: 7, 14). Initiation of MET therapy did not vary based on older age (OR = 0.8; 95% CI: 0.57, 1.14); sex (OR = 0.9; 95% CI: 0.67, 1.33); resident involvement (OR = 1.1; 95% CI: 0.63, 2.0); presentation to an academic centre (OR = 1.4; 95% CI: 0.96, 1.95) or stone size (OR = 1.3; 95% CI: 0.76, 2.06). **Conclusion:** Management of renal colic with MET is uncommon in this region and practice variation appears driven by physician preference rather than evidence. Practice guidelines with standardized order sets are urgently needed to improve care.

Keywords: renal colic, medical expulsion therapy, emergency department

LO016

Can we use administrative data to define an emergency department population at risk for pulmonary embolism? Development and validation of an algorithm to identify a research population

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Introduction: Pulmonary embolism (PE) is a potentially life-threatening condition that is in the differential diagnosis of many emergency department (ED) presentations. However, no diagnostic code for *suspected PE* exists. Thus, identifying the population of patients undergoing PE workup from administrative data for use as a denominator in clinical research and quality improvement can be difficult. To overcome this, we used standardized triage complaint codes and investigations to develop search algorithms useful to identify patients undergoing PE workup from an administrative dataset. Our objective was to quantify the sensitivity, specificity, and case yield of these search algorithms in order to identify a superior search strategy. **Methods:** Hospital administrative data for adult patients (age $\geq$ 18 years), which included standardized triage complaint codes and ICD-10 diagnostic codes for PE, were obtained from four urban EDs between July 2013 to January 2015. Standardized triage complaint codes were evaluated for the proportion of patients diagnosed with PE. Combinations of high-yield presenting complaints, in combination with D-dimer testing or imaging orders, were evaluated for sensitivity, specificity, and predictive values for PE. **Results:** Of 479,937 patients presenting with 174 different complaints, 1,048 were diagnosed with PE. The best-performing search strategy was the combination of standardized CEDIS complaints of Cardiac Pain, Chest Pain (Cardiac Features), Chest Pain (Non-Cardiac Features), Shortness of Breath, Syncope/Pre-syncope, Hemoptysis, and Unilateral Swollen Limb/Pain, along with with D-dimer testing and/or CTPA, or V/Q scan. This combination captured 808 PE diagnoses for a sensitivity of 77.1% (95%CI 74.4-79.5%) and specificity of 86.8% (95%CI 86.7-86.6%). **Conclusion:** We identified a high-yield combination of presenting complaints and test ordering that can be used to define an ED population with suspected PE. This population of patients can be used as a denominator in research or quality improvement work that evaluates the utilization of diagnostic testing for PE.

Keywords: pulmonary embolism

LO017

Review of prehospital naloxone use in Ontario: Is a mandatory patch point necessary?

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Introduction: Recent years have brought an epidemic of opioid abuse to Canada. At present, in Ontario, Naloxone may not be administered by any paramedic without the direct online medical approval of a Base Hospital Physician (BHP). The objective of this study was to review the use of Naloxone by Emergency Medical Service (EMS) personnel, under the existing Advanced Life Support Patient Care Standards (ALS-PCS) medical directive for opioid toxicity, for safety and potential complications that may occur with removal of the mandatory patch point. **Methods:** This study was a retrospective ambulance call report review of consecutive Naloxone requests placed to a BHP of the Regional Paramedic Program of Eastern Ontario (RPPEO) between Oct 1st, 2013 and Oct 31st, 2015. The RPPEO consists of 10 prehospital services, both urban and rural jurisdictions, and has a mix of advance care and primary care paramedics. All ambulance call reports are electronically stored at the secured RPPEO data warehouse. Data was extracted using a standardized data collection tool. All ambulance call reports were reviewed by 2 independent authors (VC, NC). Compliance with the existing medical directive for opioid toxicity was determined. We calculated the frequency of denied Naloxone requests and the rationale for each patch refusal was recorded. We also categorized all adverse events associated with Naloxone administration. **Results:** From 244 patches, 215 patients were administered Naloxone. Only 7.8% (19/215) of requests for Naloxone were refused; 78.9% (15/19) did not meet existing inclusion criteria for Naloxone administration in the ALS-PCS medical directive for opioid toxicity because the patient's respiration rate was above 12/min. Of the 215 patients who were administered Naloxone, adverse events were extremely uncommon: 5 (2.3%) became violent or verbally abusive, 1 (0.5%) was transiently hypertensive and 4 (1.9%) vomited. **Conclusion:** Requests for Naloxone to a BHP are common and yet are seldom declined. The use of prehospital Naloxone is associated with few adverse events. These results demonstrate that it would be safe to remove online medical direction for Naloxone from the ALS-PCS medical directive for opioid toxicity if combined with updated paramedic education.

Keywords: emergency medical services (EMS), xaloxone, opioid

LO018

The utility of ECG characteristics as prognostic markers in pulseless electrical activity arrests: a retrospective observational cohort study

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Introduction: Compared to pseudo-pulseless electrical activity (PEA with myocardial contractions present), true PEA is hypothesized to carry a poorer prognosis and to show bradycardia and a wide QRS complex on ECG. Our objective was to study the predictive potential of ECG characteristics on survival to hospital discharge (SHD) for out-of-hospital cardiac arrest (OHCA) patients with PEA initial rhythm. **Methods:** We studied a cohort of OHCA patients prospectively enrolled between Sept. 2007 and Oct. 2009 at the Ottawa/OPALS site (13 cities, 7 EMS, and 6 Fire services) of the ROC PRIMED study. We included adult (≥ 18) non-traumatic OHCA with PEA initial rhythm where resuscitation was attempted, and for which ECG characteristics were available. We measured mean heart rate (HR), mean QRS interval, and presence of P waves (each with kappa agreement) using the first six QRS complex available. We report patient and system characteristics using descriptive statistics and determined the impact of ECG characteristics (HR, QRS width, P waves) on return of spontaneous circulation (ROSC) and SHD using multivariate regression analysis. **Results:** Demographics of 332 included cases were: mean age 71.7; male 58.4%; home residence 76.5%; bystander witnessed 56.3%; bystander CPR 28.5%; interval from dispatch to paramedic arrival 6min:24sec; ROSC at ED arrival 26.5%; SHD 5.4%. Survivors had higher mean HR (66.1 vs. 52.0 bpm, $p = 0.83$; kappa = 0.69) and shorter mean QRS intervals (108.3 vs. 129.6 ms, $p = 0.01$; kappa = 0.74) compared to non-survivors. Presence of p waves could not reliably be ascertained (kappa = 0.35). Predictors of ROSC were: ALS paramedic on scene (AdjOR = 8.90, 95%CI 1.11-71.41; $p = 0.04$), successful intubation (AdjOR = 3.35, 1.75-6.39; $p = 0.0002$), and use of atropine (AdjOR = 0.27, 0.14 - 0.50; $p < 0.0001$). Predictors of survival were: location of arrest (AdjOR = 1.49, 1.11 - 1.99; $p = 0.007$), and use of atropine (AdjOR = 0.06, 0.02-0.22; $p < 0.0001$). Despite various cutoff explorations, ECG characteristics were not predictive of ROSC or survival in multivariate analyses. Survivors had HR as low as 6 bpm and QRS as wide as 357 ms. **Conclusion:** Early ECG characteristics could not predict ROSC or SHD in a population of OHCA PEA victims, and should not be used to terminate resuscitation efforts. Atropine administration was consistently associated with decreased likelihood of ROSC and survival.

Keywords: cardiac arrest, electrocardiogram (ECG), emergency medical services (EMS)

LO019

The prevalence and characteristics of non-transported EMS patients in Nova Scotia

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Introduction: An undefined yet potentially significant risk for Emergency Medical Services (EMS) systems are patients who access 911 with an ambulance response who are not transported to hospital (non-transport). Our objective was to determine the prevalence and associated characteristics of non-transport and potentially clinically adverse non-transports in Nova Scotia. **Methods:** We conducted a secondary analysis of pooled cross-sectional, population-based administrative data in a provincial EMS system that provides care to 920,000 residents. Electronic patient care record (ePCR) data was retrospectively analyzed for one calendar year (2014). The dependent variables were non-transport status and potentially adverse non-transport status. Potentially adverse non-transports were defined as a repeat call within 48 hours for a related complaint with the outcome of transport or death. Independent variables include patient characteristics, (age, sex, vitals and paramedic clinical impression), operational (crew type and response code) and environmental (time, date, and location). For both objectives we determined the prevalence of the outcome of interest, and associated characteristics. **Results:** There were 74,471 EMS responses between January to December 2014, 18.9% (n = 14, 094/74,471) resulted in a non-transport. The characteristics most associated with non-transport are: age, paramedic clinical impressions, number of co-morbidities, response mode, and incident location type. As age decreased, the likelihood of non-transport increased. Younger non-transported patients (0-15 years old) (OR 2.2, 99.9% CI 1.9-2.5) are more likely to have non-transport. Relative to other paramedic

clinical impressions, glycemic issues (OR 4.8; 99.9% CI 3.9-5.7) and wellness checks (OR 6.5; 99.9% CI 5.7-7.3) are more likely to have a non-transport. Non-transports are more likely at a detention facility (OR 4.1; 99.9% CI 3.2-5.1) or a roadway (OR 2.4; 99.9% CI 2.1-2.8). 5.6% (n = 798/14094) of non-transport patients were classified as a potentially adverse non-transport. **Conclusion:** This study demonstrated that a significant portion of patients (18.9%) had a non-transport outcome, but only a small percentage (5.6%) were considered potentially adverse. The results of this study provide timely information to policy makers and healthcare practitioners on the scope of this issue, and suggest potential directions for future study and clinical decision making.

Keywords: non-transport, emergency medical services (EMS), transport

LO020

Obstacle course runs: review of acquired injuries and illnesses at a series of Canadian events (RACE)

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Introduction: The growing popularity of obstacle course runs (OCRs) has led to significant concerns regarding their safety. The influx of injuries and illnesses in rural areas where OCRs are often held can impose a large burden on first responders, Emergency Medical Services (EMS) and local Emergency Departments. Literature concerning these events is minimal and mostly consists of media reports. Recognizing the lack of epidemiologic data, we sought to accurately determine the patterns and frequency of injuries and illnesses that occur at OCRs, the treatments required, and what proportion require further medical care or transfer to hospital. **Methods:** Data were extracted from medical charts completed for all patients presenting to the on-site medical team at OCR events across Canada from May to August, 2015. Frequency and patterns of injuries and illnesses were determined as well as treatments and disposition. There were 45 285 OCR participants in 8 events. There were 572 total patient contacts and 557 patients were included in the study. 15 patients were excluded because they were not race participants. **Results:** Less than 2% of participants at any event required on-site medical care. 11 patients (1.97%) required transfer to hospital by EMS. The majority of injuries were musculoskeletal in nature (74.71%). 495 patients (88.87%) returned to the event with no need for further medical care. The majority of treatments could be provided with first aid training and basic medical equipment. **Conclusion:** Injury and illness rates at this series of OCRs was similar to other mass gathering events. Injuries were mostly musculoskeletal in nature and required minor treatment. Having a medical team on site likely reduced local hospital and EMS volume from these events. This study raises the question of whether having a physician on site at OCRs could significantly reduce the number of patients advised to seek further medical care or the number of ambulance transfers. Prospective research is needed in order to develop plans for more appropriate resources, safety protocols, and medical staffing, thereby improving patient care and reducing the burden on local EMS and rural hospitals.

Keywords: prehospital, sports medicine

LO021

Use of health services among non-institutionalized frail elderly with fracture: preliminary results

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Introduction: Frail older adults experience an increased risk of a number of adverse health outcomes such as comorbidity, disability, dependency, institutionalization, falls, fractures, hospitalization, and mortality. Identification of frail adults is important. The objective of this study is to examine the association between frailty and use of health services (emergency, general practitioner, hospitalization) prior to and following a visit for a fracture in non-institutionalized seniors. **Methods:** This study is a population-based cohort build from the Quebec Integrated Chronic Disease Surveillance System, an innovative chronic disease surveillance system linking five health care administrative databases. Algorithms using data from this system are accurate and reliable for identifying fractures. The sample includes 179,734 seniors $\geq$ 65 years old, non-institutionalized in the year before the fracture. Their frailty status was measured using the elderly risk assessment index. Poisson regression models were used to compare use of health services (emergency, general practitioner, hospitalization) 1 year before and 1 year after a visit for a fracture (adjusting for age, sex, comorbidities, social deprivation, material deprivation and site of fracture). **Results:** Overall, preliminary results show that the use of health services increased significantly in the year following the fracture in frail non-institutionalized elderly vs the non-frail one ($p < 0.05$). **Conclusion:** This study suggests that frail seniors with a fracture require more health services after their incident fracture. Furthermore, using a frailty assessment index in health administrative databases can help identify seniors that are at high risk of needing more health services and, therefore, improve their care.

Keywords: frailty, fracture, health administrative databases

LO022

Incidence and impact measurement of delirium induced by ED stay - INDEED

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Introduction: Delirium is a dreadful complication in seniors' acute care. Many studies are available on the incidence of delirium, however ED-induced delirium is far less studied. We aim to evaluate the incidence and impact of ED-induced delirium among older non-delirious admitted ED patients who have prolonged ED stays ($\geq$ 8 hours). **Methods:** This prospective INDEED study phase 1 included patients recruited from 4 Canadian EDs. Inclusion criteria: 1) Patients aged 65 and over; 2) ED stay $\geq$ 8 hours; 3) Patient is admitted to the hospital; 4) Patient is non-delirious upon arrival and at the end of the first 8 hours; 5) Independent or semi-independent patient. Eligible patients were assessed by a research assistant after an 8 hour exposition to the ED and evaluated twice a day up to 24h after ward admission. Patients' functional and cognitive status were assessed using validated OARS and TICS-m tools. The Confusion Assessment Method was used to detect incident delirium. Hospital length of stays (LOS) were obtained. Univariate and multivariate analyses were conducted to evaluate outcomes. **Results:** Of the 380 patients prospectively followed, mean age was 76.5 ($\pm$ 8.9), male represent 50% and 16.5% very old seniors ($>$ 85 y.o.). The overall incidence of ED-induced delirium was 8.4%. Distribution by the 4 sites was: 10%, 13.8%, 5.5% & 13.4%. The mean ED LOS varied from 29 to 48 hours. The mean hospital LOS was increase by 6.1 days in the delirious patients compared to non-delirious patient ($p < 0.05$). Increase mean hospital LOS distribution by site was by: 6.9, 8.5, 4.3 and 5.2 days for the ED-induced delirium patients. **Conclusion:** ED-induced delirium was recorded in nearly one senior out of ten after a minimal 8 hour exposure in the ED environment.

An episode of delirium increases hospital LOS by about a week and therefore could contribute to ED overcrowding.
Keywords: delirium, length of stay

LO023

Association between ED-induced delirium and cognitive & functional decline in seniors

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Introduction: Delirium is a common medical complication among seniors in hospital setting. In the emergency department (ED), its prevalence varies between 7 & 14%. Delirium is associated with increased mortality & longer hospital stay. This condition is also associated with functional & cognitive decline in hospitalized seniors and higher risk of institutionalization up to 2 years after their discharge. However, no data is currently available for ED patients. The aim of this study was to evaluate the association between ED-induced delirium and functional & cognitive decline in seniors at 60 days. **Methods:** This study is part of *the Incidence and Impact measurement of Delirium Induced by ED-Stay (INDEED)* study, an ongoing multicenter prospective cohort study in 5 Quebec EDs. Patients were recruited after 8 hours in the ED and followed up to 24h after admission. A 60-day follow-up phone assessment was also conducted. Delirium was measured by the validated Confusion Assessment Method & the Delirium Index. Functional status was measured by the validated OARS. Cognitive status was measured using the validated TICS-M. Functional and cognitive decline were obtained by comparing the baseline and 60-days follow-up scores. **Results:** 380 seniors were recruited and 280 had 60-day follow-up data available. ED-induced delirium was 8.4% of seniors. There was a difference in mean functional decline among seniors with and without ED-induced delirium 2.95(1.23-4.67) vs 1.55(1.20-1.91, $p_{wlicoxon} = 0.05$] Proportion of seniors showing a decline ≥ 2 points on the OARS was significantly higher In those with ED-induced delirium (65,0 % vs 40.18 %, $p = 0.03$). Seniors with ED-induced delirium also showed a significant decline in mean TICS scores [3.31 (0,82-5.84) vs -0.01 ((-.071-0.75)), $p_{wlicoxon} = 0.009$]. There was no significant difference in the proportions of seniors showing a decline ≥ 3 OARS points between those with or without delirium ($p = 0.06$). **Conclusion:** ED-induced delirium seems to be associated with poor functional and cognitive outcomes in older patients 60 days after discharge from the hospital. Further studies are required to confirm clinical importance ED-induced delirium delayed complication.
Keywords: delirium, geriatrics, emergency department

LO024

Time to perform ultrasound guided femoral nerve block in older hip fractures patients by emergency physicians

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Introduction: Ultrasound-guided femoral nerve block (USFNB) is optimal for providing analgesia for patients with hip fractures, but is rarely performed. Time of the procedure was cited as a barrier in our previous survey. **Methods:** We conducted a knowledge-to-practice intervention that included a two-hour training session on USFNB, use of a block kit, and reminders to improve uptake of USFNB. We measured the time it took for trained EPs to complete the block during a 20 month period. **Results:** Of 36 EPs, 34 (94.4%) were not routinely performing USFNB at the beginning of the study, and 4 declined to participate, leaving 30 participants who received training. The 30 trained EPs performed 100 USFNB over the next 20 months (range 1 to 20 blocks per EP). The mean reduction in pain was -4.47 on a 10 point numeric rating scale. The median time to perform the blocks was 15.0 minutes (IQR, 10 to 20 minutes), and 90 % of blocks took less than 30 minutes. The most common reason given for not performing a block was excessive clinical load. **Conclusion:** Given that we included 88.2% of eligible EP's and included the first time EP's performed a USFNB, our estimates of time to perform USFNB block should generalize to other Canadian academic ED's. Time to complete USFNB is in keeping with other commonly performed ED procedures and should not be a barrier to optimizing analgesia.
Keywords: older adults, hip fracture, regional anesthesia

LO025

In support of Choosing Wisely: variation in CT ordering for patients presenting to emergency with minor head injury

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Introduction: Individual and institutional disparities in CT imaging rates for patients with head injuries have long been recognized, leading to the development of well-validated clinical decision rules designed to standardize clinical practice. To assess their impact on current practice, we sought to evaluate variation in CT imaging by emergency physicians for patients presenting with head injury across the province of Alberta. **Methods:** A unique data warehouse merging administrative, clinical, and imaging platforms for 11 Alberta emergency departments (EDs) was created. Unique identifiers were obtained for all emergency physicians who were included in this analysis if they evaluated in excess of ten ED patients presenting with a chief complaint of "head injury". Patients with high triage acuity (CTAS 1) were excluded, as were patients who were admitted to hospital. Descriptive statistics were employed to describe variation between physicians and sites for a 24 month period from 2013-2015. **Results:** 311 emergency physicians treating 20,797 patient encounters for head injury were included. Overall a total of 8,245 head injury patients (40%) received one or more CT scans. Physician variation across the 11 sites ranged from 4% -100% of head injury patients receiving a CT. Within sites CT ordering between physicians varied from 9-fold (4% - 36%) at the lowest variation site, to more than 20-fold (4% - 90%) at the highest variation site. After removing the 5% lowest and highest ordering physicians, variation in ordering continued to range from 10% - 72%. No trends were observed across the two years examined. **Conclusion:** This is the largest study to date examining physician level variation in CT ordering practices for ED head injury patients. We have identified marked persistent practice variation despite the presence of well-validated clinical decision rules and a relatively low risk medicolegal environment. Variable risk tolerance and limited use of validated clinical decision rules are likely contributors making this area an ideal focus for targeted interventions to improve imaging appropriateness and reduce practice variation.
Keywords: Choosing Wisely, CT scans, practice variation

LO026

Outcomes of a provincial cardiac reperfusion strategy: a population-based, retrospective cohort study

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Introduction: Nova Scotia has a province wide reperfusion strategy for the treatment of patients presenting with acute ST-Elevation Myocardial Infarction (STEMI). Patients are referred for primary percutaneous coronary intervention (PPCI) if a first medical contact to device time can be achieved within 90 to 120 minutes; otherwise, fibrinolytic therapy is administered, as per guideline recommendations. Since 2011, Nova Scotian paramedics have been providing prehospital fibrinolysis (PHF) and prehospital catheterization (cath) lab activation for STEMI patients outside and within the PPCI catchment area, respectively. Patients who received fibrinolysis are transferred to a PCI facility if rescue PCI is required or if there are other indications for urgent intervention. This province wide approach is unique and the objective of this retrospective cohort study is to compare the impact of this approach on the primary outcome of 30-day mortality. **Methods:** For the study period, July 2011 to July 2013, STEMI patients who were diagnosed prehospital or in the ED who subsequently underwent reperfusion therapy were identified in the Emergency Health Services (EHS), Cardiovascular Information Systems (CVIS) and Cardiovascular Health Nova Scotia (CVHNS) databases. Baseline demographics and outcomes were then compared according to the treatment received: 1) PHF; 2) ED Fibrinolysis (EDF); 3) prehospital activated PPCI (EHS PPCI); and 4) ED activated PPCI (ED PPCI). **Results:** There were a total of 1107 STEMI patients identified during the study period, of whom 742 received lytic therapy (146 PHF; 596 EDF) and 332 underwent PPCI (202 EHS PPCI; 130 ED PPCI). Demographic variables were similar across the groups. The primary outcome of 30-day mortality was not significantly different across groups: 5 (3%) in PHF, 26 (4%) in EDF, 8 (4%) in EHS to PPCI and 2 (2%) in ED to PPCI. The number of rescue PCIs was 28 (19%) in PHF and 102 (17%) in EDF. Other outcomes (key timestamps) are pending. **Conclusion:** Our results show that the 30-day mortality was lowest for patients undergoing PPCI and slightly less for patients receiving pre-hospital fibrinolytic compared to those receiving ED fibrinolytic with no difference in the proportion requiring subsequent rescue PCI. The majority of patients in rural areas received EDF as opposed to PHF; pending results will show if this represents a delay in patient presentation after symptom onset.
Keywords: prehospital, fibrinolysis

LO027

Cervical spine injury in trauma patients 65 years and older immobilised in the prehospital setting

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Introduction: Following a protocol derived from the Canadian C-spine Rule (CCR), patients 65 years and older transported by ambulance after trauma require full spinal immobilisation. Immobilisation complicates the transport and the evaluation; potential side effects have been recognized. The aim of this study was to evaluate the effect of mechanism of trauma and age on the rate of cervical injury in a geriatric population. **Methods:** We conducted a retrospective observational study on patients 65 years and older transported by ambulance to a level-one trauma center from March 2008 to October 2013. The outcome was the rate of clinically important cervical spine injury (CICSI), defined as any fracture, dislocation or ligamentous injury needing treatment or specialised follow up. The rate was calculated in the geriatric population and in the subgroup of patients with minor trauma, defined as a fall from a standing height, a chair or a bed. We then looked at the rate of CICSI based on age to define a subgroup at lower risk of lesion. **Results:** We included 1221 patients with a mean age of 80 y.o. (SD = 8), 739 women (61%). CICSI was found in 53 patients (4.3%, 95% CI 3.2-5.4). This is similar to the rate found in patients 65 years and older in the NEXUS population (4.6%) and the CCR population (6.0%). The mechanism of injury was a minor trauma for 716 patients (59%). Of those, 24 patients (3.4%, 95% CI 2.1-4.7) had CICSI. The rate increased after 85 y.o in both the overall population (3.4% vs 6.4%) and the minor trauma subgroup (2.6% vs 4.4%). **Conclusion:** The subgroup of patients 65-84 y.o. with a minor trauma had the lower rate of cervical spine injury (2.6%). In a lot of prehospital systems, those patients are not systematically immobilised for transport. It will be interesting to review the files of all patients with CICSI to identify any possible case that would have been missed without the age criteria.
Keywords: prehospital, immobilization, geriatrics

LO028

Prospective validation of an iOS app to evaluate tremor in patients with alcohol withdrawal syndrome

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Introduction: Ideal management of alcohol withdrawal syndrome (AWS) incorporates a symptom driven approach, whereby patients are regularly assessed using a standardized scoring system (Clinical Institute Withdrawal Assessment for Alcohol-Revised; CIWA-Ar) and treated according to severity. Among the domains assessed by the CIWA-Ar, tremor is the most objective indicator of withdrawal severity, however, the ability of clinicians to reliably quantify tremor is highly dependent on experience. The objective of this study was to prospectively validate an objective, reliable tool to standardize and quantify the severity of alcohol withdrawal tremor using the built-in accelerometer of an iOS application. **Methods:** A prospective observational study of patients $\geq$18 years presenting to an academic emergency department in alcohol withdrawal was conducted from Oct 2014 to Aug 2015. Assessments were videotaped by a research assistant and subsequently reviewed by 3 clinical experts, blinded to the primary clinical assessment. Tremor severity was scored using the 8-point CIWA scale (0 = no tremor, 7 = severe tremor). Accelerometer derived results were compared to expert assessments of each video. Inter-rater agreement was estimated using Cohen's kappa (k) statistic. **Results:** 76 patients with 78 tremor recordings were included. Accelerometer derived tremor scores matched exactly with expert assessor scores in 36 (46.2%) cases, within 1 point for 73 (93.6%) cases and differed by $\geq$ 2 points in 5 (6.4%) cases. The overall kappa for agreement within 1 point for tremor severity was 'very good' 0.92 (95% CI: 0.86, 0.99). **Conclusion:** iOS accelerometer based assessment of the tremor component of the CIWA-Ar score is reliable and has potential to more accurately assess the severity of patients in alcohol withdrawal. We anticipate this resource will be easily disseminated and will impact and improve the care of patients with alcohol withdrawal.
Keywords: alcohol withdrawal, validation, interrater agreement

LO029

Undetected serious medical illness in mental health patients seen in an academic emergency department

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Introduction: Mental health concerns make up 5-10% of all adult presentations to Canadian emergency departments (ED). One challenge

for the emergency physician (EP) is determining if a patient with a mental health concern has concomitant underlying medical illness. We defined "serious medical illness" (SMI) as a pathological condition that requires inpatient treatment on a medical or surgical ward. SMI undetected by emergency physicians in patients presenting with mental health concerns may result in adverse patient outcomes. The aim of this study was to determine the prevalence, timing, and etiology of undetected SMI in the ED among adult patients presenting with mental health concerns. **Methods:** A retrospective chart review was performed on all patients age 18 and older who presented to the ED at Victoria Hospital, London Health Sciences Centre between October 1, 2014 and April 30, 2015, who were subsequently referred to psychiatry by the EP. The primary outcome was the number of patients transferred to a medicine or surgery inpatient unit for treatment of their SMI within seven days of psychiatry admission from the ED. **Results:** 1,255 patients were referred to psychiatry during the study period. 803 patients were admitted and 452 were discharged. Of the admitted patients, 14/803 patients (1.7%) met our primary outcome. The mean age of patients in the SMI group (n = 14) was 64 years. The mean age in the non-SMI group (n = 1,241) was 38. In the SMI group, 3/14 patients died, 2/14 patients required an ICU admission, and 2/14 patients underwent a surgery for their missed SMI. The average length of psychiatry admission prior to transfer was 3.7 days. The average length of medical/surgical admission after transfer from psychiatry was 8.3 days. Undetected diagnoses included NSTEMI, serotonin syndrome, lithium toxicity, thoracic aortic aneurysm, gastrointestinal stromal tumour, forearm abscess, Parkinsonian crisis, and others. **Conclusion:** This chart review demonstrated a 1.7% rate of undetected serious medical illness in patients who presented to the ED with mental health concerns. Adverse outcomes included death, ICU admissions, and surgeries. This rate is similar to other studies on the topic. The SMI group tended to be older than the non-SMI group. This research may have implications on the appropriate workup and disposition of elderly patients presenting to the ED with mental health concerns.
Keywords: mental health, undetected medical illness

LO030

Inter-rater agreement of nurse and clinical expert tremor assessments for patients with alcohol withdrawal syndrome in the emergency department

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Introduction: Of the domains assessed by the CIWA-Ar, tremor is the most objective, and reliable clinical symptom of alcohol withdrawal syndrome. Even so, anecdotal evidence suggests that the ability of health care workers to reliably rate tremor severity is highly variable, and there is no high quality, readily available training to teach this competency. Improper evaluation and interpretation of tremor may result in under or over treatment, posing serious risks to patient safety, prolonging emergency department (ED) length of stay, and increasing the likelihood of complications/hospital admission. The objective of this study was to prospectively compare tremor assessment scores assigned by nurses and clinical experts for patients with alcohol withdrawal syndrome in the ED. **Methods:** A prospective observational study was conducted for patients ≥18 years presenting to an academic ED in alcohol withdrawal from Oct 2014 to Aug 2015. Individual tremor assessments were videotaped by a research assistant and subsequently reviewed by 3 clinical experts, blinded to the primary clinical assessment. Tremor severity was scored using the 8-point CIWA scale (0 = no tremor, 7 = severe tremor). Tremor severity scores assigned in real-time by the nurses were compared to expert assessments of each video. Inter-rater agreement was estimated using Cohen's kappa (k) statistic. **Results:** 31 patients with 62 tremor recordings were included. Nurse-derived tremor scores matched exactly with expert assessor scores in 11 (17.7%) cases, within 1 point for 29 (46.8%) cases and differed by ≥ 2 points in 33 (53.3%) cases. The overall kappa for agreement within 1 point for tremor severity was 'fair' 0.39 (95% CI: 0.25, 0.53). **Conclusion:** These results confirm the high variability in the assessment of alcohol withdrawal tremor by health care workers. Future research should focus on ways to improve the accuracy of tremor in alcohol withdrawal patients, and the development and implementation of an educational program to improve the individual competencies of clinical staff in the recognition and treatment of alcohol withdrawal in the ED.
Keywords: alcohol withdrawal, tremor, inter-rater agreement

LO031

The epidemiology of emergency department visits for dog-related injuries in Alberta

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Introduction: Injuries due to interactions with dogs (e.g. bites, collisions, etc) are an important public health concern from both a health and an economic perspective. The consequences of these injuries can be both physical (injury, pain, infection, disfiguration) and psychological. The purpose of this study is to understand the prevalence and characteristics of dog-related injuries among patients presenting to Alberta emergency departments (EDs). Further, this study describes the burden of these injuries on ED economic health care resources. **Methods:** This retrospective, administrative database cohort study utilised the National Ambulatory Care Reporting System (NACRS) to identify all visits made to Alberta EDs in fiscal years 2010/11 through 2014/15 for dog-related injuries. ED visits where the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA) code "W54-Bitten or Struck by Dog" appeared in the first four diagnosis fields were captured. The Canadian Institute for Health Information costing model utilising the Comprehensive Ambulatory Classification System and Resource Intensity Weights was employed to calculate average unit health care costs for ED visits excluding physician fees. Data were analyzed using descriptive statistics. **Results:** During the 5 year study period, Albertans made 21,821 ED visits for dog-related injuries. The ED visit rate was highest in children under 2 years of age, namely 234 per 100,000 for males and 206 per 100,000 for females. ED visit rates were highest for patients residing in the northern health region of the province (220/100,000) compared to metropolitan areas (90/100,000 and 64/100,000 for Edmonton and Calgary zones respectively). One third of visits occurred in the summer months, with a greater proportion of visits occurring on the weekend (34.4%). The predominant areas of injury were wrist/hand/fingers (n = 7756 visits; 35.5%) and head/face/neck (n = 5152 visits; 23.6%). In 287 visits (1.3%), the patient was admitted to hospital. ED visit costs were highest for children 4 years of age and younger ($243.86/visit; $p < 0.001$). **Conclusion:** Dog-related injuries result in a substantial number of ED visits and significant costs in Alberta. Understanding the characteristics of these injuries provides an opportunity for prevention, including strategies focussed on higher risk groups involving children and residents of rural areas.
Keywords: injury

LO032

Use of pharmacological sleep aids among emergency medicine staff physicians in a Canadian tertiary-care setting: a web based survey

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Introduction: Emergency medicine by its nature requires shift-work that often follows an erratic and unpredictable pattern. Faced with this ongoing challenge we hypothesized that many ED physicians may have taken steps to minimize their personal sleep deprivation through the use of a pharmacological sleep aid (PSA). The extent and nature of PSA use in this population is not well studied. We sought to describe the use of PSAs amongst practicing ED physicians in a Canadian tertiary-care setting. We also hoped to determine the specific substances being used, their frequency and predictive factors contributing to their use. **Methods:** A cross-sectional descriptive web-based survey was sent via e-mail to all practicing staff emergency physicians within the Calgary zone of Alberta Health Services. Participation was entirely voluntary and all responses were anonymous. Descriptive statistics were used to assess frequencies and summary measures. Logistic regression was used to explore associations between key variables. **Results:** Of the 198 eligible ED physicians, 144 (73%) completed the survey. 132 (92%) felt that shift-work negatively affected their ability to sleep and 121(84%) had experienced insomnia at some point in their medical career. 96 (67%) ED physicians had used a PSA at some time in their career and 82(57%) were currently using a PSA with any frequency. The most frequent sleep aids currently being used were non-benzodiazepine hypnotics (65%), alcohol (31%) and melatonin (27%). 66(46%) respondents required a prescription for their PSA and 37(56%) of those had obtained a prescription from an ED physician colleague. Physician self-reporting of experience with insomnia was strongly associated with prior use of any PSA (OR 4.0; 95% CI 1.6-10.0) and prior use of non-benzodiazepine hypnotics (OR 14.4; 95% CI 3.2-64.2) There was no statistically significant association between current use of a PSA and physician age, physician gender, number of night shifts worked per month or co-habitation with children. None of the physicians who responded felt that their use of a PSA adversely affected their ability to provide quality patient care. **Conclusion:** Pharmacological sleep aid use among Canadian ED physicians may be more common than previously assumed. This could have implications for physician wellbeing and performance.

Keywords: sleep, shiftwork, wellbeing

LO033

Attitudes of emergency physicians towards homeless and substance using patients

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Introduction: Patients who are homeless and/or using substances rely heavily on emergency departments (ED) for medical care, and present with complex medical and social needs. Negative physician attitudes towards this population undermine the therapeutic relationship, compromising the quality of medical care provided. The objective of this study was to determine the attitudes of emergency physicians towards homeless and substance-using patients. **Methods:** Using a Modified Total Design approach, we conducted a cross-sectional survey of emergency physicians at five different healthcare locations in Calgary, Alberta, Canada. Attitudes were assessed using two validated measures, the Health Care Providers Attitudes Towards the Homeless Inventory (HPATHI), and the Short Understanding of Substance Use Scale (SUSS). Surveys were self-administered by respondents between March and December 2013. **Results:** A total of 117 physicians completed the survey (response rate 48%). 28% of respondents resented the amount of time it takes to see homeless patients, and 32% believed caring for homeless patients was not financially viable; 57% felt overwhelmed by the complexity of problems that homeless people have. Physicians with extra training in addiction medicine or health care for the homeless had more positive attitudes than physicians with no extra training; physician attitudes worsened over time towards both populations. **Conclusion:** Physicians feel overwhelmed when caring for patients who are homeless and/or substance using and negative attitudes worsened over time. Extra training in addiction medicine or healthcare for the homeless is associated with more positive attitudes. Possible strategies to improve attitudes should include a multifaceted approach addressing individual physician knowledge deficits, as well as expanded access to resources in the ED and community, designed to deal with the complex needs of these populations.

Keywords: substance use disorders, homeless persons, attitude of health personnel

LO034

Does head injury matter? Comparison of functional outcomes in elderly who have sustained a minor trauma with or without head injury: a prospective multicenter cohort study

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Introduction: The older adult population is growing. The consequences of minor trauma involving a head injury (MT-HI) in independent older adults are largely unknown. This study assessed the impact of a MT-HI on the functional and cognitive outcomes six months post injury of older adults who sustained a minor trauma. **Methods:** This multicenter prospective cohort study in eight sites included patients who were: aged 65 years or older, presenting to the emergency department (ED) within two weeks of injury with a chief complaint of a minor trauma, discharged within 48 hours, and independent for their basic activities of daily living prior to the ED visit. Participants underwent a baseline evaluation and a follow-up evaluation at six months post-injury. The main outcome was the functional decline measured with the Older Americans' Resources and Services (OARS) scale six months after the trauma. **Results:** All 926 eligible patients were included in the analyses: 344 MT-HI patients and 582 without head injury. After six months, the functional decline was similar in both groups, 10.8% and 11.9% respectively (RR = 0.79 [95% CI: 0.55-1.14]). The proportion of participants with mild cognitive disabilities was also similar, 21.7% and 22.8% respectively (RR = 0.91 [95% CI: 0.71-1.18]). Furthermore, for the group of patients with a MT-HI, the functional outcome was not statistically different with or without the presence of a co-injury (RR = 1.35 [95% CI: 0.71-2.59]), or with or without the presence of a mTBI as defined by the WHO criteria (RR = 0.90 [95% CI: 0.59-1.13]). **Conclusion:** This study did not demonstrate that the occurrence of a MT-HI is associated with a worse functional or cognitive prognosis than other minor injuries without a head injury in an elderly population six months after injury.

Keywords: head injury, elderly, functional outcomes

LO035

The prevalence of alcohol-related trauma recidivism: a systematic review

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Introduction: Recurrent admission to a hospital or trauma centre for separate incidents of traumatic injury is known as trauma recidivism. Although use of alcohol is a known risk factor for injury and associated with trauma recidivism, the scale of alcohol-related trauma recidivism has not been well described. The purpose of this review was to search the published literature for studies that evaluated the prevalence of alcohol use among trauma recidivists. Our primary objective was to determine the proportion of trauma recidivism related to alcohol use. The association between alcohol and trauma recidivism was evaluated as a secondary objective. **Methods:** Four electronic databases (MEDLINE, Embase, CINAHL, Web of Science) were searched from inception until December 2015 for all articles that might provide evidence on the proportion of trauma recidivism related to use of alcohol. After removal of duplicates, the search strategy yielded 2470 records for screening. Only primary studies that reported on repeated admissions to a hospital or trauma center for traumatic injuries specifically related to alcohol use were included. Descriptive statistics were used to assess study characteristics and the prevalence of trauma recidivism related to alcohol use. An aggregate weighted estimate of alcohol-related trauma recidivism was calculated. **Results:** A total of 12 studies met all inclusion criteria. Studies were published between 1989 and 2014. Overall, there were 3386 trauma recidivists among included studies. The proportion of trauma recidivists with evidence of alcohol use on admission ranged from 26.7% to 76.9% (median 46.4%). The aggregated sample produced a weighted estimate of 41.0% (1388/3386) for alcohol-related trauma recidivism. In four studies, the association between alcohol and trauma recidivism was examined; all four found a positive association between alcohol use and repeated admission for traumatic injury. Studies varied considerably in design, trauma populations, periods for evaluating recidivism, definitions for positive alcohol on admission, and methods used to determine alcohol use. **Conclusion:** Evidence from current literature suggests that 41.0% of trauma recidivism is related to use of alcohol. Due to methodological limitations among the studies included for review, this may underestimate the actual prevalence of alcohol-related trauma recidivism.

Keywords: alcohol, trauma, recidivism

LO036

The influence of cognitive rest and graduated return to usual activities emergency department discharge instructions on symptoms of minor traumatic brain injury

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Introduction: It is estimated 15-50% of patients with a mild traumatic brain injury (MTBI) diagnosed in the emergency department (ED) will develop post-concussive syndrome (PCS). Although expert consensus recommends cognitive rest and graduated return to usual activities, these interventions are not based on prospective clinical evidence. The objective of this study was to determine if patients randomized to graduated return to usual activity discharge instructions had a decrease in their Post-Concussion Symptom Score (PCSS) 2 weeks after MTBI compared to patients who received usual care MTBI discharge instructions. **Methods:** This was a pragmatic, randomized trial of adult (18-64 years) patients presenting to an academic ED (annual census 65,000) with chief complaint 'head injury' occurring within 24 hours of ED visit. Patients were contacted by text message or phone 2 weeks post ED discharge and again at 4 weeks and asked to complete a validated, 22 item questionnaire to determine if there was a change in their PCSS. Secondary outcomes included change in PCSS at 4 weeks, number follow-up physician visits, and time off work/school. **Results:** 118 patients were enrolled in the study (58 in the control group and 60 in the intervention). Mean (SD) age was 35.2 (13.7) years and 43 (36.4%) were male. There was no difference with respect to change in PCSS at 2 weeks (10.5 vs 12.8; Δ 2.3, 95% CI: 7.0, 11.7) and 4 weeks post-ED discharge (21.1 vs 18.3; Δ 2.8, 95% CI: 6.9, 12.7) for the intervention and control groups, respectively. The number follow-up physician visits and time off work/school was similar when the groups were compared. **Conclusion:** Results from this study suggest graduated return to usual activity discharge instructions do not impact rate of resolution of MTBI symptoms 2 weeks after ED discharge. Given patients continue to experience low to moderate symptoms 2 weeks after MTBI, more investigation is needed to determine how best to counsel and treat patients with post-concussive symptoms.

Keywords: head injury, concussion, discharge instructions

LO037

A randomized double-blind trial comparing the effect on pain of an oral sucrose solution versus placebo in children 1 to 3 months old needing urethral catheterization

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Introduction: Oral sweet solutions have been accepted as effective analgesics for procedures in the neonatal population. However, there have been a limited number of trials in older infants. These studies have conflicting results. The objective of the study was to compare the efficacy of an oral sucrose solution versus placebo in reducing pain during urethral catheterization in infants 1 to 3 months old in the Emergency Department (ED). **Methods:** A randomized, double-blind clinical trial was conducted in a pediatric university-affiliated hospital ED. Infants, 1 to 3 months of age, were recruited and randomly allocated to receive 2 ml of 88% sucrose solution (SUC) or 2 ml of placebo solution (PLA) orally, 2 minutes before planned urethral catheterization. The primary outcome measure was the difference in pain scores as assessed by the Face, Legs, Activity, Cry and Consolability (FLACC) Pain Scale at 1 min post procedure. Secondary outcome measures were the difference in pain scores using the Neonatal Infant Pain Scale (NIPS), crying time and variations in heart rate. **Results:** Seventy-six participants were recruited and completed the study, 37 (group SUC) and 39 (group PLA) respectively. The mean difference in FLACC scores compared to baseline was 5.62 $\pm$ 1.32 (SUC) vs. 6.21 $\pm$ 1.15 (PLA) ($p = .51$) during catheterization, 2.70 $\pm$ 1.21 (SUC) vs. 2.26 $\pm$ 1.41 (PLA) at 1 min ($p = .64$) and 0.66 $\pm$ 1.32 (SUC) vs. 1.26 $\pm$ 1.00 (PLA) at 3 mins ($p = .38$). For the NIPS scores, it was 4.27 $\pm$ 1.06 (SUC) vs. 4.69 $\pm$ 0.92 (PLA) ($p = .56$) during procedure, 2.05 $\pm$ 0.91 (SUC) vs. 1.97 $\pm$ 1.19 (PLA) ($p = .92$) at 1 min and 0.49 $\pm$ 0.89 (SUC) vs. 0.89 $\pm$ 0.97 (PLA) ($p = .54$) at 3 mins. The difference in the mean crying time was not different between both groups: 99 $\pm$ 34 secs (SUC) vs. 100 $\pm$ 25 (PLA) ($p = .99$). No significant difference was found in participants' heart rate variations during procedure 23 $\pm$ 8 BPM (SUC) vs. 26 $\pm$ 7 (PLA) ($p = .60$), after 1 min 19 $\pm$ 12 BPM (SUC) vs. 17 $\pm$ 7 (PLA) ($p = .76$) and after 3 mins -1 $\pm$ 12 BPM (SUC) vs. 3 $\pm$ 6 (PLA) ($p = .53$).

Conclusion: In infants 1 to 3 months of age undergoing urethral catheterization in the ED, administration of an oral sweet solution did not statistically decrease pain scores as measured by the FLACC and NIPS scales. Participants' heart rate variations and crying time were not significantly decreased when sucrose was provided.
Keywords: pain, pediatric

LO038

Evaluation of a midstream urine collection technique for infants in the emergency department

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Introduction: A novel bladder stimulation technique has been described for midstream urine (MSU) collection in well-feeding, inpatient newborns. We sought to determine the performance of this technique amongst infants presenting to the Emergency Department (ED). **Methods:** Our prospective ED-based study enrolled a convenience cohort of infants aged ≤ 90 days who required urine testing. Infants with significant feeding issues, moderate to severe dehydration, or critical illness were excluded. Bladder stimulation consisted of finger tapping on the lower abdomen with or without lower back massage while holding the child upright. Healthcare providers received standardized training in the technique. Primary outcome was the proportion of infants with successful MSU collection via the technique. Success was defined as adequate sample collection (≥ 1 mL urine) within 5 minutes of initiating stimulation. Secondary outcomes included the proportion of contaminated MSU samples, time required for MSU collection and full protocol completion, and patient discomfort as perceived by parent/guardian using a 100 mm visual analog scale [VAS]. Assuming success *a priori* in 50% of infants, a sample size of 115 allowed a 95% confidence interval of +/- 9.1% around the point estimate. **Results:** We enrolled 115 infants. Mean age was 53.0 days old (interquartile range [IQR] 26.7-68.0); 58.3% were male (69.2% uncircumcised). Midstream urine was successfully collected in 61 infants (53.0%; 95% CI 0.44,0.62). Thirty-one MSU samples (50.8%) were contaminated; uncircumcised males held the highest proportion (55.0%). Most contaminated samples (83.9%) were reported as "non-significant growth" or "growth of ≥ 3 organisms" and were easily identifiable as contaminants with minimal impact on clinical care. Only 4 (8.5%) of the 47 patients discharged home after successful MSU collection had a repeat ED visit for urine testing. Median stimulation time for MSU collection was 45 seconds (IQR 20-99 secs). Median time for full protocol completion was 30.83 minutes (IQR 24.42-46.83 mins). Mean VAS for infant discomfort was 20.2 mm (SD +/- 20.4 mm). **Conclusion:** Our pragmatic, ED-based study found the success rate of this bladder stimulation technique to be significantly lower (53%) than its published rate (86%). The contamination rate was high but most contaminated specimens were easily identifiable as such and had minimal clinical impact.
Keywords: urine sample, infant, bladder stimulation

LO039

The effect of desaturations on subsequent medical visits in infants discharged from the emergency department with bronchiolitis

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Introduction: Bronchiolitis is the most common lower respiratory tract infection among infants, characterized by wheeze and respiratory distress. Reliance on pulse oximetry has been associated with increased hospitalizations, prolonged hospital stay and escalation of care. The objectives were to determine if there is a difference in the proportion of unscheduled medical visits within 72 hours of emergency department discharge in infants with bronchiolitis who desaturate to <90% for at least one minute during home oximetry monitoring versus those without desaturations. **Methods:** This is a prospective cohort study from 2008 to 2013 enrolling 118 otherwise healthy infant aged 6 weeks to 12 months discharged home from a tertiary care pediatric emergency department with a diagnosis of acute bronchiolitis. The primary outcome was unscheduled medical visits for bronchiolitis, a visit to any health care provider due to concerns about respiratory symptoms, within 72 hours of discharge in infants with and without desaturations. Secondary outcomes included examination of the severity and duration of the desaturations, delayed hospitalizations within 72 hours of discharge and the effect of activity on desaturations. **Results:** During a mean monitoring period of 19 hours, 75/118 (64%) infants had at least one desaturation event (median continuous duration 3.4 minutes). 59/118 infants (50%) had at least 3 desaturations, 12 (10%) desaturated for >10% monitored time and 51(43%) had desaturations lasting ≥ 3 minutes continuously. 59/118 (50%) infants desaturated to ≤ 80% and 29 (24%) to ≤ 70% for ≥ 1 minute. A total 18/75 infants with desaturations (24.0%) had an unscheduled visit for bronchiolitis versus 11/43 of their non-desaturating counterparts (25.6%) [Difference - 1.6%; 95%CI -0.15 to ∞, p = 0.66]. One of 75 desaturating infants (1.3%) and 2/43 (4.6%) of those without desaturations were hospitalized within 72 hours [Difference of -3.3%; 95% CI -0.04 to 0.10, p = 0.27]. Seventy seven percent of infants with desaturations experienced them during sleep or while feeding. **Conclusion:** The majority of infants with mild bronchiolitis experienced recurrent or sustained desaturations after discharge home. Children with and without desaturations had comparable rates of return for care, with no difference in unscheduled return medical visits and delayed hospitalizations.
Keywords: bronchiolitis, oxygen saturation, healthcare utilization

LO040

Do combined electrocardiogram rhythm and point of care ultrasound findings predict outcome during cardiac arrest? The second Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED 2) Study

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Introduction: Survival to hospital discharge is better for PEA than asystole in out-of-hospital cardiac arrest. Point of care ultrasound (PoCUS) is widely used in cardiac arrest, although not mandated by ACLS guidelines. This study examines if initial PoCUS findings combined with cardiac rhythm are predictive of outcomes including return of spontaneous circulation (ROSC), survival to hospital admission (SHA), and hospital discharge (SHD). **Methods:** A database review was completed for patients arriving to a tertiary ED in asystole or PEA arrest from 2010 to 2014. Patients under 19y or with a previous DNR were excluded. Patients were grouped into those with cardiac activity on PoCUS *and* PEA on ECG (Positive group); those with no cardiac activity recorded on PoCUS *and* asystole on ECG (Negative group); and those with a mix of positive and negative findings (Indeterminate group). Data was analyzed for the frequency of ROSC, SHA, and SHD. **Results:** 186 patients met the study criteria, with 14 (8%) in the positive group, 134 (72%) in the negative group,

and 38 (20%) in the indeterminate group. The positive group had significantly better initial outcomes than the negative group: ROSC: 78% (95% CI 49-95%) vs 17% (11-25%); OR 17.70 (4.57-168.5; $p < 0.0001$) and SHA: 29% (8-58%) vs 7% (3-12%); OR 5.56 (1.45-21.28; $p = 0.022$), and then the combined negative and indeterminate groups: ROSC: 22% (16-29%), OR 12.93 (3.43-48.73; $p < 0.0001$; SHA: 8% (5-13%); OR 4.51 (1.25-16.27; $p = 0.033$). There was no difference between the positive group and either the negative or combined groups for final outcome of SHD: 0% (0-23%) vs 1% (0-5%); OR 1.83 (0.08-39.97; $p = 1.00$; and vs 1% (0-5%); OR 1.67 (0.08-33.96; $p = 1.00$). The negative group had worse initial outcomes than the combined positive and indeterminate groups: ROSC 17% (11-25%) vs. 50% (36-64%) OR 0.21 (0.10-0.42; $p < 0.0001$); SHA 6% (3-12%) vs. 8% (5-13%) OR 0.34 (0.13-0.92; $p = 0.0490$). There was no difference in SHD: 1% (0-5%) vs. 1% (0-5%) OR 0.77 (0.07-8.71; $p = 1.00$). **Conclusion:** Our results suggest that although finding positive cardiac activity on ECG (PEA) and also on PoCUS is associated with greater ROSC and SHA, it does not identify patients with a final outcome of SHD.

Keywords: point-of-care ultrasound (PoCUS), cardiac arrest, electrocardiogram (ECG)

LO041

Predicting the return of spontaneous circulation using near-infrared spectroscopy monitoring: a systematic review and meta-analysis

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Introduction: Tissue oximetry using near-infrared spectroscopy (NIRS) is a non-invasive monitor of cerebral oxygenation. This new technology has been used during cardiac arrest because of its ability to give measures in low blood flow situations. The aim of this systematic review was to assess the evidence regarding the association between NIRS values and resuscitation outcomes in patients undergoing cardiopulmonary resuscitation. We hypothesized that higher NIRS values would be associated with better outcomes and that the strength of that association would differ depending on the timing of the NIRS measurements. **Methods:** This review was registered (Prospero CRD42015017380) and is reported as per the PRISMA guidelines. Medline, Embase and CENTRAL were searched from their inception to September 18th, 2015 using a specifically designed search strategy. Grey literature was also searched using Web of Science and Google Scholar. NIRS manufacturers and authors of included citations were contacted to inquire on unpublished results. Finally, the references of all retained articles were reviewed in search of additional relevant studies. Studies reporting NIRS monitoring in adults during cardiac arrest were eligible for inclusion. Case reports and case series of fewer than five patients were automatically excluded. Two reviewers assessed the quality of included articles and extracted the data. **Results:** Out of 3275 unique citations, 19 non-randomized observational studies (15 articles and four conference abstracts) were included in this review, for a total of 2436 patients. Six studies were evaluated at low risk of bias, nine at intermediate risk and four at high risk. We found a stronger association between the return of spontaneous circulation (ROSC) and the highest NIRS value measured during resuscitation (standard mean deviation (SMD) 3.46 (95%CI 2.31-4.62)) than between ROSC and the mean NIRS measures (SMD 1.33 (95%CI 0.92-1.74)) which was superior to the one between ROSC and initial measures (SMD 0.45 (95%CI 0.02-0.88)). **Conclusion:** Patients with good outcomes have significantly higher NIRS value during resuscitation than their counterparts. The association between ROSC and NIRS measurements was influenced the timing of measurements during resuscitation.

Keywords: cardiopulmonary resuscitation, near-infrared spectroscopy, prognosis

LO042

Sonography in Hypotension and Cardiac Arrest (SHoC) - Hypotension: derivation of an evidence-based consensus algorithm for the integration of point of care ultrasound into resuscitation of hypotensive patients

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Introduction: Point of care ultrasound has become an established tool in the initial management of patients with undifferentiated hypotension. Current established protocols (RUSH, ACES, etc) were developed by expert user opinion, rather than objective, prospective data. We wished to use reported disease incidence to develop an informed approach to PoCUS in hypotension using a "4 F's" approach: Fluid; Form; Function; Filling. **Methods:** We summarized the incidence of PoCUS findings from an international multicentre RCT, and using a modified Delphi approach incorporating this data we obtained the input of 24 international experts associated with five professional organizations led by the International Federation of Emergency Medicine. The modified Delphi tool was developed to reach an international consensus on how to integrate PoCUS for hypotensive emergency department patients. **Results:** Rates of abnormal PoCUS findings from 151 patients with undifferentiated hypotension included left ventricular dynamic changes (43%), IVC abnormalities (27%), pericardial effusion (16%), and pleural fluid (8%). Abdominal pathology was rare (fluid 5%, AAA 2%). After two rounds of the survey, using majority consensus, agreement was reached on a SHoC-hypotension protocol comprising: **A. Core:** 1. Cardiac views (Sub-xiphoid and parasternal windows for pericardial *fluid*, cardiac *form* and ventricular *function*); 2. Lung views for pleural *fluid* and B-lines for *filling* status; and 3. IVC views for *filling* status; **B. Supplementary:** Additional cardiac views; and **C. Additional** views (when indicated) including peritoneal fluid, aorta, pelvic for IUP, and proximal leg veins for DVT. **Conclusion:** An international consensus process based on prospectively collected disease incidence has led to a proposed SHoC-hypotension PoCUS protocol comprising a stepwise clinical-indication based approach of Core, Supplementary and Additional PoCUS views.

Keywords: point-of-care ultrasound (PoCUS), shock, consensus

LO043

Is there an association between resuscitation effort and the use of cardiac ultrasound in patients arriving to the emergency department in cardiac arrest? The second Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED 2) Study

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Introduction: The use of cardiac point of care ultrasound (PoCUS) to assess cardiac arrest patients is widespread, although not mandated by advanced cardiac life support (ACLS) guidelines. This study aims to examine if the use of ultrasound is associated with a difference in the length of resuscitation and the frequency of interventions during ACLS in the emergency department (ED). **Methods:** A retrospective database and chart analysis was completed for patients arriving to a tertiary ED in cardiac arrest, between 2010 and 2014. Patients were excluded if aged under 19, or with a previous DNR order. Patients were grouped based on whether PoCUS was used during ACLS (PoCUS group) and those without PoCUS (control group). Multiple data were abstracted from charts using a standardized form. Data was analyzed for the length of resuscitation, frequency of common ACLS interventions such as endotracheal intubation, administration of epinephrine, and defibrillation, as well as initial cardiac activity findings on PoCUS. **Results:** 263 patients met the study inclusion criteria, with 51 (19%) in the control group, and 212 (81%) in the PoCUS group. In the PoCUS group 23 (11%) had cardiac activity (Positive PoCUS) and 189 (89%) had no cardiac activity recorded. Positive PoCUS patients had longer mean resuscitation times (26.13 min, 95% CI 17.80-34.46 min) compared to patients with no PoCUS cardiac activity (12.63 min, 95% CI 11.07-14.19 min, $p < 0.05$) as well as to the control group (14.20 min, 95% CI 10.30-18.09 min, $p < 0.05$). Positive PoCUS patients were more likely to receive endotracheal intubation (91%, 95% CI 72-99%), and epinephrine (100%, 95% CI 85-100%) than patients with no PoCUS cardiac activity (ET: 47%, 95% CI 40-54%, $p < 0.0001$; Epi: 81%, 95% CI 75-86%, $p < 0.0172$) and than the control group (ET: 65%, 95% CI 50-78%, $p < 0.0227$; Epi: 80%, 95% CI 67-90%, $p < 0.0258$). There was no difference in numbers receiving defibrillation between groups. **Conclusion:** Our results suggest emergency physicians may be making increased resuscitative effort for patients with positive cardiac activity findings on PoCUS compared to those with negative findings or when no PoCUS was performed.

Keywords: point-of-care ultrasound (PoCUS), cardiac arrest, advanced cardiac life support

LO044

Stress-testing the resuscitation room: latent threats to patient safety identified during interprofessional in-situ simulation in the emergency department

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Introduction: Emergency Department (ED) resuscitation is a complex, high-stakes procedure where positive outcomes depend upon effective interactions between the healthcare team, the patient, and the environment. To this end, resuscitation teams work in spaces designed to optimize workflows and ensure that necessary treatments and skillsets are available when required. However, systematic failures in this environment cannot always be adequately anticipated, exposing patients to opportunities for harm. As part of a new interprofessional education initiative, this prospective, observational study sought to characterize latent threats to patient safety (LST's) identified during the delivery of in-situ, simulated resuscitations in two Canadian, tertiary care, academic Emergency Departments. **Methods:** In-situ simulation sessions were delivered on a monthly basis in the EDs of each hospital campus, during which a variety of simulated resuscitation scenarios were run with distinct teams of ED healthcare professionals. A research assistant was present throughout each session and documented LST's identified by simulation facilitators and participants during the case and debriefing. Data were entered into a master table and grouped thematically for analysis. **Results:** After a pilot run-in, 10 in-situ simulation sessions were delivered, involving 27 cases and reaching 180 ED healthcare professionals (25 attending MD, 37 resident MD, 59 RN, 24 RT). 83 latent safety threats were identified through these sessions (mean 3.1 LSTs per case) of which 52 were determined to be "actionable". Corrective mechanisms have been initiated in 72% of these cases (e.g., new education campaigns and in-servicing, equipment provisioning, equipment checklists). **Conclusion:** In-situ simulation, beyond its role as a training tool for developing Non-Technical and Crisis Resource Management skills, can be effectively used to identify systematic deficits and knowledge gaps that could expose critically ill patients to harm. Effective quality improvement and continuing education programs are essential to translate these findings into more resilient patient care.

Keywords: in-situ simulation, patient safety, quality

LO045

Sonography in Hypotension and Cardiac Arrest (SHoC) - Cardiac Arrest: A consensus on the integration of point of care ultrasound into advanced cardiac life support during cardiac arrest

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Introduction: Point of care ultrasound (PoCUS) provides invaluable information during resuscitation efforts in cardiac arrest by determining presence/absence of cardiac activity and identifying reversible causes such as pericardial tamponade. There is no agreed guideline on how to safely and effectively incorporate PoCUS into the advanced cardiac life support (ACLS) algorithm. We consider that a consensus-based priority checklist using a "4 F's" approach (Fluid; Form; Function; Filling), would provide a better algorithm during ACLS. **Methods:** The ultrasound subcommittee of the Australasian College for

Emergency Medicine (ACEM) drafted a checklist incorporating PoCUS into the ACLS algorithm. This was further developed using the input of 24 international experts associated with five professional organizations led by the International Federation of Emergency Medicine. A modified Delphi tool was developed to reach an international consensus on how to integrate ultrasound into cardiac arrest algorithms for emergency department patients. **Results:** Consensus was reached following 3 rounds. The agreed protocol focuses on the timing of PoCUS as well as the specific clinical questions. **Core** cardiac windows performed during the rhythm check pause in chest compressions are the sub-xiphoid and parasternal cardiac views. Either view should be used to detect pericardial *fluid*, as well as examining ventricular *form* (e.g. right heart strain) and *function*, (e.g. asystole versus organized cardiac activity). **Supplementary** views include lung views (for absent lung sliding in pneumothorax and for pleural fluid), and IVC views for *filling*. **Additional** ultrasound applications are for endotracheal tube confirmation, proximal leg veins for DVT, or for sources of blood loss (AAA, peritoneal/pelvic fluid). **Conclusion:** The authors hope that this process will lead to a consensus-based *SHoC-cardiac arrest* guideline on incorporating PoCUS into the ACLS algorithm.

Keywords: point-of-care ultrasound (PoCUS), cardiac arrest, consensus

LO046

Factors associated with hospital admission following asthma exacerbations: a systematic review

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Introduction: Patients with asthma frequently present to the emergency department (ED) with exacerbations; however, a select number of patients require admission to hospital. The objective of this study was to summarize the evidence regarding asthma-related hospital admissions and factors associated with these admissions following ED presentation. **Methods:** Comprehensive literature searches were conducted in seven electronic databases (database inception to 2015); manual and grey literature searches were also performed. Studies reporting disposition for adults after ED presentation were included. Study quality was assessed using the Newcastle-Ottawa Scale (NOS); standardized data-collection forms were used for data extraction. Admission proportions and factors associated with admission at a statistical significance level ($p < 0.05$) were reported. **Results:** Out of an initial 5865 identified articles, 37 articles met full inclusion criteria. Admission proportions were reported in 25/37 studies, ranged from 1% to 37%, and collectively demonstrated a decline of ~9% in admissions between 1993 and 2012. Studies including a >50% Caucasian ethnicity were found to have a median admission proportion of 13% (interquartile range [IQR] = 7, 20) versus studies with >50% non-Caucasian ethnicity at 22% (IQR = 20, 28). Age, female sex, and previous hospitalizations for asthma exacerbation were the most individually identifiable factors associated with admission. Presenting features and medication profile were the most frequent domains associated with admission. **Conclusion:** Admission rates have decreased approximately 9% in a nearly 20-year span and seem to be higher in studies involving mostly non-Caucasian ethnic groups. Demographic factors, markers of severity obtained by history or at ED presentation, and medication profile could be assessed by ED clinicians to effectively discern patients at high risk for admission.

Keywords: asthma, admissions, knowledge synthesis

LO047

Predictors of treatment failure in renal colic patients discharged from the emergency department

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Introduction: Most patients with acute renal colic are discharged from the ED after initial diagnosis and symptom control, but 20-30% require repeat ED visits for ongoing pain, and 15-25% require rescue intervention (ureteroscopic intervention or lithotripsy). If patients destined for failure of outpatient management could be identified based on information available during their ED visits, they could be prioritized early for intervention to reduce short term pain and disability. Our objective was to identify predictors of outpatient treatment failure, defined as the need for hospitalization or rescue intervention within 60 days of ED discharge. **Methods:** We collated prospectively gathered administrative data from all Calgary region patients with an ED diagnosis of renal colic over a one-year period. Demographics, arrival mode, triage category, vital signs, pain scores, analgesic use and ED disposition were recorded. Research assistants reviewed imaging reports and documented stone characteristics. These data were linked with regional hospital databases to identify ED revisits, hospital admissions, and surgical procedures. The primary outcome was hospitalization or rescue intervention within 60 days of ED discharge. **Results:** Of 3104 patients with first ED visit for acute renal colic, 1296 had CT or US imaging and were discharged without intervention. Median age was 50 years and 69% were male. 325 patients (25.1%) required an ED re-visit and 11.8% required admission or rescue intervention. Patients with small (<5mm), medium (5-7mm) and large (>7mm) stones failed in 9.0%, 14.4% and 9.9% of cases respectively. The only factor predictive of treatment failure in multivariable models was stone position in the proximal or mid-ureter. Age, sex, vital signs, pain score, WBC, creatinine, history of prior stone or intervention, stone side, stone size, presence of stranding and degree of hydronephrosis were not associated with outpatient failure. **Conclusion:** Outpatient treatment failure could not be predicted based on any of the predictors studied.

Keywords: renal colic, treatment failure, pain management

LO048

Systematic review of the use of low-dose ketamine for analgesia in the emergency department

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Introduction: Ketamine is a popular sedative agent for painful procedures. It is not widely used at sub-dissociative analgesic doses in the emergency department (ED). We sought to determine the performance of low-dose ketamine (LDK) as an analgesic for acute pain management in adult patients in the ED. **Methods:** We systematically reviewed electronic databases (MEDLINE, EMBASE, AMED, CINAHL, PubMed and Cochrane database of systematic reviews), grey literature, conference proceedings and clinical trials registries. Two independent reviewers identified eligible studies using pre-determined criteria. We included peer-reviewed studies that used LDK (< 1 mg/kg IV or < 2mg/kg IM) in adult patients (>18 yo) requiring acute pain management for any condition in the ED. Our outcome measures included analgesic effect of LDK compared to any opioids, need for rescue analgesia, and neuropsychological adverse events. We assessed inter-rater agreement using kappa statistics, risk of bias using the Cochrane Collaboration's Tool, and propose a treatment recommendation using GRADE. Heterogeneity among studies precluded meta-analysis.

Results: We reviewed 1,408 studies and selected 44 for full review (kappa = 0.70). Thirty-three were excluded due to wrong patient population and non-analgesic use of ketamine. Eleven studies with 1,249 participants were included - six randomized control trials (RCTs) and five observational studies. All of which had an overall low risk of bias. There was extensive variation in the dose and route of LDK used (0.1 - 0.7 mg/kg SC/IV/IM), administration protocols, and use of adjunct analgesia. There is a lack of high quality data regarding the use of LDK as an analgesic agent in the ED. However, the current moderate quality data demonstrates a significant analgesic effect of LDK with occasional need for rescue analgesia and neuropsychological adverse events. Commonly reported neuropsychological adverse events included dizziness, dysphoria, and confusion, rarely agitation or hallucinations. All adverse events were self-limited or occasionally required benzodiazepines for resolution. **Conclusion:** Our GRADE evidence table identified moderate quality evidence from six RCTs supporting the analgesic effect of LDK for acute pain management in the ED when compared to using opioids alone.

Keywords: pain, low-dose ketamine

LO049

Ibuprofen or oxycodone? An observational cohort study of post-emergency department discharge management of children's fracture pain

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Introduction: Pediatric fracture pain is under-treated both in the emergency department (ED) and after discharge. Oral opioids and ibuprofen are amongst the top medications used to treat this pain. This study describes the post ED discharge effectiveness and safety of ibuprofen and oxycodone. **Methods:** A prospective cohort observational study was conducted at the Stollery Children's Hospital (Edmonton, Alberta) from June 2010 to July 2014. Children aged 4-16 years, with an acute fracture, who were being discharged home with *either* ibuprofen (Ibu) or oxycodone (Oxy) for pain management were eligible for recruitment. Patients were contacted daily for three days, and at 2 and 6 weeks post-injury. Information regarding medication use, pain levels (with the Faces Pain Scale, Revised), adjuvant therapies, adverse events, and side effects and follow up was collected. **Results:** A total of 329 children (n = 112 Oxy, n = 217 Ibu) were included. Mean age was 10.4 years (Ibu), and 12.3 years (Oxy); 68% (n = 223) were male. Fracture types included forearm/wrist (47%,n = 154), lower leg/ankle (14%,n = 46), shoulder/clavicle (13%,n = 42), and upper arm/elbow (12%,n = 39). Reductions were performed in 34% of cases (n = 113), while 9% (n = 29) had buckle fractures. Children receiving Oxy had their eating, sleeping, play, and school attendance affected more than those receiving Ibu. More children receiving Oxy (81%, 91/112) experienced an adverse effect than those receiving Ibu (61%, 129/213) (p = 0.0002); abdominal pain, dizziness, drowsiness, nausea, and vomiting were most prominent. The change in pain score (maximum pain - post-treatment pain) for Day 1 was 3.79 for Oxy and 3.61 Ibu; Day 2 was 3.68 Oxy and 3.55 Ibu; Day 3 was 3.34 Oxy and 3.66 Ibu. On Day 1, 59% (66/112) of Oxy cohort patients used other medication(s) for their pain treatment; 19% (41/213) did the same in the Ibu cohort. **Conclusion:** Ibuprofen and oxycodone provide similar pain relief for children with post-Ed discharge fracture pain. Oxycodone has greater impact on activities of daily living, side effects, and use of other medications to relieve pain. Oxycodone does not appear to confer any benefit over ibuprofen for pain relief, and given its negative side effect profile, this study suggests that ibuprofen is the better option. Further research is needed to determine the best combination treatment for fracture pain for children.

Keywords: opioid, pain, pediatric

LO050

The predictive value of pre-endoscopic risk scores to predict adverse outcomes among emergency department patients with upper gastrointestinal bleeding - a systematic review

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Introduction: Patients with upper gastrointestinal bleeding (UGIB) are at risk for serious adverse events (SAE) after emergency department (ED) discharge. Endoscopy can aid in risk stratification but is not easily available. Therefore, stratifying using pre-endoscopic risk scores can aid ED physicians in disposition decisions. The aim of this study was to conduct a systematic review to assess the predictive value of pre-endoscopic risk scores for risk-stratification of ED UGIB patients. **Methods:** We searched 4 databases from inception to March 2015 with search terms related to "UGIB" and "ED". Inclusion criteria were: 1) adult UGIB patients presenting to the ED; 2) risk scores without endoscopic predictors developed and validated in variceal and non-variceal UGIB patients. We excluded case reports, reviews, abstracts, animal studies and commentaries. In 2 phases (screening and full-review), 2 reviewers independently screened articles for inclusion. SAE included 30-day death, recurrent bleeding and need for intervention. Two reviewers independently extracted patient level data and the consensus data was used for analysis. We report kappa for the article selection, and pooled sensitivity, specificity, positive and negative predictive value, positive and negative likelihood ratios and accuracy with 95% CI for the risk scores. **Results:** We identified 3,173 articles, of which 3,065 were excluded in phase I (kappa 0.88, 95% CI 0.83-0.93). In phase II, we included 16 of the 108 remaining articles (kappa 0.84, 95% CI 0.70-0.97); 3 studied Glasgow Blatchford Score (GBS), 1 clinical Rockall score (cRockall) and 2 AIMS65; 6 compared GBS and cRockall, 3 compared GBS, a modification of the GBS and cRockall and 1 compared the GBS and AIMS65. Overall, the accuracy of the GBS, cRockall and AIMS65 was 0.47 (95% CI 0.46-0.47), 0.47 (95% CI 0.46-0.49) and 0.62 (95% CI 0.61-0.62), respectively. The accuracy for the GBS with a cut-off score of 2 was 0.73 (95% CI 0.71-0.74). **Conclusion:** None of the risk scores identified by our systematic review were robust and hence, cannot be recommended for use in clinical practice. However, the GBS with a cut-off score of 2 was superior over other risk scores. Future prospective studies are needed to develop robust new scores for use in ED patients with UGIB.

Keywords: upper gastrointestinal bleeding, risk stratification, emergency department

LO051

Validation of a clinical decision rule to detect patients with adverse drug events in the emergency department

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Introduction: Adverse drug events (ADE) are a leading cause of emergency department (ED) visits, yet are missed in up to 50% of presentations. In 2014, Accreditation Canada, a not-for-profit

organization that evaluates healthcare institutions based on quality of care, introduced a requirement for EDs to identify patients at high-risk for drug-related morbidity, so that medication management interventions can be targeted to high-risk groups. We derived a clinical decision rule to identify patients at high-risk for ADEs using 4 variables. Our objective was to validate the rule by determining its sensitivity and specificity in a new sample. **Methods:** We conducted a prospective observational study in two tertiary care and one urban community hospital in British Columbia and Ontario. We used a systematic selection algorithm to generate a representative sample, and enrolled adults who reported taking at least one medication during the prior two weeks. Nurses completed the clinical decision rule and evaluated patients for standardized clinical findings. Each patient was assessed by a research pharmacist and a physician who were blinded to data collected by nurses. Any disagreement was subsequently adjudicated by an independent committee. The primary outcome was an ADE, defined as an unintended and harmful event related to medication use resulting a change in medical management, hospital admission or causing death. We calculated the rule's sensitivity, specificity, and the proportion of patients screening positive with 95% confidence intervals (CI). **Results:** Among 1529 enrolled patients, 196 (12.8%, 95% CI 11.2-14.6%) were deemed to have experienced an ADE. The rule, consisting of the variables (i) having a pre-existing medical condition or having taken antibiotics within one week, and (ii) age $\geq$ 80 or having a medication change within 28 days, had a sensitivity of 92.9% (95%CI 88.3%-96.0%) and a specificity of 35.0% (95%CI 32.5%-37.7%) for ADEs. The proportion of patients screening positive was 41.7%. **Conclusion:** Among adults presenting to EDs, the rule was sensitive for ADEs while maintaining reasonable specificity. If implemented, the rule may help identify those patients at high-risk for ADEs who may benefit from evaluation by a clinical pharmacist in the ED, and will help institutions meet current Accreditation Canada standards.

Keywords: adverse drug event, patient safety, clinical decision rule

LO052

Sticks and stones may break your bones, but does having a car crash in a rural location affect your access to EMS care and surgical intervention? The initial analysis of a unique EMS and Trauma Dataset

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Introduction: In Canada, major trauma is a healthcare priority and in 2014 was responsible for over 15866 deaths, with a total economic burden of 26.8 billion dollars. Numerous factors influence the likelihood of occurrence and outcome from major trauma, including incident factors, host, EMS response, emergency, surgical and critical care. Traditionally trauma registers contained information that mainly concerning hospital treatment and host factors. This collaborative analysis uses matched data from a Provincial Trauma Research Register and records from a Provincial Ambulance Service. **Methods:** A retrospective observational (registry) study comparing rural and urban adult and pediatric major trauma patients (Injury Severity Score >15) who were injured in a motor vehicle crash (ICD V20-V99) and presented to a level 1 or level 2 trauma centre by EMS by primary or secondary transfer, between April 2011 and March 2013 in a selected province in Canada. Comparisons of the process care times, and patient disposition, were made in an inclusive trauma system. **Results:** 108 cases meet the inclusion criteria with 78 considered rural and 30 urban using published definitions. The median response times were 16.2 minutes for rural *(95% CI: 13.2 -19.8) and 7.8 minutes for urban (95% CI: 7.2 - 10.5) with 60% and 61% meeting response targets respectively*. A greater proportion of urban patients are taken initially to level 3-5 centers and require secondary transfer (45% urban vs 24% rural $p = < 0.01$). Median times intervals to surgical care were double for the urban patients (14 rural vs 32 hrs urban $p = < 0.01$). **Conclusion:** The majority of serious road traffic collisions occur in rural areas. Although rural patients wait longer for an initial EMS response, more rural patients are taken directly to a level 1 or 2 trauma center. Unexpectedly then rural patients have much shorter times to surgical care. The benefits of an inclusive trauma system should be weighed against the benefits of bypass processes in urban environments where the nearest Emergency Department is not a Level 1 or 2 Trauma Center.

Keywords: trauma, emergency medical services (EMS), rural

LO053

Follow-up head CT scan after mild traumatic brain injury: is it really necessary?

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Introduction: Injured seniors visits are on the rise in the emergency department (ED) and up to 30 % are traumatic brain injury (TBI). Many patients suffer from comorbidities that require the use of anticoagulant drugs. The use of these drugs usually modify the trajectory patients will undergo in the ED. In the last decade, some authors suggested a systematic follow-up CT head scan 8 hours after the initial, while others didn't see the need to scan, referring only to the clinical features. We sought to evaluate the presence of delayed intracranial bleeding, evolution and investigation at the ED of elderly patients presenting for a mild TBI, with or without anticoagulotherapy. **Methods:** A retrospective cohort was built with hospital administrative clinical data for year 2014 at a Canadian Level 1 trauma center. Patients 65 years and older with traumatic brain injury and residing in the trauma center catching area were included. Data were extracted from medical files using a standardized collection tool in a consecutive pattern. Patients were classified in three groups: use of anticoagulant drug, use of antiplatelet drug and no anticoagulotherapy. Clinico-administrative data, intervention delay, investigations, comorbidities, medication and physiological status were collected. Intra and extra-hospital data were collected for a period of 90 days and the use of imaging and trajectories were analysed. Univariate and multivariate analysis were conducted. **Results:** 93 of the 189 TBI injury were mild TBI. The 93 patients were divided in patients using anticoagulotherapy (n = 9, 10 %), using antiplatelet drug (n = 58, 62.4 %) and no use of drug (n = 29, 31.2 %). Each group respectively undergo an initial head CT scan in a proportion of 88.9 %, 93 % and 76 %. Follow-up head CT scan were seen in 43 %, 16 % and 10 %. Delayed intra-cranial hemorrhage were identified in respectively 0 %, 2 % and 0 %. **Conclusion:** With the increase in patients presenting at Canadian ED for head trauma, our study suggests that anticoagulated elderly patients suffering from a mild traumatic brain injury do not systematically require a follow up CT head scan or longer observation time at the ED. A future clinical decision rule to determine the need of follow-up CT could be of benefit to emergency physicians.

Keywords: minor head injury, elderly, anticoagulant

LO054

The emergency department usage and utility of ISAR and CAM assessment tools in identifying hip fracture patients at risk for developing delirium

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Introduction: Delirium is an acute state of mental confusion that is a frequent complication in older adults with a hip fracture, and is often unrecognized by clinicians in the emergency department (ED). It is associated with prolonged hospitalization, functional decline, hospital readmission, and death. The Identification of Seniors At Risk (ISAR) and Confusion Assessment Method (CAM) are two standardized tools designed to facilitate prompt screening and detection of functional decline and delirium respectively amongst adults 65 and older. The objective of this study was to determine the ED usage and utility of ISAR and CAM assessment tools in identifying hip fracture patients at risk for developing delirium. **Methods:** This was a retrospective chart review of patients aged 65 and older, presenting to an academic ED (annual census 60,000) with a discharge diagnosis of hip fracture from January 1st 2014 to July 31st 2015. At this institution, both the ISAR and CAM are included in the standard ED nursing documentation and are intended to be completed for all patients over 65 years of age. **Results:** Of the 243 hip fracture cases included in this study, the ISAR and CAM scores were completed for 131 (53.9%) and 69 (28.4%) patients, respectively. There were 43 (17.7%) cases of recorded in-hospital acute delirium. Of the delirium cases, 20 (46.5%) had an ISAR assessment. Patients with an ISAR score of ≥ 3 were more likely to experience delirium compared to those with lower ISAR scores (28.3% vs 8.3%; Δ 20.0%, 95% CI: 6.6%, 34.9%). Of the 43 patients with delirium, 11 (25.6%) had a CAM score recorded. Patients with a positive CAM score (meeting 3 of 4 criteria in the diagnostic algorithm) were more likely to experience delirium compared to those with negative CAM scores (66.7% vs 11.1%; Δ 55.6%, 95% CI: 17.5%, 79.9%). **Conclusion:** Vigilant efforts are needed to ensure these screening tools are applied for all patients over the age of 65 presenting to the ED to improve the recognition and early management of delirium. Future research should focus on initiatives to improve delirium screening compliance by ED personnel.

Keywords: hip fracture, delirium, screening tools

LO055

Increased utilization of Bier block for pediatric forearm fracture reduction following simulation and web-based training

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Introduction: Bier block (BB) regional intravenous anesthesia is a safe and effective alternative to procedural sedation for analgesia during forearm fracture reductions, yet BB remains infrequently utilized in the Pediatric Emergency Department (PED). No standardized methods of BB training have previously been described. The objectives of this study were to evaluate comfort and level of experience with BB in the PED, and to determine if a multimodal instructional course increases these from baseline and translates to increased utilization of this technique. **Methods:** A novel interdisciplinary simulation and web-based training course was developed to teach the use of BB for forearm fracture reduction at a tertiary PED. Participants were surveyed pre/post training, and at 2- and 6-months regarding their comfort with and willingness to use BB. In parallel, we prospectively assessed the clinical utilization of BB in the PED during the 24-month period immediately following course completion. **Results:** Course participation included 38 members of the PED (N = 26 physicians, 12 nurses), and survey response rate was 100% at all time points. Respondents reported that course participation increased both their comfort (10% pre vs. 89% post-training, $p < 0.001$) and willingness (51% pre vs. 95% post-training, $p < 0.001$) to use BB for forearm fracture reduction, an effect that was sustained at 6-months following course completion (66% and 92%, respectively, $p < 0.001$ for both). Before course attendance, only 6% of respondents indicated that they had ever used BB in a PED setting, and all participants indicated that the course addressed their learning objectives. In clinical practice, there were no BB performed prior to course administration. We observed a consistent and sustained increase in the clinical utilization of BB, with 39% of all PED forearm reductions performed using BB at 24-months post-course completion (114 BB, 17 unique physicians). **Conclusion:** A combined simulation and web-based training course increased comfort and willingness to use BB and was associated with increased utilization of this technique for forearm fracture reduction in the PED.

Keywords: intravenous regional anesthesia, procedural sedation

LO056

Perceptions and provision of analgesia for acutely painful conditions in children: a multi-centre prospective survey of caregivers

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Introduction: The suboptimal management of children's pain in the emergency department (ED) is well described. Although surveys of physicians show improvements in providing analgesia, institutional audits suggest otherwise. One reason may be patient refusal. Our objectives were to determine the proportion of caregivers that offered analgesia prior to arrival to the ED, accept analgesia in the ED, and identify reasons for withholding analgesia. Our results will inform knowledge translation initiatives to improve analgesic provision to children. **Methods:** A novel survey was designed to test the hypothesis that a large proportion of caregivers withhold and refuse analgesia. Over a 16-week period across two Canadian paediatric EDs, we surveyed caregivers of children aged 4-17 years with an acutely painful condition (headache, otalgia, sore throat, abdominal pain, or musculoskeletal injury). The primary outcome was the proportion of caregivers who offered analgesia up to 24 hours prior to ED arrival and accepted analgesia in the ED. **Results:** The response rate was 568/707 (80.3%). The majority of caregivers were female (426/568, 75%), aged 36 years or older (434/568, 76.4%), and had a post-secondary education (448/561, 79.9%). Their children included 320 males and 248 females with a mean age of 10.6 years. Most (514/564, 91.1%) reported being "able to tell when their child was in pain". On average, children rated their maximal pain at 7.4/10. A total of 382/561 (68.1%) caregivers did not offer any form of analgesia prior to arrival. Common reasons included lack of time (124/561, 22.1%), fear of masking signs and symptoms (74/561, 13.2%) or the seriousness of their child's condition (72/561, 12.8%), and lack of analgesia at home (71/561, 12.7%). Analgesia was offered to 328/560 (58.6%) children in the ED and 283/328 (72.6%) caregivers accepted. The most common reason for not accepting analgesia was child refusal (20/45, 44.4%). **Conclusion:** Most caregivers do not offer analgesia to their child prior to arriving in the ED despite high levels of pain and an awareness of it. Despite high rates of acceptance of analgesia in the ED, misconceptions are common.

Knowledge translation strategies should dispel caregiver misconceptions, and highlight the impact of pain on children and the importance of analgesia at home.
Keywords: pain management, analgesia, knowledge translation

LO057

Association between metoclopramide treatment in the ED for concussion and persistent post-concussion headaches: a propensity score matching analysis

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Introduction: There is a paucity of pediatric literature regarding effective treatment for post-concussion headache. The objective of this study was to assess whether metoclopramide treatment in the Emergency Department (ED) within 48 hours of injury was associated with reduced persistent headache symptoms post-concussion at 1-week and 1-month post-injury. **Methods:** Children aged 8-18 years with acute concussion were enrolled across 9 EDs of the Pediatric Emergency Research Canada network in a prospective cohort study [Predicting and Preventing Post-concussive Problems in Paediatrics (5P)] from August 2013 to June 2015. Treatments administered in ED (including metoclopramide) were collected using standardized forms. Self-report symptom questionnaires were rated at baseline, at 7 and 28 days follow-up using the validated Post-Concussion Symptom Inventory (PCSI). Propensity scores for treatment with metoclopramide were calculated using a multivariate logistic regression model including confounders. Intervention and control groups were matched 1:4 on the logit of the propensity scores using a greedy algorithm and nearest-neighbour approach. The primary outcome was headache persistence at one-month. **Results:** 2095 patients met inclusion criteria and completed baseline assessment. At 1 and 4 weeks respectively, 54% (963/1808) and 26% (456/1780) of participants completing follow-up had persistent headache symptoms. 50 metoclopramide treated participants were propensity score matched to 234 controls (1:4 matching). At 4 weeks, no statistically significant difference in persistent headache symptoms was observed between the treatment and propensity score matched control groups (OR: 0.67; 95% CI: 0.33-1.36, $p = 0.26$). There was also no statistically significant difference between the groups at 1-week post-concussion (OR 0.58; 95% CI: 0.32-1.05, $p = 0.07$). **Conclusion:** This secondary analysis was unable to detect a statistically significant association between acute ED treatment with metoclopramide and reduced medium and long-term headache symptoms post-concussion. Nevertheless, the 1-week results hold promise, but require a well-powered RCT to fully address confounding issues to determine the benefit of metoclopramide post-concussion.
Keywords: concussion, headache, propensity analysis

LO058

Reducing unnecessary coagulation studies in suspected cardiac chest pain patients

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Introduction: In light of escalating health care costs, initiatives such as Choosing Wisely have been advocating the need to "reduce unnecessary or wasteful medical tests, treatments and procedures". We have identified coagulation studies as one of those low cost, but frequently ordered items, where we can decrease unnecessary testing and costs by leveraging our Computerized Practitioner Order Entry (CPOE). Considerable evidence exists to suggest a low yield of doing coagulation studies (herein defined as PTT AND INR's) in suspected cardiac chest pain patients (SCCP). **Methods:** Using administrative data merged with CPOE we extracted data 90 days pre- and 90 post-intervention (Pre-intervention: May 20, 2015 to August 19th 2015, Post-intervention: August 20th, 2015 to November 18th 2015). The setting for the study is a large urban center (4 adult ED's with an annual census of over 320,000 visits per year). Our CPOE system is fully integrated into the ED patient care. The intervention involved modifying the nursing CPOE to remove the pre-selected coagulation studies in SCCP and providing education around appropriate usage of coagulation studies. Patients were included in the study if the bedside nurse or physician felt 1. the chest pain may be cardiac in nature and 2. Labs were ordered. The primary outcome was to compare the number of coagulation studies ordered pre and post-intervention. **Results:** Our analysis included 10,776 patients that were included in an SCCP pathway as determined by the CPOE database. Total number of visits in these two phases were similar (73,551 pre and 72, 769 post). In the pre-intervention phase, 5255 coagulation studies were done (4246 ordered by nursing staff and 1009 studies ordered by ED physicians). In the post-intervention phase, 1464 coagulation studies were ordered (1211 by nursing staff and 253 additional tests were ordered by ED physicians). With our intervention, we identified a net reduction of 3791 coagulation studies in our post-intervention phase for a reduction of 72.14% reduction ($p = < 0.0001$) At a cost of 15.00$ (CDN$ at our center), we would realize an estimated cost -savings of 56,865$ for this intervention over a 90 day period. **Conclusion:** We have implemented a simple, sustainable, evidence based intervention that significantly minimizes the use of unnecessary coagulation studies in patients presenting with SCCP.
Keywords: chest pain, coagulation, decision support

LO059

CT head scans yield no relevant findings in patients presenting to the emergency department with bizarre behavior

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Introduction: The standard approach between Emergency Departments (EDs) and Psychiatric Emergency Services is to medically "clear" a stable patient of organic pathology prior to psychiatric consultation. Medical clearance involves neuroimaging, typically in the form of a computed tomography (CT) head scan. This study examines the clinical impact of ordering CT head scans for patients presenting with bizarre behaviour. **Methods:** A 5-year retrospective chart review was conducted at 3 academic, urban ED sites. Inclusion criteria were patients ≥18 years of age triaged as "mental health - bizarre behavior" (defined as deviating from normal cognitive behaviour with no obvious cause) with a CT head scan ordered while under the care of the ED. Exclusion criteria were focal neurologic deficits on exam, alternative medical etiology (i.e. delirium, trauma) and/or pre-existing CNS disease. Demographic, administrative, and neuroimaging data were extracted with 10% of charts independently reviewed by a staff Emergency Physician for inter-rater reliability. **Results:** 270 cases met study criteria. CT results were unavailable in 3, leaving 267 cases studied. The population demographics were: 49% percent female, average age 51 years old, 28% homeless, 59% arrived by police and/or ambulance. CT head results demonstrated 1 (0.4%) case with possible acute findings on CT. 108 (40%) had incidental findings (i.e. cerebral atrophy, small hypodensities), none of which impacted clinical management. Average time to physician assessment was 1 hour 58 minutes (sd 1:17) and time

to CT head completion was 6 hours 50 minutes (sd 7:20) leaving an average of 4 hours 52 minutes awaiting these results. Ultimately 86% of patients were referred to a consultant of which 92% were to Psychiatry. **Conclusion:** This study of CT head scans for bizarre behavior ED presentations showed that the CT results did not change the clinical management of the patient. Furthermore, awaiting these results prolonged ED length of stay and delayed patient disposition. A prospective trial of a clinical decision tool for ordering CT head scans in these patients is warranted.
Keywords: neuroimaging, medical clearance, emergency department

LO060

Diagnostic and prognostic value of hydronephrosis in emergency department patients with acute renal colic

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Introduction: Hydronephrosis is a marker of stone-related ureteral obstruction. Our objective was to assess the diagnostic and prognostic value of hydronephrosis in ED patients with renal colic. **Methods:** We used an administrative database to identify all renal colic patients seen in Calgary's four EDs in 2014. Research assistants reviewed imaging reports to identify proven ureteral stones, and to document hydronephrosis and stone size. Surgical interventions, ED and hospital visits within 60-days were collated from all regional hospitals. The primary outcome was sensitivity and specificity of hydronephrosis (moderate or severe) for detecting stones >5mm. We also assessed the association of hydronephrosis with index admission-intervention, and with outcomes at 7 and 60 days. **Results:** In 2014, 1828 patients had a confirmed ureteral stone plus assessment of hydronephrosis and stone size (1714 CT, 114 US). Hydronephrosis was absent, mild, moderate or severe in 15%, 47%, 34% and 4% of patients respectively. Median stone size was 4.0, 4.0, 5.0 and 7.0mm for patients in these categories. Mild, moderate and severe hydronephrosis were highly associated with admission (OR = 2.0, 4.6, 9.8; $p < 0.001$) and index visit surgical intervention (OR = 2.1, 3.7, 6.0; $p < 0.001$). The presence of moderate-severe hydronephrosis was 54.7% sensitive and 65.4% specific for stones > 5mm, with positive and negative predictive values of 51% and 74.2%. Of 1828 patients, 748 had an index visit surgical procedure and 1080 were discharged with medical management. In the latter group, hydronephrosis was absent, mild, moderate or severe in 20%, 50%, 27% and 3%. Corresponding median (IQR) stone size was 3.0, 4.0, 4.0 and 5.0mm. Of 1080 medically managed patients, 19% and 25% had an unscheduled ED revisit by 14 and 60 days, 9% and 10% were hospitalized by 7 and 60 days, and 13% had a rescue procedure within 60 days. In the medically managed group, degree of hydronephrosis had no statistical association with any outcomes at 7 or 60 days. **Conclusion:** Hydronephrosis has poor sensitivity, specificity and predictive value for stones >5mm. Degree of hydronephrosis is highly associated with MD decisions for admission and intervention, but not associated with patient outcomes in the absence of these decisions. Despite poor diagnostic and prognostic performance, hydronephrosis is likely guiding critical early management decisions.
Keywords: hydronephrosis, renal colic, diagnosis

LO061

Variation in emergency department use of computed tomography for investigation of acute aortic dissection

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Introduction: Acute aortic dissection (AAD) is a life threatening condition making early diagnosis critical. Although 90% present with acute pain, the myriad of associated symptoms can make investigation and diagnosis a challenge. Our objectives were to assess emergency physician use of CT, yield of CT and ordering variation among physicians in patients presenting with pain for diagnosis of AAD. **Methods:** This historical cohort study of consecutive adult patients presenting to two tertiary academic care EDs over one calendar year included patients with a primary complaint of non-traumatic chest, back, abdominal or flank pain. Patients were excluded if clear diagnosis was made by basic investigations or exam. Primary outcome was rate of CT Thorax or Thorax/Abdomen ordered to rule out AAD as per clinical indication on diagnostic requisition. Secondary outcome was variation in CT ordering. Variation was measured with; Cochrane q test for homogeneity, proportion of positive CT's (z-test) and mean CT's (t test) ordered between high (>5CT/yr) and low (<5CT/yr) test users. Sample size of 6 per group was calculated based on an expected delta in mean CT ordered of 5 and a within group SD of 3. **Results:** 31,201 patients presented with chest, abdominal, back, flank pain during the study period. 8,472 were excluded based on a diagnosis made by clinical exam or basic investigations. 22,776 were included (Mean 47years SD 18.5yrs 56.2% Female). Most common diagnoses; Chest pain NYD (23.3%), Abdominal pain NYD(20.8%), Lower back pain NYD(10.5%), Renal Colic (5.3%), ACS (2.9%). CT was ordered to rule out AAD in 175 (0.7%) (Mean 62 years SD 16.5, 50.6% Female). Only 4(2.3%) were found to have an AAD. There was significant variation (range 0.6-12% Q test $P < 0.027$) between proportion of CT's ordered by physicians. Between high (Mean 7.9 n = 10 AAD = 2) and low test users (Mean 2.3 n = 41 AAD = 2), there was significant difference in mean number of CT's ordered ($p < 0.001$) but no difference in number of AAD found ($p < 0.2$). No AAD were missed. **Conclusion:** Current rate of imaging for aortic dissection is appropriately low but inefficient, with 98% of advanced imaging negative. There is significant variation in physician CT ordering (almost 20-fold) without an increase in diagnosis. These findings suggest great potential for more standardized and efficient use of CT for the diagnosis of AAD.
Keywords: aortic dissection, imaging, variation

LO062

Ultrasound-assisted distal radius fracture reduction

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Introduction: Closed reduction of distal radius fractures (CRDRF) is a commonly performed emergency department (ED) procedure. The use of Point-of-care ultrasound (POCUS) to diagnose fractures and guide reduction has previously been described. The primary objective for this study was to determine if the addition of PoCUS to CRDRF changed the perception of successful initial reduction. This was measured by the rate of further reduction attempts based on POCUS following the initial clinical determination of achievement of best possible reduction. **Methods:** We performed a multicenter prospective cohort study, using a convenience sample of adult ED patients presenting with a distal radius fracture to 5 Canadian EDs. All study physicians underwent standardized PoCUS training for fractures. Standard clinically guided best possible fracture reduction was initially performed. PoCUS was then used to assess the reduction adequacy. Repeat reduction was performed if deemed indicated. A post-reduction radiograph was then performed. Clinician impression of reduction adequacy was scored on a 5 point Likert scale following the initial clinically guided reduction, and

following each POCUS scan and the post-reduction radiograph. **Results:** There were 131 patients with 132 distal radius fractures. Twelve cases were excluded prior to analysis. There was no significant difference in the assessment scores for reduction success by PoCUS vs. clinical assessment (Median scores 4 vs.4; $p = 0.370$;) or in the odds ratio of successful reduction (0.89; 95% CI 0.46 to 1.72; $p = 0.87$). Significantly fewer cases fell in the uncertain category with POCUS than with clinical assessment (12 vs 2; $p = 0.008$). Repeat reduction was performed in 49 patients (41.2%). In this group, the odds ratio for adequate reduction assessment post-PoCUS to pre-PoCUS was 12.5 (95% CI 3.42 to 45.7; $p < 0.0001$). There was no significant difference in the assessment of reduction by PoCUS vs. radiograph. **Conclusion:** PoCUS guided fracture reduction leads to repeat reduction attempts in approximately 40% of cases, and enhances certainty regarding reduction adequacy when clinical assessment is unclear.
Keywords: point-of-care ultrasound (PoCUS), fracture, reduction

LO063

Adverse events in a pediatric emergency department: a prospective, cohort study

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Introduction: Data regarding adverse events (AEs) (unintended harm to a patient related to health care provided) among children treated in the emergency department (ED) have not been collected despite identification of the setting and population as high risk. The objective of our study was to estimate the risk and type of AEs, as well as their preventability and severity, for children seen in a pediatric ED. **Methods:** This prospective cohort study examined outcomes of patients presenting to a paediatric ED. Research assistants (RA) recruited patients < 18 yrs old during 28 randomized 8-hr shifts (over 1 yr). Exclusion criteria included unavailability for follow-up and insurmountable language barrier. RAs collected demographics, medical history, ED course, and systems level data. A RA administered a structured telephone interview to all patients at day 7, 14, and 21 to identify flagged outcomes (such as repeat ED visits, worsening/new symptoms, etc). Admitted patients' health records were screened with a validated trigger tool. A RA created narrative summaries for patients with flagged outcomes/triggers. Three ED physicians independently reviewed summaries to determine if an AE occurred. Primary outcome was the proportion of patients with an AE within 3 weeks of their ED visit. **Results:** We enrolled 1367 (70.3%) of 1945 eligible patients. Median age was 4.3 yrs (range 2 months-17.95 yrs); 676 (49.5%) were female. Most (n = 1279; 93.9%) were discharged. Top entrance complaints were fever (n = 206,15.1%), cough (n = 135, 9.9%), and difficulty breathing (n = 108, 7.9%). Eight eighty (6.5%) patients were triaged as CTAS 1 or 2, 689 (50.6%) as CTAS 3, and 585 (42.9%) as CTAS 4 or 5. Only 44 (3.2%) were lost to follow-up. Flagged outcomes/triggers were identified for 498 (36.4%) patients. Thirty three (2.4%) patients suffered at least one AE within 3 weeks of ED visit; 30 (90.9%) AEs were related to ED care. Most AEs (n = 28; 84.8%) were preventable. Management (n = 18, 54.5%) and diagnostic issues (n = 15, 45.5%) were the most common AE types. The most frequent clinical consequences were need for medical intervention (n = 15;45.5%) and another ED visit (n = 13,39.4%). In univariate analysis, age ($p = 0.005$) and weekday presentation ($p = 0.02$) were associated with AEs. **Conclusion:** We found a lower risk of AEs than that reported among inpatient paediatric and adult ED studies utilizing similar methodology. A high proportion of AEs were preventable.
Keywords: pediatrics, adverse events, patient safety

LO064

Simulation in Canadian postgraduate emergency medicine training — a national survey

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Introduction: Simulation-based medical education (SBME) is an important training strategy in emergency medicine (EM) postgraduate programs yet the extent of its use is variable. This study sought to characterize the use of simulation in FRCP-EM residency programs across Canada. **Methods:** A national survey was administered to residents (PGY2-5) and program representatives (PR), either a program director or simulation lead at all Canadian FRPC-EM programs. Residents completed either paper or electronic versions of the survey, and PR surveys were conducted by telephone. **Results:** The resident and PR response rates were 60% (187/310) and 100% (16/16), respectively. All residency programs offer both manikin-based high fidelity and task trainer simulation modalities. Residents reported a median of 20 (range 0-150) hours participating in simulation training annually, spending a mean of 16% of time in situ, 55% in hospital-based simulation laboratories, and 29% in off-site locations. Only 52% of residents indicated that the time dedicated to simulation training met their training needs. All PRs reported having a formal simulation curriculum with a frequency of simulation sessions ranging from weekly to every 6 months. Only 3/16 (19%) of programs linked their simulation curriculum to their core teaching. Only 2/16 programs (13%) used simulation for resident assessment, though 15/16 (93%) PRs indicated they would be comfortable with simulation-based assessment. The most common PR identified barriers to administering simulation by were a lack of protected faculty time (75%) and a lack of faculty experience with simulation (56%). Both PRs and residents identified a desire for more simulation training in neonatal resuscitation, pediatric resuscitation, and obstetrical emergencies. Multidisciplinary involvement in simulations was strongly valued by both residents and PRs, with 76% of residents indicating that they would like greater multidisciplinary involvement. **Conclusion:** Among Canadian FRCP-EM residency programs, SBME is a frequently used training modality, however, there exists considerable variability in the structure, frequency and timing of simulation exposure for residents. Several common barriers were identified that impact SBME implementation. The transition to competency-based medical education will require a national, standardized approach to SBME that includes a unified strategy for training and assessment.
Keywords: simulation, education, emergency medicine

LO065

Reduced length of stay and adverse events using Bier block for forearm fracture reduction in the pediatric emergency department

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Introduction: Distal forearm fractures are one of the most common injuries presenting to the pediatric emergency department. Procedural sedation (PS) is commonly used to provide analgesia during fracture reduction, but requires a prolonged recovery period and can be associated with adverse respiratory events. Bier block (BB) regional anesthesia is a safe alternative to PS for fracture reduction analgesia. We sought to assess the impact of BB on length of stay (LOS) and adverse events following forearm fracture reduction compared to PS. **Methods:** We performed a retrospective study of patients aged 6 to 18 years, presenting with forearm fractures requiring closed reduction from June

2012 to March 2014. The primary outcome measure was emergency department LOS; secondary outcomes included reduction success rates, adverse events and unscheduled return visits. **Results:** Two-hundred and seventy-four patients were included for analysis; 109 treated with BB, 165 underwent PS. Overall, mean LOS was 82 min shorter for patients treated in the BB group (279 min vs. 361 min, $p < 0.05$). Sub-analysis revealed a reduced LOS among patients treated with BB for fractures involving a single bone (286 min vs. 388 min, $p < 0.001$) and both-bones of the forearm (259 min vs. 321 min, $p < 0.05$). Both BB and PS resulted in comparable rates of successful reduction (98.2% vs. 97.6%, $p = 0.74$). There were no major adverse events in either group. Patients who received BB experienced significantly fewer minor adverse events (2.7% vs. 14.5%, $p < 0.05$). Return visit rates were similar in the BB and PS groups (17.6% vs. 17.1%, $p < 0.05$). **Conclusion:** Compared to PS, forearm fracture reduction performed with BB was associated with a reduced emergency department LOS and fewer adverse events, with no difference in reduction success or return visits.
Keywords: ketamine, lidocaine, sedation

LO066

H1-antihistamine administration is associated with a lower likelihood of progression to anaphylaxis among emergency department patients with allergic reactions

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Introduction: H1-antihistamines are often used to treat allergic reactions, however, the influence of H1-antihistamines on progression to anaphylaxis remains unclear. Among patients initially presenting with allergic reactions, we investigated whether H1-antihistamines were associated with a lower proportion of patients progressing to anaphylaxis during observation. **Methods:** This was a retrospective cohort study conducted at two urban EDs from 2007 to 2012. We included adult patients with allergy and excluded those who met criteria of anaphylaxis at first evaluation by medical professionals and/or received antihistamines before the evaluation. Primary outcomes of interest were the number of patients who developed anaphylaxis during observation at ED and/or transportation by EMS. Secondary outcomes were the number of biphasic reactions and severe anaphylaxis (defined as $sBP < 90$; $SpO2 < 92\%$; and/or confusion, collapse, loss of conscious, or incontinence). Logistic regression was performed comparing primary and secondary outcomes between H1-antihistamine treated and non-treated groups with propensity score adjustment of the baseline covariates. Number needed to treat (NNT) was calculated by adjusted absolute risk reduction of H1-antihistamine compared to non H1-antihistamine use on primary outcome. **Results:** This study included 1717 patients with allergic reactions, of whom 1228 were treated with H1-antihistamines. In the H1-antihistamine group 1.0% and 0.2% developed anaphylaxis and severe anaphylaxis, respectively; in the non-H1-antihistamine group 2.6% and 0.6% developed anaphylaxis and severe anaphylaxis, respectively. There were no biphasic reactions (0%, 95% confidence interval [CI] 0 to 0.17%). Administration of H1-antihistamines was associated with a lower incidence of subsequent anaphylaxis (adjusted odds ratio [OR] 0.23, 95% CI 0.10 to 0.53; NNT to benefit 49.1, 95% CI 41.6 to 83.3). There were no significant associations between H1-histamines administration and secondary outcomes. **Conclusion:** Among ED patient with allergic reactions, H1-antihistamine administration was associated with a lower likelihood of progression to anaphylaxis. These findings suggest that H1-antihistamines should be administered early in the care of patients with allergic reactions.
Keywords: anaphylaxis

LO067

Emergency department management of diabetic ketoacidosis and hyperosmolar hyperglycemic state: national survey of attitudes and practice

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Introduction: The 2011 Canadian Diabetes Association (CDA) Clinical Practice Guidelines were developed in order to help physicians manage hyperglycemic emergencies in the emergency department (ED), including diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS). The goal of this study was to determine physician attitudes towards these guidelines and to identify potential barriers to their implementation in the ED. **Methods:** We distributed an online, cross sectional survey to 500 randomly selected members of the Canadian Association of Emergency Physicians (CAEP) who were currently practicing physicians. A total of 3 email notifications were distributed on days 1, 7 and 14. The survey consisted of 23 questions relating to physician management of DKA and HHS in the ED. The primary outcome was overall physician familiarity and usage of the guidelines using a 7-point Likert scale. Secondary outcomes included physician attitudes towards the guidelines as well as any perceived barriers to their implementation in the ED. Simple descriptive statistics were used to illustrate the survey results. **Results:** The survey response rate was 62.2% (311/500) with the following participant characteristics: male (62.6%), CCFP(EM) training (46.1%) and working in major academic centers (50.5%). The overall awareness rate of the CDA guidelines was 22.9% (95% CI = 18.3%, 27.5%). 58.9% (95% CI = 53.3%, 64.3%) reported the CDA guidelines being useful. The most frequently reported barriers to CDA guideline implementation were concerns about education issues (56.0%), lack of time and disruption of flow (23.9%), staffing and human resource issues (26.7%) and poor policy adherence (25.5%). Physician's ideal changes to optimize the management of these patients included improved coordination for follow-up with family physicians (79.9%), increased diabetes education for patients (73.9%) and increased availability to diabetes specialists (47.5%). **Conclusion:** In this study, although Canadian ED physicians were generally supportive of the CDA guidelines, many were unaware that these guidelines existed and barriers to their implementation were reported. Future research should focus on strategies to standardize DKA and HHS management by ensuring physician awareness and education to ensure the highest quality of patient care.
Keywords: clinical guidelines, diabetic ketoacidosis, hyperosmolar hyperglycemic state

LO068

Physician adherence to Antimicrobial Guidelines for Community Acquired Pneumonia in the St. Michael's Hospital Emergency Department

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Introduction: The Toronto Central Local Health Integration Network released new antimicrobial guidelines for the treatment of community acquired pneumonia (CAP) in August 2013. These deemphasized antimicrobial coverage for atypical organisms and use amoxicillin-clavulanic acid (AMC) as first-line for low risk CAP. The purpose of this study was to assess physician adherence to these guidelines in St. Michael's Hospital (SMH) Emergency Department (ED). **Methods:** A retrospective chart review was conducted from April 1 to May 31 in

2013, 2014 and 2015. All adult patients who were discharged home from the ED with a diagnosis of pneumonia were included. Severity of pneumonia was graded based on the CRB-65 score as per the CAP guidelines. Primary outcome was type of antibiotic prescribed by the ED physician. Data was analyzed using simple descriptive statistics. **Results:** There were a total of 141 patients analyzed during the study period (N = 46 in 2013, N = 59 in 2014, N = 36 in 2015). Demographics and relevant comorbidities were similar across the years: age (2013: median = 53 years, range 20-92 years; 2014: 56, 21-83; 2015: 54, 20-81); preexisting lung disease (30%, 27%, 25% respectively); HIV positive status (9%, 7%, 17%). CRB-65 score was: low risk (0 points) = 70% in 2013, 66% in 2014, 75% in 2015; intermediate risk (1-2 points) = 30%, 34%, 25%; high risk (3-4 points) = 0% in all years. Percentage of patients discharged home with a documented prescription was 83%, 85%, and 94% respectively. In 2013, patients received azithromycin (AZM) (n = 17, 43% of antibiotic prescriptions that year); levofloxacin (LVX) (n = 10, 25%); AMC (n = 5, 13%); clarithromycin (CLR) (n = 5, 13%); trimethoprim-sulfamethoxazole (SXT) (n = 2, 5%); doxycycline (DOX) (n = 1, 3%). In 2014: AMC (n = 26, 51%); AZM (n = 12, 24%); LVX (n = 9, 18%); CLR (n = 2, 4%); DOX (n = 1, 2%); erythromycin (ERY) (n = 1, 2%). In 2015: AMC (n = 17, 47%); AZM (n = 12, 33%); LVX (n = 4, 11%); CLR (n = 1, 3%); SXT (n = 1, 3%); DOX (n = 1, 3%). Number of return ED visits within 2 weeks were: n = 16 (35%); n = 11 (19%); and n = 10 (28%) respectively. **Conclusion:** The results of this study show that there has been a change in antibiotic prescribing practices in the SMH ED since dissemination of the CAP guidelines, with AMC accounting for nearly half of antibiotic prescriptions. Further antimicrobial stewardship efforts will focus on evaluating factors influencing prescribing practices.
Keywords: community-acquired pneumonia, quality improvement, antibiotic stewardship

LO069

Current management of pharyngitis in the emergency department: a retrospective multicenter observational study

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Introduction: Pharyngitis is a common presenting complaint at the emergency department (ED). Historically, acute pharyngitis has been overdiagnosed as the result of a bacterial etiology, leading to over-prescription of antibiotics, and overuse of throat culturing. This study attempts to quantify the current management of acute pharyngitis in the ED, and compare to the theoretical management using a modified Centor score. **Methods:** This was a retrospective chart review of 1640 patients who presented to four EDs in the central zone of the Nova Scotia Health Authority that received a diagnosis of pharyngitis, bacterial pharyngitis or tonsillitis. The primary outcome was the observed rate of each diagnosis in the study population, the rate of antibiotic prescription, and the rate of throat swab cultures performed. The secondary outcomes were the rate of antibiotics and throat swabs ordered using a modified Centor score. Antibiotics as first-line treatment were indicated if the Centor score was three or greater, and throat cultures were indicated if the Centor score was two or greater. **Results:** A total of 1596 patients were included in the analysis. Antibiotics were given in 893 patients (0.559; 95% CI: {0.535, 0.584}). Cultures were sent on 863 patients (0.541 CI: {0.516, 0.565}). Using the modified Centor thresholds, we would have prescribed antibiotics as the first-line treatment in 77 cases (0.048 CI: {0.038, 0.060}), potentially saving 786 prescriptions, and ordered throat swabs on 502 patients (0.315, CI: {0.292, 0.338}), saving 361 cultures. The most commonly prescribed antibiotic was penicillin, and the least prescribed was metronidazole. **Conclusion:** Over half of patients that present with acute pharyngitis receive an antibiotic, and over half have a throat swab culture performed. Utilizing a modified Centor score would result in decreased antibiotic prescription rate, and a diminished rate of throat cultures. Incorporation of these Centor criteria could result in diminished antibiotic prescription rates for acute pharyngitis in the ED.
Keywords: antibiotic, pharyngitis

LO071

Influenza and pneumococcal vaccinations in the emergency department

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Introduction: Influenza and pneumococcal disease are vaccine preventable diseases that account for significant morbidity and mortality in Canada. Influenza vaccination has been shown to reduce mortality and pneumococcal vaccination reduces invasive pneumococcal disease. Previous studies have shown that emergency department (ED) patients are often at high risk for influenza and pneumococcal disease and willing to be vaccinated during their ED stay. Our study set out to determine what proportion of adult patients in the ED qualify for and are willing to be vaccinated against influenza and pneumococcus during their ED visit. **Methods:** Our study used a convenience sample of patients presenting to the ED at a large Canadian tertiary care centre (Vancouver General Hospital). Inclusion criteria were: adult patients (19 years or greater); consenting to be screened for immunization status; and able to communicate in English. The exclusion criteria were: critically ill patients and patients in severe pain. The primary outcome was the proportion of patients presenting to the ED that could be immunized for influenza and pneumococcus (member of a high risk group, unvaccinated and willing to be vaccinated). Secondary outcomes included additional demographic characteristics and patient attitudes regarding vaccination. **Results:** We screened 413 patients of which 55 did not meet inclusion/exclusion criteria and 104 declined participation. A total of 254 patients completed the survey for a response rate of 71%. Our primary outcome was present in 20% of patients for influenza (high risk for complications, unvaccinated and willing to be vaccinated in the ED). For pneumococcus, 15% were at high risk, unvaccinated and willing to be vaccinated in the ED. In our population, 83% were at high risk of complications from influenza and 58% were at high risk of complications from pneumococcus. In total, 53% of patients would accept influenza vaccine and 44% would accept pneumococcal vaccine. **Conclusion:** Our study demonstrates that there is a significant high-risk population that is otherwise unreached and are willing to be vaccinated for influenza and pneumococcus in the ED. Our patient population has a very high prevalence of risk factors for complications of pneumonia and influenza. This data suggests that ED patients are a high-risk population and could be a target group for vaccination campaigns.
Keywords: influenza, pneumococcus, vaccination

LO072

Fever in the returning traveller: a systematic review and critical appraisal of existing clinical practice guidelines and approaches to returning travellers presenting with fever

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Introduction: Fever in the returning traveller is a common ED presentation; however approaches and level of comfort with tropical diseases vary widely. This project aimed to conduct a systematic review and critical appraisal of existing clinical practice guidelines and approaches, to guide an ED approach, in Canada, to fever in the returning traveller. **Methods:** A literature review was conducted of peer reviewed papers, national and international practice guidelines, and practice statements presenting approaches to fever in the returning traveller. A literature search was conducted using MEDLINE and Embase (1947-Dec 2014), with librarian assistance to optimize strategy. The databases of guideline clearing houses, CMA, PHAC, WHO, CDC, and the Cochrane library were searched, along with a google scholar search. References of included articles were hand searched. Article titles and abstracts were reviewed by the author for inclusion. Key elements of the guidelines and approaches were identified and grouped by theme and where appropriate, the quality of guidelines were assessed by two reviewers using the AGREEII tool. **Results:** The search returned 1598 titles. 72 full manuscripts were reviewed based on inclusion from title and abstract, with 24 manuscripts included for final analysis. Common elements suggested by the guidelines or approaches were identified and grouped within three themes (key historical features, physical exam findings, investigations). Most manuscripts presented tables of important clinical information, but limited guidance on how to approach diagnosis in a focused manner. When evaluated by AGREEII, only one guideline (D'Acremont et al) scored > 50% overall quality rating. Unlike other approaches, this guideline proposes a stepwise approach to diagnosis and treatment based on the presence of key exposures, signs/symptoms, and eosinophilia. **Conclusion:** The guideline by D'Acremont et al was identified as the most rigorous existing practice guideline. This guideline, combined with other elements identified by thematic review, forms the basis of a suggested ED approach to fever in the returning traveller, which will be further refined using the AGREEII model to propose a practice guideline for Canadian EDs.

Keywords: fever, returning traveller, AGREEII

LO073

Implementation of an ED atrial fibrillation and atrial flutter pathway decreases ED length of stay

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Introduction: Atrial fibrillation and flutter (AFF) are the most common arrhythmias presenting to the emergency department. A coordinated ED AFF electronic order-set and management pathway was developed in collaboration with cardiologists at our institution. The primary objective of this study was to compare the ED length of stay pre and post pathway implementation. Secondary objectives included comparison of the following outcomes pre and post-pathway (PRE & POST): AFF Clinic referral rates, ED return rates, and mortality. **Methods:** This was a retrospective case series of patients presenting to our quarternary care ED with AFF pre and post AFF pathway implementation. Cases were identified using an administrative database covering 120 000 annual ED visits. Trained research assistants and the primary investigator extracted data from the electronic medical record. 20% of all charts were double collected to ensure accuracy (k = 0.85). Descriptive variables were described using counts, means, medians and confidence intervals. Chi-square statistics of dependent samples were calculated for the primary outcome. **Results:** We examined 307 cases of AFF presenting to our ED (n = 130 PRE; n = 177 POST). Demographic variables were similar PRE and POST: mean age (66.0 [95%CI 63.8-68.3] PRE; 65.0 [63.0-67.0] POST), % male (59.2% PRE; 59.3% POST), presenting rhythm (66.2% A.fib [58.0-74.3] A. flutter 29.2% [21.4-37.0] PRE; 61.0% A.fib [53.8-68.1] A. flutter 17.5% [11.9-23.1] POST), and CHADS2VASC score (2.1 [1.8-2.4] PRE; 1.9 [1.7-2.1] POST). The mean ED LOS decreased by 72.5 minutes (95% CI -22.9 to -122.1; P < 0.001). AFF clinic referral rates increased from 16.9% PRE to 25.4% POST (not significant). ED return rates within 30 days for AFF, CHF, major bleeding and CVA were unchanged. 30 day mortality rates were not statistically different (1.5% PRE vs. 2.8% POST). **Conclusion:** A coordinated ED AFF pathway was associated with a significant reduction in ED LOS without significant changes in ED return rates or mortality.

Keywords: atrial fibrillation, length of stay, emergency medicine

LO074

Point of care ultrasound for lung B-lines in the early diagnosis of acute decompensated heart failure in the emergency department: a systematic review

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Introduction: Dyspnea is a common presenting problem in the emergency department (ED) that frequently creates a diagnostic challenge for physicians. Acute decompensated heart failure (ADHF) represents a common cause that requires prompt diagnosis and management. Recent studies on dyspneic patients have suggested a potential role for point-of-care ultrasound (PoCUS). The objective of this systematic review was to assess the sensitivity and specificity of early bedside lung ultrasound in patients presenting to the ED with dyspnea. **Methods:** A search of the literature was conducted using PubMed, EMBASE, the Cochrane Library, bibliographies of previous systematic reviews, and abstracts from major emergency medicine conferences. We included prospective studies that assessed the diagnostic accuracy of B-lines from bedside lung ultrasound in the ED patients compared to a clinical diagnosis of ADHF at hospital discharge. The final diagnosis included at least one of CXR, computed tomography, or BNP. Two reviewers independently screened all titles and abstracts for possible inclusions. Two separate content experts full text-reviewed selected studies and performed quality analysis using a modified Critical Appraisal Skills Program (CASP) questionnaire. Extracted data was assessed with summary receiver operator characteristics curve (SROC) analysis with pooled sensitivity and specificity. Heterogenity was tested. **Results:** The electronic search yielded 3674 articles of which six met the inclusion criteria and fulfilled CASP requirements for methodological quality. The total number of patients in these studies was 1911. Heterogeneity was noted; due to poorer performance by novice users. Meta-analysis of the data showed that in detecting ADHF, bedside lung ultrasound had a pooled sensitivity of 89.6% (95% CI 69.5 to 97.0%) and a pooled specificity of 88.4% (95% CI 75.0 to 95.1%). The positive likelihood ratio was 6.01 (95% CI 2.93 to 12.32) and negative likelihood ratio was 0.13 (95% CI 0.06 to 0.30). **Conclusion:** This study suggests that in patients presenting to the ED with undifferentiated dyspnea, early point of care lung ultrasound may be used to confirm the diagnosis of ADHF, which may facilitate earlier appropriate management. Test performance may vary according to experience.

Keywords: point-of-care ultrasound (PoCUS), B-Lines, heart failure

LO075

Clinical exam for acute aortic dissection: a systematic review and meta-analysis

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Introduction: Acute aortic dissection (AAD) is difficult to diagnose and if missed carries a significant mortality rate. Our aim was to assess the accuracy of history, physical exam and plain radiographs compared to advanced imaging in the diagnosis of AAD in adults presenting to the ED with a clinical suspicion of AAD. **Methods:** We conducted a librarian assisted systematic review. Databases searched: Pubmed, Medline, Embase and the Cochrane database from 1968 to January 2016. No restrictions for language were imposed. Studies were reviewed and data extracted by two independent reviewers. AAD was defined by CTA, MRI or TEE Prospective and retrospective studies of patients presenting with a clinical suspicion of AAD were included. Case series were excluded. Studies were combined if low clinical and statistical heterogeonity ($I^2 < 30\%$). Study quality was assessed using the QUADAS tool. Bivariate random effects meta analyses using Revman 5 and SAS 9.3 was performed. **Results:** We identified 792 records: 61 selected for full text review, 13 included and a further 7 from reference searches. 20 studies with 4721 participants were included (mean QUADAS score 12/14 SD 1.2, Kappa 0.8). Prevalence of AAD ranged from 9.6-76.1% (mean 39.1% SD 17.1%). Mean diagnosis in those without AAD varied between studies with ACS (30.3% SD 30.1%), Anuerysm(12.4% SD 9.8%), Chest wall pain(18.1% SD 13.3%) and PE (7.9% SD 7.85%) being the most common. The clinical findings most suggestive of AAD were, neurological deficit (specificity 94% LR 4.1 [95% CI, 3.1-5.2], I^2 0%, n = 9), hypotension(specificity 94% LR 2.6 [95% CI 1.6-4.2], I^2 0%, n = 8), pulse deficit (specificity 92% LR 3.4 [95% CI 1.8-6.4], I^2 0%, n = 9) and syncope (specificity 92% LR 1.4 [95% CI 1.1-1.8], I^2 10%, n = 6). The most useful for identifying patients less likely to have AAD were an absence of a widened mediastinum (sensitivity 80% LR 0.3 [95% CI 0.2-0.5], I^2 20%, n = 13) and an AHA Aortic dissection risk score <1 (n = 2 sensitivity 91%,99% LR 0.02,0.22, [95% CI 0.003-0.128, 95%CI 0.2-0.3]). **Conclusion:** Suspicion for AAD should be raised with syncope, hypotension and pulse or neurological deficit in the appropriate clinical setting. Conversely the absence of a widened mediastinum and a low ADD score decreases likelihood. Clinical exam alone cannot rule out acute aortic dissection but it can help risk stratify for further testing.

Keywords: aortic dissection, clinical exam

LO076

Remote ischemic conditioning to reduce reperfusion injury during acute STEMI: a systematic review and meta-analysis

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Introduction: Remote ischemic conditioning (RIC) is a non-invasive therapeutic strategy that uses brief cycles of inflation and deflation of a blood pressure cuff to reduce ischemia-reperfusion injury during acute ST-elevation myocardial infarction (STEMI). The primary objective of this systematic review was to determine if RIC initiated prior to catheterization increases myocardial salvage index, defined as the proportion of area at risk of the left ventricle salvaged by treatment following emergent percutaneous coronary intervention (PCI) for STEMI. Secondary outcomes included infarct size and major adverse cardiovascular events. **Methods:** Electronic searches of PubMed, Ovid MEDLINE, EMBASE and Cochrane Central Register of Controlled Trials were conducted and reference lists were hand-searched. Randomized controlled trials comparing PCI with and without RIC for patients with STEMI published in English were included. Two reviewers independently screened abstracts, assessed quality of the studies, and extracted data. Data were pooled using random-effects models and reported as risk ratios (RR) with 95% confidence intervals (CIs). **Results:** Nine RCTs were included with a combined total of 999 patients (RIC + PCI = 534, PCI = 465). The myocardial salvage index was higher in the RIC + PCI group at 3 and 30 days; mean difference 0.09 (95% CI: 0.04, 0.15) and 0.12 (95% CI: 0.03, 0.21), respectively. Infarct size was reduced in the RIC + PCI group at 3 and 30 days; mean difference -3.82 (95% CI: -8.15, 0.51) and -4.00 (95% CI: -7.07, -0.93), respectively. There was no statistical difference with respect to death and re-infarction, however there was a reduction in heart failure with RIC + PCI at 6 months; RR: 0.43 (95% CI: 0.19, 0.99). **Conclusion:** RIC is emerging as a promising adjunctive treatment to PCI for the prevention of reperfusion injury in STEMI patients. Ongoing, multicenter clinical trials will help elucidate the effect of RIC on clinical outcomes such a hospitalization, heart failure and mortality.

Keywords: remote ischemic conditioning, STEMI, meta-analysis

LO077

A restrictive transfusion strategy decreases mortality, re-bleeding and adverse events in hemodynamically stable patients with acute upper gastrointestinal bleeding: findings from a systematic review and meta-analysis of randomized controlled trials

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Introduction: Acute upper gastrointestinal bleeding is a potentially life-threatening medical emergency that frequently requires red blood cell (RBC) transfusions. However, the optimal hemoglobin thresholds for transfusion is controversial. The objective of this study was to establish the most efficacious transfusion threshold. **Methods:** A systematic review of the published literature was completed. MEDLINE, Health technology assessment database, Cochrane central register, Cochrane database of systematic reviews, and EMBASE were searched from inception to May 2015 using search terms including "blood transfusions", "hemoglobin", and "red blood cell". Studies were included if they: reported original data, were peer-reviewed, studied adult populations, were randomized controlled clinical trials and primarily focused on clinical efficacy or effectiveness of liberal and restrictive pre-transfusion hemoglobin level thresholds. Quality was assessed using the Cochrane Risk of Bias tool. Data were extracted and meta-analysis was conducted using a random effects model to determine the risk ratio for: all-cause mortality, further bleeding and any adverse events. All steps were completed independently by two reviewers. **Results:** The literature search identified 4037 unique abstracts. Of these, 156 abstracts proceeded to full text review. 154 articles were excluded during full-text review resulting in 2 articles for final analysis. The total number of participants included was 701. The hemoglobin threshold to transfuse RBC varied between 70-80g/L versus 90-100g/L in restrictive and liberal policies, respectively. Both studies were at low risk of bias. Meta-analysis resulted in a pooled decreased risk of all-cause mortality (RR 0.65, 95% CI 0.44-0.96), re-bleeding (RR 0.63, 95% CI 0.46-0.85) and adverse events (RR 0.83, 95% CI 0.73-0.95) in the restrictive blood transfusion group versus the liberal blood transfusion group. **Conclusion:** While the evidence is limited, the risk of death is lower and there is no significant harm for a restrictive strategy. In this context, there is a decreased risk of transfusion associated adverse events among those receiving a restrictive strategy and should be considered for its impact on patient safety and health system resources.

Keywords: upper gastrointestinal bleeding, blood transfusions, hemoglobin

LO078

The immigrant effect: a barrier to accessing primary and emergency department care - a Canadian population cross-sectional study

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Introduction: In 2011, Canada had a foreign-born population of about 6,775,800 people. They represented 20.6% of the total population, the highest proportion among the G8 countries. Immigrants encounter significant barriers to accessing primary healthcare. This is thought to be due to lower education level, employment status and the healthy immigrant effect. Our objective was to assess in an immigrant population without a primary care physician, would similar socio-economic barriers also prevent access to the emergency department. **Methods:** Data regarding individuals' ≥ 12 years of age from the Canadian Community Health Survey, 2007 to 2008 were analyzed (N = 134,073, response rate 93%). Our study population comprised 15,554 individuals identified without a primary care physician who used emergency department care. Socioeconomic variables included employment, health status, and education. Covariates included chronic health conditions, mobility, gender, age, and mental health. Prevalence estimates and confidence intervals for each variable were calculated. Weighted logistic regression models were constructed to evaluate the importance of individual risk factors and their interactions after adjustment for relevant covariates. Model parameters were estimated by the method of maximum likelihood. The Wald statistic was employed to test the significance of individual variables or interaction terms in relation to ED choice. **Results:** Our study population included 1,767 immigrants and 13,787 Canadian born respondents from across Canada without a primary care physician (57.3% male). Immigrants were less likely to use the emergency department then Canadian born respondents (Odds Ratio 0.4759 (95%CI 0.396-0.572). Adjusting for health, education or employment had no effect on this reduced access (Odds Ratio 0.468 (95%CI 0.378-0.579). **Conclusion:** In a Canadian population without a primary care physician, immigrants access the emergency department less then Canadian born respondents. However this effect is independent of previously reported social and economic barriers. Immigration status is an important but complex component of racial and ethnic disparity in access to care. Specific policy and system development targeting this at risk population are required to allow for equal access to healthcare.

Keywords: immigrant, emergency department, primary care

LO079

Prevalence and geographic variability of ectopic pregnancy in Ontario using inpatient and outpatient data: a 12-year surveillance study

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Introduction: It is estimated that 6% to 13% of patients presenting to the emergency department (ED) with vaginal bleeding or abdominal pain will have ectopic pregnancy. Risk factors such as previous pelvic infections, assisted reproductive technologies and previous tubal surgery as well as prevalence of ectopic pregnancy vary geographically. To date, the surveillance of ectopic pregnancy in Canada has been limited to hospitalized patient data, excluding patients receiving methotrexate therapy, day surgery or expectant management, possibly underestimating the true prevalence. The objective of this study was to determine Ontario's ectopic pregnancy rate and geographic variability using both inpatient and outpatient data sources. **Methods:** Data from the Canadian Institute for Health Information Discharge Abstract Database, Same Day Surgery Database, National Ambulatory Care Reporting System, and Ontario Health Insurance Plan (OHIP) Claims Database was retrieved for all females with valid OHIP coverage aged 15 to 45 years from July 2002 to August 2014. Using ICD-10 and OHIP codes for ectopic pregnancy, abortions and deliveries, the rates and distribution of ectopic pregnancy (per 1000 reported pregnancies) by age group and public health unit (PHU) were documented. These data were also compared to the rate of ectopic pregnancy documented using only hospitalized patient data. **Results:** Using inpatient and outpatient data sources, the rate of ectopic pregnancy in Ontario increased from 20.5 to 27.5 per 1000 reported pregnancies from 2002 to 2014, respectively. The rate of ectopic pregnancy using only hospitalized patient data decreased from 12.6 to 9.5 per 1000 reported pregnancies from 2002 to 2014, respectively. The median (IQR) rate of ectopic pregnancy over the 12-year study period varied across public health units in Ontario, ranging from 14.9 (12.5, 17.5) to 37.7 (29.1, 55.8) per 1000 reported pregnancies. **Conclusion:** The rate of ectopic pregnancy is increasing in Ontario and has been previously underreported using only hospitalized patient data. Further research is needed to identify the factors resulting in this increase as well as the outcomes of ectopic pregnancies in Ontario.

Keywords: ectopic pregnancy, pregnancy, gynecology

LO080

Performance and proximity: exploring resident factors that impact the quality of work-based assessments

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Introduction: Much of the literature investigating the challenges associated with completing high quality work-based assessments (WBAs) have raised specific concerns over the appropriate documentation of assessments of underperforming trainees or trainees in difficulty. The purpose of this study was to examine the relationship between resident performance and the quality of assessments documented by supervisors on Daily Encounter Cards (DECs). The effect of trainee proximity (i.e. on-service versus off-service status) on this relationship was also examined. **Methods:** A series of DECs from the Department of Emergency Medicine at the University of Ottawa was scored by two raters using the Completed Clinical Evaluation Report Rating (CCERR). The CCERR is a 9-item instrument that has previously demonstrated reliable ratings and the ability to discriminate the quality of completed DECs. A proxy measure of resident performance was calculated by averaging the scores across performance items on the DEC to produce a "mean DEC rating". Linear regression analysis was conducted with "mean DEC rating" as the independent measure and CCERR score as the dependent measure. Separate linear regression analyses were repeated for DECs completed for on-service versus off-service residents. **Results:** Linear regression analysis demonstrated a small but significant inverse relationship between mean DEC rating and CCERR score ($p < 0.001$, $r = -0.184$), suggesting that when residents performed poorly, their supervisors tended to document higher quality assessments, and conversely, when residents performed well, their supervisors provided lower quality assessments. Further analysis demonstrated that this relationship was present for the on-service group

($p < 0.001$, $r = -0.24$). However, no relationship was observed in the off-service group ($p = 0.62$, $r = -0.05$). **Conclusion:** Resident performance and trainee proximity are important factors impacting the quality of documented clinical performance assessments. Greater attention needs to be given to determining ways of improving the quality of assessments reported for residents who are appropriately progressing in their clinical competence as well as for off-service trainees.

Keywords: resident assessment, daily encounter cards, trainee proximity

LO081

Novel EMS spine board to accurately weigh critically ill or injured children

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Introduction: A rapid and accurate weight of a child can be of critical importance during pediatric emergencies. The Broselow Tape (BT) is the gold standard for estimating a child's weight based on their length. It separates children into incremental weight categories. Studies have shown that the BT is not accurate. We created a new pediatric spine board (PedEBoard) that weighs the child. The objective of this study was to compare the agreement between the actual weight vs. the PedEBoard weight and BT estimated weight of children presenting to a pediatric emergency department (ED). **Methods:** Ethics approval was obtained from McMaster University. A power calculation was done for sample size to detect 10% error. Consecutive children were recruited who presented to McMaster University's Children's ED on two days in March 2015. Children were excluded if their length was outside the BT range, non-English speaking or critically ill. Children had their weight taken by the triage nurse either on an infant scale or on a traditional standing scale. The nurse also took the child's length using a standard measuring tape or height on the standing medical scale. Infants were placed on the PedEBoard by investigators while older children were asked to lie down on the board. Investigators were blinded to the actual weight. BT weight was determined by the palmPEDi Lite app. Bland-Altman analysis was performed, comparing the percent difference between the actual weight vs. PedEBoard weight and actual weight vs. BT weight. The correlation between the PedEBoard and BT was assessed using the Spearman coefficient of rank. Data was entered into MedCalc for Windows 98, Version 15.2.2 **Results:** A total of 157 children were included in the study. The mean actual weight was 19.4kg (95% CI 17.4 to 21.3) vs. the PedEBoard weight 19.4kg (95% CI 17.4 to 21.3) vs. the BT weight 16.9kg (95% CI 15.6 to 18.2). Bland-Altman percent difference was 0.1% (95% CI -2.0 to 1.8%) between the actual weight and the PedEBoard weight and 9.6% (95% CI -22.0% to 41.2%) between the actual weight and the BT weight. The Spearman coefficient of rank correlation was 1.000 $p < 0.0001$ (95% CI 0.999 to 1.000) for the PedEBoard and 0.969 $p < 0.001$ (95% CI 0.957 to 0.977) for the BT. The BT provided the wrong weight category 80% of the time vs. 8% for the PedEBoard. **Conclusion:** The PedEBoard closely agreed with the actual weight of the child while the Broselow Tape estimate often did not.

Keywords: pediatrics, resuscitation, Broselow Tape

LO082

EMS response to police use of force events: periods of personal and professional risk in prehospital care

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Introduction: This study provides an estimate of the number of EMS calls related to police use of force events that involve struggling, intoxicated and/or emotionally distressed patients. We hypothesized there would be under-reporting of EMS risk by paramedic agencies due to lack of standardized reporting of police events by EMS services and lack of a common linked case number between prehospital agencies in Canada. **Methods:** Data were collected during a multi-site, prospective, consecutive cohort study of police use of force in 4 Canadian cities using standardized data forms. Use of force was defined a priori and the application of handcuffs was not considered a force modality. Inclusion criteria: all subjects $\geq$ 18 years of age involved in a use of force police-public encounter. We defined risk to EMS as the presence of police- and/or paramedic- assessments of violent or struggling subjects on the scene. Three separate data forms (police-report of use of force, EMS encounter, and Emergency Department (ED) visit) were linked in the study by unique ID. When police-reported EMS was activated, investigators hand searched the EMS service reports at the relevant agencies for matching call sheets. **Results:** From Jan 2010 to Dec 2012, we studied 3310 consecutive public-police interactions involving use of force above simple joint lock application. Subjects were male (86%) with a mean age of 33 yrs; 85% were assessed by police as emotionally disturbed, intoxicated with drugs and/or alcohol or a combination of those. 45% were violent at the scene. Police-reported EMS attendance in 24% (809/3310) of use of force events, of which only 43% (349/809) of EMS run sheets were available. In events with violent subjects, EMS transported 51% to ED compared to 35% by police transport (chi = 79.7, $p = 0.00$). **Conclusion:** We identified periods of professional and physical risk to paramedics attending police use of force events and found that risk significantly underrepresented in EMS data. Paramedical training would benefit from policy and procedures for response to police calls and the violent patient, the majority of whom are struggling. A common linked case number in prehospital care would enable more specific quantification of the risk for EMS providers involved in police events.

Keywords: paramedicine, police, intoxication

LO083

Outcomes and resource utilization among syncope patients transported by emergency medical services

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Introduction: Syncope accounts for 1% of all annual emergency department (ED) visits in Canada with only 10.3% suffering serious adverse event (SAE) within 30-days. However, 66% are transported to ED by Emergency Medical Services (EMS). Our objectives were to assess 30 day SAE among syncope patients transported by Emergency medical services (EMS), assess the need to develop an EMS clinical decision aid, and estimate anticipated health care savings by diverting patients from the ED to alternative care pathways. **Methods:** We conducted a prospective cohort study at four tertiary care EDs from Feb 2012 to Feb 2013. We included patients $\geq$16 years of age with syncope and who arrived to the ED via EMS. We collected patient demographics, medical history, 30 day SAE, EMS time points (call received, EMS arrival on scene, EMS departure from scene, time of transfer of care in the ED), critical EMS interventions, and ED

length of stay. We assessed for the occurrence of any SAE (death, arrhythmia, other cardiac and non-cardiac conditions) within 30 days of ED disposition. We used descriptive analysis, unpaired two-tailed t-test and chi-square test. Ethics approval was obtained at all study sites. **Results:** Of 1,475 ED patients with syncope during the study period, 992 (67.3%) arrived by EMS. Mean times (SD) for EMS arrival to the scene, patient assessment at the scene and transfer of patient from scene to the ED were 10.1 (6.4), 18.9 (8.3), and 14.6 (11.5) minutes respectively. Only two patients had critical interventions enroute (pacing and defibrillation). Overall 138 (13.9%) patients suffered a SAE; 32 (3.2%) detected by EMS, 58 (5.8%) detected during ED evaluation, 48 (4.8%) after ED disposition. The average ED length of stay was 5.9(4.2) hours. Based on average of cost from two sites, we estimated that total cost of transporting syncope patients from the scene to the ED to be $4 million in Canada. The total cost of ED care for syncope patients transported by EMS in Canada was calculated at $21.5 million. **Conclusion:** A substantial proportion of patients arriving to the ED via EMS suffer no SAE within 30 days. Correspondingly, our results suggest a need for an EMS clinical decision aid to divert low-risk syncope patients to alternative care pathways such as family physicians or rapid access clinics. If developed and implemented, this tool can potentially reduce EMS burden, ED crowding, and reduce healthcare costs.

Keywords: syncope, emergency medical services (EMS), health resource utilization

LO084

Text messaging research participants as a follow-up strategy to decrease emergency department study attrition

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Introduction: Collecting patient-reported follow-up data for prospective studies in the emergency department (ED) is challenging in this acute care, minimal continuity setting. Follow-up is frequently attempted using telephone contact and in some instances mail correspondence. The objective of this study was to determine if text messaging study participants involved in an ongoing randomized trial resulted in a lower rate of attrition as compared to conventional telephone follow-up. **Methods:** This was a secondary analysis of research participants enrolled in a randomized controlled trial assessing head injury discharge instructions. Adult (18-64 years) patients presenting to an academic ED (annual census 65,000) with chief complaint 'head injury' occurring within 24 hours of ED visit were contacted by telephone 2 and 4 weeks post ED visit to complete a symptom questionnaire. During the first 4 months of study follow-up, participants were contacted by a conventional telephone call. Attrition was higher than anticipated, thus we received subsequent ethics approval for the final 3 months of follow-up duration to contact participants by text message on the day of the first telephone attempt as a reminder of the telephone interview scheduled later that day. The proportion of patients lost to follow-up at 2 and 4 weeks post ED visit was compared between participants not receiving and receiving reminder text messages. **Results:** 118 patients were enrolled in the study (78 underwent conventional follow-up and 40 received text messages). Mean (SD) age was 35.2 (13.7) years and 43 (36.4%) were male. During the period of conventional follow-up, 3 participants withdrew from the study. Of the remaining 75 participants, 24 (32.0%) at 2 weeks and 32 (42.7%) at 4 weeks were unable to be contacted. Of the 40 participants receiving a reminder text message, 4 (10.0%) at 2 weeks and 10 (25.0%) at 4 weeks were unable to be contacted. Overall, text messaging study participants decreased attrition by 22% (95% CI: 5.9%, 34.7%) and 17.7% (95% CI: -0.8%, 33.3%) at 2 and 4 week follow-up, respectively. **Conclusion:** In this young ED cohort participating in a randomized trial, text message reminders of upcoming telephone follow-up interviews decreased the rate of attrition. Text messaging is a viable, low-cost communication strategy that can improve follow-up participation in prospective research studies.

Keywords: methodology, communication, follow-up

LO085

Canadian in-hospital mortality for patients with emergency-sensitive conditions

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Introduction: The emergency department (ED) hospital standardized mortality ratio (ED-HSMR) measures risk-adjusted mortality for patients admitted to hospital with conditions for which ED care may improve outcomes (emergency-sensitive conditions). This study aimed to describe in-hospital mortality across Canadian provinces using the ED-HSMR. **Methods:** Data were extracted from hospital discharge databases from April 2009 to March 2012. The ED-HSMR was calculated as the ratio of observed deaths among patients with emergency-sensitive conditions in a hospital during a year (2010-11 or 2011-12) to the expected deaths for the same patients during the reference year (2009-10), multiplied by 100. The expected deaths were estimated using predictive models fitted from the reference year for different hospital peer-groups (teaching, large, medium and small hospitals) adjusted for comorbidities, age, diagnosis, and hospital length of stay. Thirty-seven validated emergency-sensitive conditions were included (e.g., stroke, sepsis, shock). Aggregated provincial ED-HSMR values were derived from patient-level probabilities of death. A HSMR above or below 100 respectively means that more or fewer deaths than expected occurred in hospital within a province. **Results:** During the study period, 1,335,379 patients were admitted to 629 hospitals across 11 provinces and territories with an emergency-sensitive condition as the most responsible diagnosis, of which 8.9% died. More in-hospital deaths (95% confidence interval) than expected were respectively observed for the years 2010-11 and 2011-12 in Newfoundland [124.3 (116.3-132.6) & 117.6 (110.1-125.5)] and Nova Scotia [116.4 (110.7-122.5) & 108.7 (103.0-114.5)], while mortality was as expected in Prince Edward Island and Manitoba, and less than expected in other provinces and territories [Territories 67.3 (48.3-91.3) & 73.2 (55.0-95.5); New Brunswick 87.7 (82.5-93.1) & 90.4 (85.2-95.8); British Columbia 92.0 (89.6-94.4) & 87.1 (84.9-89.3); Saskatchewan 92.3 (87.1-97.4) & 90.8 (86.2-95.6); Ontario 94.0 (92.6-95.4) & 88.0 (86.6-89.3); Alberta 94.1 (91.1-97.2) & 91.0 (88.2-93.9); Québec 95.7 (93.8-97.6) & N/A]. **Conclusion:** Our study revealed important variation in risk-adjusted mortality for patients admitted to hospital with emergency-sensitive conditions among Canadian provinces. The results should trigger more in-depth evaluations to identify the causes for these regional variations.

Keywords: all-cause mortality, performance, quality indicators

LO086

The utility of an inpatient diagnosis-derived Charlson Comorbidity Index to create an emergency department workload model

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Introduction: A previous Canadian emergency department (ED) model determined predictors of increased workload using a manual chart review

to elucidate comorbidities. We designed an electronic algorithm to capture all comorbidities based on the Charlson Comorbidity Index (CCI) for a 5 year period preceding the ED visit from the regional inpatient database. Our objective was to identify predictors correlating with physician time require to treat patients and thus develop a multivariable model to predict physician workload. **Methods:** From May to September 2015, two research assistants (RAs) shadowed a random sample of physicians from the six urban EDs in a single health region. They documented time spent performing clinical and non-clinical functions for patient visits. A linkage with the previously validated regional ED database was used to obtain triage acuity, age, gender, mode of arrival, and CCI scores. Multiple linear regression was used to describe the associations between predictor variables and total physician time per patient visit as well as time spent on history and physical exam and to derive an equation for physician workload. RA inter-rater reliability was assessed on 107 MD-patient interactions. **Results:** Over the 4-month period, 873 patient encounters were documented. Data from 599 completed encounters were included in the model. The median age was 49.4 (SD 22.8) and 52.2% were female. Overall, 16.0% were admitted to hospital, 64.9% of patients were CTAS 1-3, 19.6% of patients arrived by ambulance, and 15.5% of patients had a CCI score of $\geq$ 1. The mean time spent on history and physical was 7.0 minutes (SD 4.73) and mean total time was 19.4 minutes (SD 11.6). Using a linear regression model with total time as the dependent and EMS arrival, CTAS, and age as the independent variables, having any CCI score is a significant predictor of total time ($p = 0.03$). with a difference of 2.9 minutes between CCI positive versus negative patients. Higher acuity was the most significant factor associated with time spent with a mean difference of 4.4 minutes per CTAS category. The intraclass correlation coefficient value was 0.99 (95% CI 0.97-1.00) indicating excellent reliability. **Conclusion:** The electronically derived CCI does have value in the development of a physician workload model and can replace the use of manual chart review to define patient comorbidities.

Keywords: Charlson Comorbidity Index, emergency department workload model, administrative database

LO087

Emergency department patients' connection to primary care providers: reasons for lack of connection

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Introduction: Some non-urgent/low-acuity Emergency Department (ED) presentations are considered convenience visits and potentially avoidable with improved access to primary care services. This study surveyed patients who presented to the ED and explored their self-reported reasons and barriers for not being connected to a primary care provider (PCP). **Methods:** Patients aged 17 years and older were randomly selected from electronic registration records at three urban EDs in Edmonton, Alberta (AB), Canada. Following initial triage, stabilization, and verbal informed consent, patients completed a 47-item questionnaire. Data from the survey were cross-referenced to a minimal patient dataset consisting of ED and demographic information. The questionnaire collected information on patient characteristics, their connection to a PCP, and patients' reasons for not having a PCP. **Results:** Of the 2144 eligible patients, 1408 (65.7%) surveys were returned and 1402 (65.4%) were completed. The majority of patients (74.4%) presenting to the ED reported having a family physician; however, the 'closeness' of the connection to their family physician varied greatly among ED patients with the most recent family physician visit ranging from 1 hour before ED presentation to 45 years prior. Approximately 25% of low acuity ED patients reported no connection with a family physician. Reasons for a lack of PCP connection included: prior physician retired, left, or died (19.8%), they had never tried to find one (19.2%), they had recently moved to Alberta (18.0%), and they were unable to find one (16.5%). **Conclusion:** A surprisingly high proportion of ED patients (25.6%) have no identified PCP. Patients had a variety of reasons for not having a family physician. These need to be understood and addressed in order for primary care access to successfully contribute to diverting non-urgent, low acuity presentations from the ED.

Keywords: access to care, non-urgent

LO088

Development of a simulation-based curriculum for ultrasound-guided internal jugular central venous catheterization

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Introduction / Innovation Concept: Insertion of an internal jugular (IJ) central venous catheter (CVC) under ultrasound guidance (USG) is a complex skill that requires considerable practice in order to achieve technical proficiency. Simulation allows novices to engage in structured and high volume repetitive practice of USG IJ CVC insertion and to work through a predictable pattern of errors prior to real patient encounters. Based on earlier work on learning curves for CVC insertion, this curriculum uses a model of simulation-based high volume deliberate practice of the fundamental skills of USG CVC insertion, and was designed with careful consideration of the conditions associated with optimal learning and improvement of performance. **Methods:** Eight residents (post graduate year 2) from the Departments of Emergency Medicine and Anesthesiology engaged in deliberate practice of USG CVC insertion during three two-hour sessions, at 2-week intervals. Progress of the residents was monitored with direct observation and regular hand motion analysis (HMA), which was compared to performance metrics set by a local expert. **Curriculum, Tool, or Material:** Students reviewed online introductory ultrasound video and articles outlining internal jugular (IJ) and femoral CVC insertion prior to the first session. Session 1 focused on ultrasound skills including knobology, transducer movement, and needle tracking. This was followed by 60 minutes of deliberate practice of the skills of USG CVC insertion on both femoral and IJ models. During sessions 2/3, students practiced complete gowning and draping using sterile technique. This was followed again by deliberate practice of the skills of USG CVC insertion on both femoral and IJ models. Students received coaching and feedback throughout all sessions, with HMA assessment of USG IJ CVC insertion at the beginning and end of each session. After three training sessions, consisting of 85 total attempts, 5/8 residents surpassed the expert benchmark for probe hand motion, 6/8 for needle hand motion, and 1/8 for total procedure time, with the remaining residents approaching the expert benchmark for each metric. **Conclusion:** We have successfully developed a simulation-based curriculum for USG IJ CVC placement. Residents demonstrated continuous improvement in each session, approaching or exceeding the expert benchmarks by the end of the third session.

Keywords: innovations in EM education, simulation, central venous catheterization

LO089

Out of province elective restrictions: implications for Royal College Emergency Medicine training

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Introduction / Innovation Concept: Several provinces (AB, SK and QC) have recently introduced restrictions to out of province (OOP) electives. Concurrently, enhanced competency training is a prominent part of RCPSC Emergency Medicine (EM) programs (Thoma et al., 2015). We present the implications of OOP elective restrictions on RCPSC-EM training and education. The revised 2008 RCPSC-EM requirements specify a minimum of 6 months devoted to achieving a particular expertise pertinent to the practice of EM. The most restrictive policies permit up to 3 months OOP during the 5-year residency. This limits residents' ability to pursue enhanced competency training opportunities outside their training site. Enhanced training might be a graduate degree, fellowship or clinical year designed by the resident and program director. Enhanced training can help achieve specific career goals, meet the needs of the institution where the resident will practice, and contribute to the growth and development of EM in Canada. **Methods:** New OOP policies are evaluated using the Health Reform Analysis (HRA) and SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis methodologies. Stated and implied reasons for reform are evaluated and stakeholder perspectives (health system authorities, partner universities, resident physicians and the general public) provided. **Curriculum, Tool, or Material:** The material includes previous out of province elective policies and recent reforms. **Conclusion:** Policies for the 4th year EM elective time are variable across universities. This has resulted in inconsistent approval of residents' requests for OOP enhanced training. Thus, enhanced training that might be approved at one site, may not be at another. Several test cases already exist and will be presented. This data has not been previously collated or reported to our knowledge. Varied interpretation of newly emerging policies has implications for the consistency, equity, and future of EM residency training in Canada.

Keywords: innovations in EM education, enhanced training, education policy

LO090

Introduction of a formalized RUSH (Rapid Ultrasound in Shock) protocol in emergency medicine residency ultrasound training

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Introduction / Innovation Concept: Expanding point of care ultrasound education in emergency medicine (EM) programs is a necessary part of curriculum development. Our objective was to integrate core and advanced applications for point of care ultrasound in caring for critically ill patients with undifferentiated shock. We chose to develop and implement an educational module using the systematic approach of the RUSH Exam for EM residents in our institution. **Methods:** After review of the literature in point-of-care ultrasound, a module was designed. An educational proposal outlining the RUSH Exam training within the -EM and CCFP-EM curricula was submitted to and accepted by the residency training committee. The objectives and goals were outlined in accordance with CanMEDS roles, and the ultrasound director provided supervision for the project. **Curriculum, Tool, or Material:** An 8-hour educational module was implemented between October 7 and November 18, 2014. All residents received formal training on the core applications in FAST and aortic scans prior to implementation. The following components of the RUSH Exam were included: two hours of didactic teaching with video clips on advanced cardiac, IVC, DVT, and pulmonary assessment; three hours of hands-on practice on standardized patients performed in the simulation lab to practice image acquisition and interpretation; one hour of didactic teaching on the overall approach to a patient with undifferentiated shock using the RUSH Exam; and two hours of hands-on RUSH Exam practice. A corresponding research project integrating a SonoSim Livescan training platform, a simulation-based testing device, demonstrated improvement in resident performance, subjective comfort with imaging patients in shock and making clinical decisions based on the findings. **Conclusion:** This 8-hour RUSH Exam educational module combined theoretical learning and hands-on practice for trainees. This module significantly broadened the scope of ultrasound training in our curriculum by providing the necessary skills in approaching patients in shock in a systematic fashion. Future direction will include ongoing education in this area and expansion as appropriate.

Keywords: innovations in EM education, ultrasound, shock

LO091

Non-urgent presentations to the emergency department: patients' reasons for presentation

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Introduction: Some low acuity Emergency Department (ED) presentations are considered non-urgent or convenience visits and potentially avoidable with improved access to primary care. This study explored self-reported reasons why non-urgent patients presented to the ED. **Methods:** Patients, 17 years and older, were randomly selected from electronic registration records at three urban EDs in Edmonton, Alberta (AB), Canada during weekdays (0700 to 1900). A 47-item questionnaire was completed by each consenting patient, which included items on whether the patient believed the ED was their best care option and the rationale supporting their response. A thematic content analysis was performed on the responses, using previous experience and review of the literature to identify themes. **Results:** Of the 2144 eligible patients, 1408 (65.7%) questionnaires were returned, and 1402 (65.4%) were analyzed. For patients who felt the ED was their best option ($n = 1234$, 89.3%), rationales included: safety concerns ($n = 309$), effectiveness of ED care ($n = 284$), patient-centeredness of ED ($n = 277$), and access to health care professionals in the ED ($n = 204$). For patients who felt the ED was not their best care option ($n = 148$, 10.7%), rationales included a perception that: access to health professionals outside the ED was preferable ($n = 39$), patient-centeredness (particularly timeliness) was lacking in the ED ($n = 26$), and their health concern was not important enough to require ED care ($n = 18$). **Conclusion:** Even during times when alternative care options are available, the majority of non-urgent patients perceived the ED to be the most appropriate location for care. These results highlight that simple triage scores do not accurately reflect the appropriateness of care and that understanding the diverse and multi-faceted reasons for ED presentation are necessary to implement strategies to support non-urgent, low acuity care needs.

Keywords: non-urgent, access to care, emergency department

LO092

The educational impact of a formalized RUSH (Rapid Ultrasound in Shock) protocol in emergency medicine residency ultrasound training

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Introduction: Point of care ultrasound for assessment of undifferentiated hypotension and shock is part of the clinical scope of Emergency Physicians in Canada. The RUSH Exam outlines a systematic approach to these patients. A RUSH Exam educational model using didactic and hands on practice was developed and implemented for Emergency Medicine (EM) residents. This study evaluated the effectiveness of the module in a simulated setting on the following endpoints: improvement in image acquisition, interpretation, speed, and subjective comfort level, among EM residents with basic ultrasound training. **Methods:** Approval was received from the institutional health research ethics board for this before and after simulation study. Residents in the -EM Program or CCFP-EM Program from July 2014 to July 2015 were eligible to consent. Participants were excluded if they were unable to complete all portions. All residents were educated to the same level of introductory ultrasound training based on the curriculum in place at our institution. The 8-hour intervention included RUSH didactic and hands on small group sessions. Testing before and after the intervention was performed with the SonoSim Livescan training platform. Two evaluators scored each resident on the accuracy of image acquisition, image interpretation, and time to scan completion. A before and after survey assessed resident comfort level with performing ultrasound on an emergency patient in shock, and basing decisions on ultrasound findings. Statistical analysis was performed using McNemar's test for image acquisition and interpretation, a paired T test for time, and the Bahpkar test for the questionnaire. **Results:** 16 EM residents including 11 senior residents and 5 junior residents were enrolled. Improvement was achieved in the categories of IVC image acquisition and interpretation, as well as interpretation for B-lines, lung sliding, cardiac apical and parasternal long axis, and DVT ($p < 0.05$). Subjective comfort level of performing ultrasound in shock and basing decisions on the findings was increased ($p < 0.0001$). Among junior residents, there was an increased speed of image acquisition. **Conclusion:** With the introduction of the RUSH Exam educational module, EM residents showed improved image acquisition, image interpretation, speed, and comfort level when using ultrasound in critically ill patients.

Keywords: simulation, ultrasound, education

LO093

A national needs assessment survey for the development of a quality improvement and patient safety curriculum for Canadian emergency medicine residents

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Introduction: The Canadian Medical Education Directives for Specialists (CanMEDS) framework defines the competencies that postgraduate medical education programs must cover for resident physicians. The 2015 iteration of the CanMEDS framework emphasizes Quality Improvement and Patient Safety (QIPS), given their role in the provision of high value and cost-effective care. However, the opinion of Emergency Medicine (EM) program directors (PDs) regarding the need for QIPS curricula is unknown, as is the current level of knowledge of EM residents in QIPS principles. We therefore sought to determine the need for a QIPS curriculum for EM residents in a Canadian Royal College EM program. **Methods:** We developed a national multi-modal needs assessment. This included a survey of all Royal College EM residency PDs across Canada, as well as an evaluative assessment of baseline QIPS knowledge of 30 EM residents at the University of Toronto (UT). The resident evaluation was done using the validated Revised QI Knowledge Application Tool (QIKAT-R), which evaluates an individual's ability to decipher a systematic quality problem from short clinical scenarios and to propose change initiatives for improvement. **Results:** Eight of the 13 (62%) PDs responded to the survey, unanimously agreeing that QIPS should be a formal part of residency training. However, challenges identified included the lack of qualified and available faculty to develop and teach QIPS material. 30 of 30 (100%) residents spanning three cohorts completed the QIKAT-R. Median overall score was 11 out of 27 points (IQR 9-14), demonstrating the lack of poor baseline QIPS knowledge amongst residents. **Conclusion:** QIPS is felt to be a necessary part of residency training, but the lack of available and qualified faculty makes developing and implementing such curriculum challenging. Residents at UT consistently performed poorly on a validated QIPS assessment tool, confirming the need for a formal QIPS curriculum. We are now developing a longitudinal, evidence-based QIPS curriculum that trains both residents and faculty to contribute to QI projects at the institution level.

Keywords: quality improvement, patient safety, medical education

LO094

Mass casualty incident training for rural Canadian municipalities: a mobile education unit initiative

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Introduction / Innovation Concept: The Shock Trauma Air Rescue Society (STARS®) is a charitable, non-profit organization that is dedicated to providing a safe, rapid, highly specialized emergency medical transport system for the critically ill and injured. The STARS® Mobile Education Unit (MEU) is comprised of a high fidelity simulation suite that mimics a hospital emergency room, installed in a specially equipped motorhome (SEM) that can wirelessly operate a high fidelity human mannequin. The MEU provides an excellent opportunity to combine continuing medical education for resuscitation and MCI management. At present, no formal MCI education process exists in Saskatchewan. **Curriculum, Tool, or Material:** The Saskatchewan STARS® MEU delivers a phased MCI education initiative to rural and regional centers within the province. The educational initiative is sub-divided into three stages: 1. pre-exercise knowledge translation using a flipped classroom approach, 2. on-site tabletop exercise (TTX) and, 3. high-fidelity simulation session with a review of MCI management principles . Sites perform a Hazard Vulnerability Analysis (HVA) following stage 2 and the highest identified site-specific risks are utilized during the development of the simulated scenarios for stage 3. During stage 2, participants also complete a pre and post-exercise survey. The survey evaluates the educational component, the tabletop exercise component and the perceived pre and post tabletop exercise competencies for the management of MCI. In the pilot project, two regional sites completed the tabletop exercise. The pre-exercise survey evaluated perceived MCI and disaster preparedness for the region. Only 8% and 25% of participants at each site respectively, reported that their disaster plan had been trialed in tabletop, full exercise or real activation within the past three years. Participants strongly agreed that the tabletop exercise was a valuable experience (86% and 88% respectively). More robust data will become available as the initiative transitions out of the pilot stage to formal operations. **Conclusion:** A formal MCI training program implemented through the STARS® MEU for rural Saskatchewan municipalities enables participants and their organizations to both review and enhance their current emergency management plans. This

initiative will aim to establish a foundation for future collaboration at the provincial and national level for rural MCI training and preparedness.
Keywords: mass casualty, tabletop exercise, interdisciplinary

LO095

Developing and implementing an interprofessional in-situ simulation program in an academic, tertiary-care emergency department: barriers, successes and the Ottawa Hospital experience

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Introduction / Innovation Concept: During Emergency Department (ED) resuscitation of critically ill patients, effective teamwork and communication among various healthcare professionals is essential to ensure favorable patient outcomes and to minimize threats to patient safety. However, numerous individual and system factors create barriers to effective team functioning. Simulation center- based training has been used to improve Crisis Resource Management skills among physician and nursing trainees, but in-situ simulation is a relatively new concept in adult Emergency Medicine in North America. **Methods:** To enhance patient care and team effectiveness, an ED nursing and physician group was created to develop and implement a novel interprofessional in-situ simulation program in two Canadian, academic tertiary-care emergency departments. Departmental approval and financial support was obtained and sessions commenced in January 2015. **Curriculum, Tool, or Material:** Monthly high-fidelity simulation sessions are held in the ED resuscitation rooms at both campuses of our hospital. Each session is facilitated and debriefed by simulation-trained Emergency Medicine faculty and senior residents, a nurse educator and a research assistant. Technical support is provided by our simulation center staff. Participants are recruited from the physicians, residents, nurses, respiratory therapists and other support staff working in the ED. To minimize the impact on patient care, two additional nurses are scheduled to cover nursing assignments on "sim days". Simulations are limited to fifteen minutes, followed by a twenty minute debriefing. **Conclusion:** We have successfully developed and implemented an interprofessional in-situ simulation program in our ED. Participant feedback has been overwhelmingly positive. Lack of financial support, reluctance of staff to participate, and overwhelmed resources are some of the challenges to running a program like this in a busy ED environment. However, there are clear benefits: empowering team members, culture change, identification of latent safety threats, and a perception of improved teamwork and communication.
Keywords: innovations in EM education, in-situ simulation, interprofessional education

LO096

Comfortable with your thoracotomy skills? An innovative simulation-based curriculum to teach rare procedures in emergency medicine

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Introduction / Innovation Concept: Emergency medicine (EM) residents must demonstrate proficiency in several rare, life-saving procedures but few clinical opportunities exist to practice and master these skills. Currently no standardized curricula exist for the instruction of these skills during EM residency. Accordingly, many residents graduate without the experience to perform these critical procedures confidently. We developed a novel, simulation-based curriculum for six rare, life-saving, EM skills that integrates deliberate practice and Kolb's theory of experiential education. **Methods:** We used existing EM training objectives and a recent national resident needs assessment to develop a simulation-based technical skills curriculum. The six station curriculum was underpinned by the pedagogical framework of experiential education and deliberate practice. Instructor and participant feedback directed subsequent curriculum modifications. **Curriculum, Tool, or Material:** This one-day intensive curriculum was successfully implemented at two Canadian EM residency programs for 54 EM residents, from both CCFP-EM and FRCP-EM streams. Participant feedback was highly favorable. An iterative approach to curriculum implementation at two separate residency programs effectively allowed educators to respond to participant needs. **Conclusion:** A novel simulation-based curriculum for rare procedures in EM is feasible, practical, and highly valued by participants. Ongoing work is underway to refine the curriculum and assess its efficacy in creating competence. Deliberate practice and Kolb's theory of experiential education provide useful frameworks for technical skills training.
Keywords: innovations in EM education, simulation, procedure

LO097

A novel curriculum for assessing competency in resuscitation at the foundations of discipline level of training

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Introduction / Innovation Concept: Junior residents are often the first physicians who attend to the acutely unwell floor patient, especially at night and on weekends. The 'Nightmares Course' at Queen's University was designed to address an Entrustable Professional Activity (EPA) relevant to several residency programs at the 'Foundations of Discipline' level of training: "to manage the acutely unwell floor patient for the first 5-10 minutes until help arrives". In keeping with competency based medical education principles, this course offers longitudinal and repetitive practice and assessment. We have also designed a summative objective structured clinical exam (OSCE) in order to identify trainees who require additional remedial practice of this EPA. **Methods:** We developed simulated cases that reflect common but "scary" calls to the floor. We then, using a modified Delphi process with experts in resuscitation, defined relevant milestones applicable to the Foundations of Discipline level of training in order to inform our formative assessment. We also modified the Queen's Simulated Assessment Tool (QSAT) to adopt CBME terminology and this will be used to provide a summative assessment during a four-scenario OSCE in the spring. Residents with QSAT scores below the competency threshold will be enrolled in a remediation course. **Curriculum, Tool, or Material:** Weekly sessions were led by staff physicians and were offered to first-year residents from internal medicine, core surgery, obstetrics and gynecology, and anesthesiology over the academic year. Each resident participated in one session every 4-week block. Sessions were organized into themes such as "shortness of breath" or "decreased level of consciousness" and involved three high-fidelity simulated cases with a structured debrief following each case. Formative feedback was given following each case. **Conclusion:** The Nightmares Course is a novel simulation-based, multidisciplinary curriculum in resuscitation medicine. It includes longitudinal practice and repetitive assessment, as well as summative testing and remediation of an EPA common to several residency programs.
Keywords: innovations in EM education, postgraduate medical education, resuscitation

LO098

Education innovation: implementing a point-of-care ultrasound curriculum for emergency medicine residents

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Introduction / Innovation Concept: Point-of-care ultrasound (POCUS) is becoming standard of care in Canadian emergency departments. However, its integration in Emergency Medicine (EM) residency training is poorly studied. If a four-week curriculum can successfully teach POCUS skills to residents, this program could have potential application across specialties and across Canada. **Methods:** A four-week curriculum was designed, implemented, and evaluated. EM residents registered for the Introductory Ultrasound Rotation at Sunnybrook Health Sciences Centre were invited to participate. Curriculum evaluation included resident feedback, pre-rotation and post-rotation knowledge and skill testing, and a delayed post-rotation survey. Comparison of pre-test and post-test scores were calculated using the paired t-test. **Curriculum, Tool, or Material:** Residents were scheduled for both dedicated ultrasound scanning shifts and clinical shifts with an emphasis on POCUS in patient care. Residents also reviewed the Canadian Emergency Ultrasound Society Emergency Department Echo DVD and manual, completed weekly readings and assignments, and completed a "clinical encounter worksheet" describing how POCUS impacted clinical care in a patient encounter. Other rotation activities included Ultrasound Rounds where residents presented a critical appraisal of a POCUS-related journal article, Pediatric Ultrasound Rounds at The Hospital for Sick Children, and an advanced POCUS workshop day. Of 13 eligible residents, 12 (92%) completed at least one study assessment. However, only 8 residents (62%) completed both the pre-test and post-test, 8 residents (62%) completed the end-of-rotation survey, and even fewer residents (42%) completed the delayed post-rotation survey. Residents felt the quality of the ultrasound rotation was excellent (mean score 4.7 on 5-point Likert scale). There was an increase in test scores from a baseline of 51.5% to 70.8% on the post-rotation test ($p = 0.02$). Three months after the rotation, 100% of residents reported feeling either comfortable or extremely comfortable teaching and using the core POCUS topics covered in the curriculum. All residents reported that they would recommend the rotation to their colleagues without hesitation. All residents passed the national ultrasound certification examination at the end of the rotation. **Conclusion:** A four-week curriculum was effective in teaching EM residents POCUS skills. Further study is required to determine the ideal method for teaching POCUS skills in this group.

Keywords: innovations in EM education, ultrasound, point-of-care ultrasound (PoCUS)

LO099

Colchicine in acute and recurrent pericarditis: a meta-analysis

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Introduction: Pericarditis is a common disease associated with significant morbidity. In adults with pericarditis, we sought to determine if colchicine, in addition to standard therapies, could reduce the incidence of pericarditis recurrence, shorten the duration of symptoms and minimize adverse effects associated with other therapies. **Methods:** We followed PRISMA guidelines. We performed an electronic search (February 2015) through MEDLINE, EMBASE, CENTRAL, Web of Science, and Google scholar. Online trial registries were searched and reference lists were handed searched. Our search strategy had no limitations on study design, outcome of interest, hypothesis, language, dates or publication status. Inclusion criteria for selected manuscripts were: RCTs; adults; outpatient therapy; and idiopathic/viral/autoimmune pericarditis etiology. Cohen's unweighted kappa for inter-observer agreement was calculated. Data was extracted using a standardized data collection tool. Following assessment of homogeneity between studies, we performed a meta-analysis using (fixed or random) effect models and report odds ratios (OR) with 95% confidence intervals (CI). We assessed bias using GRADE. **Results:** We screened 647 titles/abstracts, and selected 34 manuscripts for full review (kappa 0.86, CI 0.76-0.96). 7 manuscripts met all inclusion criteria comprising 1,275 patients. We obtained the following OR with 95% CI: 1) For the overall incidence of recurrence of pericarditis (OR 0.32; CI 0.24-0.42); 2) For recurrent pericarditis at 18-months (OR 0.32; CI 0.23-0.44); 3) For event-free of recurrent pericarditis at 18-months follow-up (OR 3.40; CI 2.46-4.70); 4) For persistent symptoms at 72 hours (OR 0.29; CI 0.21-0.41); and 5) For the overall adverse events rate (OR 1.27; Cl 0.84-1.92). **Conclusion:** Colchicine reduces the number of pericarditis recurrences and the duration of symptoms in patients with recurrent or acute pericarditis. Unless there are contraindications to its use, colchicine should be prescribed in all cases of uncomplicated pericarditis, along with standard therapy.

Keywords: colchicine, pericarditis, meta-analysis

LO100

Electrical vs chemical cardioversion in patients with acute atrial fibrillation: a multicenter parallel group randomized controlled clinical trial

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Introduction: Patients with atrial fibrillation (AF) of <48 hours duration often present to Emergency Departments (ED). Electrical or chemical cardioversion can be employed to restore normal sinus rhythm (NSR). Current guidelines make no recommendations between these two methods and the management decisions are left to the discretion of the treating physician. The objective of this study was to compare these two approaches in terms of ED length of stay (LOS), success (conversion to NSR) and health related outcomes. **Methods:** At six western Canadian EDs, eligible adult patients were assigned to one of two groups following concealed allocation and using a centralized computer-generated randomization method: electrical cardioversion (EC) first (followed by chemical cardioversion [CC] if the primary method failed) or CC first (followed by EC if the primary method failed). Baseline evaluation/interview and 3/30 day telephone contact were completed and documented using the REDCap data-platform. Adverse events were externally adjudicated in a blinded-fashion. An intention to treat analysis was performed. **Results:** Overall, 84 patients participated in the study (EC: 43; CC: 41); the median age was 60 years (interquartile range [IQR]: 50, 66), and 38% were female. The baseline patient characteristics in both groups were similar. The median LOS between randomization and conversion to NSR (intervention LOS) was 1.0 hrs (IQR: 0.8, 2.7) in EC vs. 3.1 hrs (IQR: 2.0, 3.9) in CC ($p < 0.001$); more patients in EC were discharged from the ED within 4 hours than in the CC group (65% vs. 32%; $p = 0.002$). The majority of EC patients (84%) converted to NSR after the first attempt while half of the patients did so in the CC group (49%). No differences were observed in terms of adverse events (26% vs. 24%; mostly minimal), hospitalizations (0%), and patients' health outcomes (physician/ED visits, admissions, stroke) and status (SF-8) at 3 and 30 days, in groups EC and CC groups, respectively. **Conclusion:** Electrical cardioversion was associated with a

statistically significant and clinically meaningful reduction in the LOS when compared to cardioversion using chemical management. Similarities in the proportions of success, adverse events and health outcomes between the groups would support the use of electrical shock as the first approach for cardioversion in clinical practice.
Keywords: atrial fibrillation, cardioversion, randomized controlled trial

LO101

Predicting short-term risk of arrhythmia among patients with syncope: the Canadian Syncope Arrhythmia Risk Score

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Introduction: Suspicion of arrhythmias among syncope patients is the leading cause of emergency department (ED) referrals and hospitalization. However, the risk factors for short-term arrhythmias are not well defined. We sought to develop a risk prediction tool to identify syncope patients at risk for 30-day arrhythmia or death after ED disposition. **Methods:** This prospective cohort study involved 6 academic EDs that enrolled adult syncope patients. We collected standardized variables at index presentation from history, clinical examination, investigations including ECG, and patients' disposition. Adjudicated outcomes included death (due to arrhythmia or unknown cause), arrhythmia or procedural intervention to treat arrhythmias within 30-days after ED disposition. Multivariable logistic regression was used to derive the model; bootstrap sampling for internal validation and to estimate shrinkage and optimism. **Results:** 5,010 adult syncope patients (mean age 53.4 years, 54.8% females, and 9.5% hospitalized) were enrolled with 106 (3.6%) patients suffering arrhythmia or death within 30-days after ED disposition. Of 39 candidate predictors examined, eight were included in the final model: vasovagal predisposition, heart disease, any ED systolic blood pressure <90 or >180 mmHg, troponin (>99%ile), QRS duration >130msec, QTc interval >480msec and ED diagnosis of cardiac, or vasovagal syncope [Optimism corrected c-statistic: 0.91 (95%CI 0.87-0.93); Hosmer-Lemeshow $p = 0.08$]. The Canadian Syncope Arrhythmia Risk Score had a risk ranging from 0.2% for a score of -2 to 74.5% for a score of 8. Sensitivity for threshold score $\leq$ -1 was 100% (95% CI 96.5-100) and specificity for a score of ≥ 4 was 97.0% (95% CI 96.5-97.5). **Conclusion:** The Canadian Syncope Arrhythmia Risk Score can improve acute management of ED patients with syncope by better identification of those at higher-risk for short-term arrhythmia or death. Once validated, the tool can be used to guide disposition decision and can also aid in selection of patients for out-of-hospital cardiac monitoring if discharged home.
Keywords: syncope, arrhythmia, risk stratification

LO102

ALiEM AIR-Pro Series: identifying quality content from blogs and podcasts for the senior emergency medicine resident

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Introduction / Innovation Concept: In 2008, the Accreditation Council for Graduate Medical Education endorsed a change such that EM residency programs can decrease their synchronous conference experiences by up to 20% in exchange for asynchronous learning - Individualized Interactive Instruction (III). Identifying quality online resources that would also fulfill III's reporting criteria (program director monitoring, evaluation component, faculty oversight, program effectiveness) is challenging. Using crowdsourced expertise, the Approved Instructional Resources (AIR) series from Academic Life in Emergency Medicine (ALiEM) was created in 2014 to provide a credible method to identify quality educational blogs and podcasts. The identified resources, however, focused on basic content with limited utility for more senior residents. We thus created the AIR-Pro series in 2015, aimed to cover more advanced concepts. **Methods:** The AIR-Pro series is a continuously building curriculum covering a new subject area every 2 months. For each area, 6 EM Chief Residents identify 3-5 advanced clinical questions. Using FOAMsearch.net to search blogs and podcasts, relevant posts are scored by 8 reviewers from the AIR-Pro Board (faculty and chief residents at various institutions). The scoring instrument contains 5 measurement outcomes (7-point Likert scale): recency, accuracy, educational utility, evidence based, and references. The AIR-Pro Approved label is given to posts with a score of $\geq$28 (out of 35) points and these are featured in the blog posting. For scores of 26-27, an Honorable Mention label is given if Board members collectively felt that they were valuable. For each AIR-Pro subject area, a multiple choice quiz is written based on the featured posts. Educator dashboard access of the Google Drive quizzes is given to program directors for monitoring. If approved by their program director, EM residents receive official III credit upon completion of each quiz. **Curriculum, Tool, or Material:** As of Jan 1, 2016, there have been 2 modules published on ALiEM with 1,220 (Cardiovascular) and 1,059 (Trauma) pageviews worldwide. Although early in development, 21 different institutions are using the AIR-Pro Series with over 150 residents completed the cardiovascular and trauma quizzes. We anticipate more because the original AIR Series has over 73 programs using it for III credit. **Conclusion:** The AIR-Pro series is a novel, objective, crowdsourced approach towards identifying quality, educational, social media content for the advanced EM resident.
Keywords: innovations in EM education, social media, quality assessment

LO103

Trauma Resuscitation Using in-situ Simulation Team Training (TRUST): using risk-informed simulation for team performance and human factors evaluation

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Introduction / Innovation Concept: Trauma resuscitation requires a multidisciplinary team to perform at a high level within a dynamic, high-stakes environment. The unpredictable nature of trauma care increases the possibility for errors, often from underlying latent safety threats (LSTs). In-situ simulation (ISS) is a point-of-care training strategy that occurs within the patient care environment involving the actual healthcare team and provides a novel approach to team training and LST identification. Using ISS, critical events can be recreated providing an opportunity to explore and learn from past challenges. We developed and piloted a risk-informed, multidisciplinary ISS trauma training program to assess teamwork performance and identify LSTs within the trauma care environment. **Methods:** A comprehensive process was initiated to gain support from all stakeholders within the trauma program. Simulation cases were derived from a review of adverse events and unexpected deaths. Human factors experts aided with the integration of system- and process-related elements into the case design. ISS sessions involved all trauma team members. Debriefing after each session facilitated a team-based discussion and an opportunity

for reflective practice and video recording was used for teamwork evaluation and process mapping. **Curriculum, Tool, or Material:** We conducted monthly, unannounced, multidisciplinary, high-fidelity ISS scenarios at a Canadian Level 1 trauma centre. The trauma team was activated by the usual notification process and care provided in the same manner as an actual trauma patient. A semi-structured debriefing followed each session with a focus on team performance and LST identification. Teamwork was measured using a previously validated tool, the Clinical Teamwork Scale. Findings were used to inform discussion at multidisciplinary trauma rounds as part of an iterative process of evaluation and implementation. **Conclusion:** This multidisciplinary ISS trauma training program offers a novel approach to team performance evaluation and LST identification. Using risk-informed scenarios combined with human factors analysis we are able identify knowledge and technical skill proficiency gaps, LSTs and integrate formative team assessment. An iterative process beginning with ISS followed by multidisciplinary rounds provides a robust framework for system-based changes to improve team performance and overall patient care.
Keywords: simulation, trauma, patient safety

LO104

A collaborative approach to developing and delivering a multimodal quality improvement and patient safety curriculum for emergency medicine residents

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Introduction / Innovation Concept: The 2015 CanMEDS framework requires all Canadian residency programs to increase their focus on Quality Improvement and Patient Safety (QIPS). A survey of the FRCP Emergency Medicine Residency Program Directors in Canada (63% response rate, 8/13) found that 75% (6/8) of programs have QIPS curricula with 84% (5/6) in the form of didactic lectures and 67% (4/6) as resident participation in a local project. Lectures alone do not expose learners to the practicality of conducting a QIPS project, and local resident projects often do not expose learners to the complexities of organization-wide QI initiatives. Furthermore, QI initiatives require working in interdisciplinary teams. We therefore hypothesize that an effective QIPS curriculum will require multiple education methods delivered using a multi-disciplinary lens. **Methods:** A collaborative longitudinal QIPS curriculum for emergency medicine residents at the University of Toronto (UT) was developed using multiple educational methods by physicians and non-medical QI specialists. The curriculum addresses three levels of QIPS training: Knowledge (lectures in PGY1 and 2), practical skills at the local clinical microsystem level (QI project in PGY3), and practical skills at the organization level (problem solving using the case method in PGY5). **Curriculum, Tool, or Material:** The lectures are taught by physicians involved in local and organization-wide QI projects and by those in senior management. The PGY3 residents enrol in a co-learning curriculum developed by the Department of Medicine, where residents and faculty conduct a local QI project together. The PGY5 teaching cases were created with management consultants using material from a real hospital QIPS initiative. PGY5s are taught using the case method that places the learner in the role of the organization's manager who discusses the issues in class and proposes actions. Residents learn about the practicality of their recommendations by discussion with the management consultants, who disclose the case outcomes and review the lessons learned. **Conclusion:** A longitudinal QIPS curriculum for emergency medicine residents at UT was developed collaboratively. Multiple teaching methods address all three levels of QIPS training. This curriculum represents a novel use of the case method to instruct QIPS project leadership and management outside of the business school setting. Discussions with management consultants provide a different perspective of the real-life challenges of conducting QIPS initiatives.
Keywords: innovations in EM education, quality improvement, case-based learning

Moderated Posters Presentations

MP001

Low acuity emergency department access: are other options available?

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Introduction: Patients with low-acuity (CTAS level IV and V) complaints often use the emergency department (ED) to access care. This has often been attributed to lack of a primary care (PC) provider. However, simply being registered with a primary care practitioner may not prevent low acuity ED presentation. There is some evidence that a lack of timely access to primary care may contribute to low acuity ED presentations. The Wait Time Alliance, a group of Canadian physicians and their respective professional associations, has recently set a benchmark of same day access to family doctors. It is unclear if this benchmark has been achieved in all jurisdictions. **Methods:** We performed linked cross sectional surveys to quantify the number of people presenting to a tertiary hospital ED (with 56,000 annual visits) with non-urgent problems who felt unable to access PC. PC practices were also surveyed to assess access using the metric of time to third next available appointment. Sample size calculations were completed. Descriptive statistics were reported. **Results:** In the patient survey, 381 of 580 patients consented to participate. Of those, 89 patients met eligibility criteria. 32 (35.9%) reported that the wait to see their PC provider was "too long". 45 (50.5%) patients did not contact their PC office prior to ED presentation. 46 of 72 PC physician surveys were returned; a response rate of 63.8%. The mean time to third next available appointment in the region was 7.7 (95% CI 4.9-10.5) days (median 5 days, range 0-50 days). **Conclusion:** Fifty percent of low acuity patients did not attempt to access their PC provider prior to ED presentation. The benchmark of same day access to primary care has not been achieved in many practices in this region. Initiatives to promote primary care access would benefit both patients and providers.
Keywords: primary care, advanced access, patient acuity

MP002

Beyond rater cognition: the impact of supervisor continuity on the quality of documented work-based assessments

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Introduction: Barriers to completing high quality work-based assessments (WBAs) include relational factors such as the episodic and fragmented interaction that often exists between clinical supervisors and trainees. In an effort to increase supervisor-trainee continuity, the Department of Emergency Medicine at the University of Ottawa created Clinical Teaching Teams (CTT) in which a resident and clinical

supervisor work matched shifts together throughout the year. The aim of this study was to determine the impact of supervisor-trainee continuity on the quality of assessments documented on Daily Encounter Cards (DECs). **Methods:** DECs completed by 20 clinical supervisors were collected and sorted into three groups representing differing degrees of supervisor-trainee continuity (Group 1: CTT emergency resident; Group 2: non-CTT emergency resident; Group 3: non-CTT off-service resident). DECs were scored using the Completed Clinical Evaluation Report Rating (CCERR), a 9-item instrument that has been shown to have reliable ratings and the ability to discriminate the quality of completed DECs. Scores were analyzed using a univariate ANOVA with "mean CCERR score" as the dependent variable and "continuity group" and "supervisor" as between-subject variables. The relationship between CCERR scores and number of CTT encounters over time was examined using a repeated measures ANOVA with "encounter number" as the within-subject factor. **Results:** Mean CCERR scores for the CTT (21.0, SD = 5.8), non-CTT (21.9, SD = 4.2), and off-service (20.7, SD = 4.0) groups differed ($p = 0.019$). A subsequent pairwise comparison demonstrated a statistically significant difference in means between the non-CTT and off-service groups ($p = 0.04$); however, this 1.2 difference on the 45-point CCERR scale is unlikely to be of any educational significance. The number of repeated encounters did not have a statistically significant effect on CCERR scores ($p = 0.43$) indicating that DEC quality did not improve with greater supervisor-trainee interaction. **Conclusion:** DEC quality as scored by the CCERR was low for all three groups. Increasing supervisor continuity alone did not result in higher quality assessments of clinical performance. Additional research focusing on the educational alliance that develops between supervisor and trainee may hold greater promise.

Keywords: daily encounter cards, assessment, supervisor continuity

MP003

AP or IP? Introduction of a new assessment of performance tool for point of care ultrasound

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Introduction: Organizations including CAEP, CEUS, the International Federation for Emergency Medicine (IFEM) and the Canadian Association of Radiologists have all called for defined competency assessments for point of care ultrasound (PoCUS). Definitions of core indications vary. The requirement for ongoing assessment of performance and skills maintenance is often overlooked. We describe the introduction an IFEM approved Assessment of Practice (AP) tool across a PoCUS training program and for continued assessment. **Methods:** We completed a cross sectional survey and cohort study including the entire body of emergency medicine physicians at a tertiary hospital. Over a 3 year period, all practitioners were assessed for CAEP position statement defined core applications at baseline and again after 2 years using a published PoCUS AP tool. We describe the tool, its application and the performance assessment findings. Emergency physicians (EP) underwent AP following formal training including an approved course and a logbook documenting a variable number of scans. **Results:** 23 EPs completed training and underwent AP initially, with all 23 EPs completing further assessment within 3 years. Assessment of practice was completed for 1. Focused Diagnostic Ultrasound Assessment for AAA, eFAST, cardiac, early pregnancy; and 2. Focused Procedural Ultrasound Guidance for venous catheterization. All EPs demonstrated initial and continuing competency in these PoCUS modalities. **Conclusion:** The IFEM PoCUS curriculum promotes ongoing local assessment of performance. We successfully implemented this competency based approach and demonstrated feasibility, flexibility and utility in a Canadian emergency medicine program.

Keywords: point-of-care ultrasound (PoCUS), competency, quality assurance

MP004

Analgesia for acute gingivostomatitis: a national survey of pediatric emergency physicians

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Introduction: Gingivostomatitis is a common, painful pediatric presentation, and yet, few studies are available to guide management. We aimed to describe pediatric emergency physicians' current practice patterns, with respect to analgesic use in children with acute gingivostomatitis. **Methods:** A national survey was conducted at all 15 national academic pediatric centres. Electronic surveys were distributed to pediatric emergency physicians using a modified Dillman protocol; non-respondents received paper surveys via post. Data were collected regarding demographics, clinical behaviour, knowledge, perceived barriers and factors that influence practice. **Results:** Overall response rate was 74% (150/202). Most physicians preferred the combination of acetaminophen and ibuprofen (72%) to either agent alone (ibuprofen 19%, acetaminophen 7%). The preferred second-line analgesics were oral morphine (48%, 72/150) and compounded topical formulas (42%, 64/150). The most commonly cited compounded agent was Benadryl plus Maalox (23%, 35/150). Clinical experience with a medication appeared to be the greatest influence on practice patterns; with 52% (78/149) 'strongly agreeing' that this was a factor. The most commonly cited barrier to adequate analgesia was difficulty in administration of topical or oral medication to children. **Conclusion:** As with many other painful conditions, acetaminophen and ibuprofen are reported to be used most frequently. However, oral morphine and topical compounded agents were also frequently prescribed. Regardless of patient age, physicians preferred oral morphine as a second-line agent to treat pain from severe gingivostomatitis. Future research should focus on determining which analgesic and route (oral or topical) is the most effective and best-tolerated choice.

Keywords: pediatric, analgesia, opioid

MP005

Treating and Reducing Anxiety and Pain PEDs (TRAPPED 2): time for action - a PERC project

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Introduction: Multiples barriers to appropriate analgesia are reported in the paediatric emergency department (PED), including limited accessibility to effective strategies. **Our objective:** was to evaluate the improvement in the accessibility of pain and anxiety management strategies in Canadian PEDs, after the creation of a national pediatric pain Quality Improvement Collaborative (QIC), through Pediatric Emergency Research Canada (PERC). **Methods:** In 2013, the TRAPPED 1 survey was administered to Canadian PEDs, in order to evaluate what resources were in place for pain and anxiety management. A pain

QIC was then created to stimulate the implementation of new strategies, through information sharing between PEDs. In 2015, the TRAPPED 2 cross sectional survey was administered. Its focus was to evaluate the improvement in the accessibility of specific strategies reported by each centre, after participating in this QIC, and working to implement change within their own PEDs. **Results:** All 15/15 Canadian PEDs responded to the TRAPPED 1 survey in 2013 and 11 agreed to participate in the national pain QIC. In-person, phone meetings, follow up surveys and email communications were employed for information sharing. Strategies identified by the QIC to be newly introduced in individual centres were educational initiatives, distraction options, nurse-initiated protocols and intranasal (IN) medications. All 15 PEDs completed the TRAPPED 2 survey. Compared to 2013, an increased number of PEDs used face-based pain scales (14/15 vs 6/15) and behavioural scales (5/15 vs 1/15) for pain assessment in 2015. Use of reminder posters on pain management at triage increased from 4/15 to 6/15 PEDs. Availability of tablets for distraction increased from 4/15 to 10/15 PEDs. Nurse-initiated protocols for topical anesthetic and oral sucrose (for needle procedures) increased from 10/15 to 12/15 sites and from 12/15 to 14/15 sites respectively. Availability of IN medications increased; fentanyl from 9/15 to 14/15 sites and midazolam from 8/15 to 10/15 sites. Ten of the 11 PEDs involved in the QIC strategy reported the implementation of at least one of their own identified strategies. **Conclusion:** This study suggests that the use of a QIC may improve the introduction of new strategies to reduce pain and anxiety in EDs. QICs may also be helpful to other centres when introducing new strategies.

Keywords: pain management, quality improvement, pediatric emergency department collaboration

MP006

Review of clinical presentation and trajectory of patients with a diagnosis of primary brain tumour in a pediatric tertiary centre

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Introduction: Recognition of life-threatening conditions, such as brain tumours, remains a challenge among pediatric patients. Few studies have described the implication of initial presentation, clinical evolution and healthcare system factors in diagnosis delay of brain tumours in children. We aimed to determine the clinical presentation patterns and health care trajectory of children with a diagnosis of primary brain tumour. **Methods:** A retrospective chart review in a pediatric university-affiliated hospital was conducted. Participants were all patients less than 18 years of age diagnosed with a brain tumour by neuroimaging between Jan 2003 and Dec 2014. Data were extracted from an institutional tumour registry and medical records. **Results:** From the registry, 288 patients were identified. The mean age at time of diagnosis was 7.44 $\pm$ 0.29 years. Most tumours were infra-tentorial (55%) and had astrocytic origin (29%). The majority (35%) had consulted only once prior to diagnosis, while 14% had consulted at least 4 times prior to diagnosis. The mean time between the onset of symptoms and diagnosis was 147 $\pm$ 19 days. The mean time between symptoms onset and first consultation was 84 $\pm$ 14 days. The most frequent symptoms and signs at onset and diagnosis were respectively: headache (44% vs 59%, $p < 0.01$), nausea and vomiting (31% vs 58%, $p < 0.01$) and abnormalities of gait (10% vs 32%, $p < 0.01$). 129 patients (45%) were diagnosed in an Emergency Department (ED). Symptoms and signs that differed significantly for those diagnosed in an ED were: headache (71% vs 42%, $p < 0.01$), nausea and vomiting (73 % vs 32%, $p < 0.01$), lethargy (26% vs 9%, $p < 0.01$), weight loss (15% vs 3%, $p < 0.01$), irritability (9% vs 0%, $p < 0.01$) and endocrine abnormality (2% vs 8%, $p = 0.02$). Clinical presentations of infants up to one year of age (14%) differed from other age groups. They presented mostly with growth abnormality (46%), macrocephaly (40%), irritability (40%), development abnormalities (18%) and sun-setting eyes sign (10%). **Conclusion:** In this large comprehensive cohort, we have found that the diagnosis of primary brain tumours is most frequently made in the ED. Different clinical presentations have been identified and varied between different settings of diagnosis and different age groups.

Keywords: brain tumours, pediatric

MP007

Constats de décès à distance et disponibilité des services préhospitalier d'urgence

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Introduction: L'Unité de coordination clinique des services préhospitaliers d'urgence (UCCSPU) est un plateau clinique rattaché au CSSS Alphonse-Desjardins (CHAU Hôtel-Dieu de Lévis) qui permet un soutien médical à distance des patients transportés par ambulance dans la région de Chaudières-Appalaches (CA). En 2011, un projet novateur, devenu programme par la suite, a été instauré afin de réaliser des constats de décès à distance (CDD). Le but du programme est de réduire le nombre de transport de patients décédés vers les hôpitaux afin de remettre rapidement en service l'équipe ambulancière. Le but de l'étude est de décrire et comparer le taux de CDD et le gain de temps sur la remise en service de l'équipe ambulancière avant et après l'implantation du programme de CDD dans deux différentes régions géographiques (Chaudières-Appalaches et Saguenay-Lac-St-Jean (SLSJ)). Par la suite, déterminer s'il existe une distance minimale à partir de laquelle ce gain de temps est nul pour chaque région. **Methods:** Il s'agit d'une étude rétrospective portant sur 204 personnes réparties en 4 groupes : 2 groupes témoins [CA pré-CDD (50) et SLSJ pré-CDD (50)] et 2 groupes d'étude [CA post-CDD (52) et SLSJ post-CDD (52)] pour les deux régions. Le pourcentage de CDD réussi (taux de réalisation) par région et les gains de temps entre chaque groupe (intra- et inter-région) en fonction de la distance avec le centre hospitalier (CH) ont été calculés. **Results:** Pour un même nombre de patients, le taux de réalisation de CDD est similaire entre les deux régions [CA = 80% (6 mois) et SLSJ = 76% (4 mois)]. Le temps de remise en service des ambulances est différent ($p < 0.05$) inter-région se caractérisant par des gains de temps moyens de 62 min (CA) et 28 min (SLSJ). Enfin, la distance minimale où le gain de temps est nul est de moins de 5 km pour chaque région. **Conclusion:** L'implantation du programme de CDD permet un gain de temps favorisant un retour plus rapide des services pré-hospitalier d'urgence si la distance entre le lieu du CDD et du CH est supérieure à 5 km. De plus, le gain en temps est proportionnel avec la distance entre le lieu du CCD et le CH.

Keywords: emergency medical services (EMS), ambulance services, prehospital

MP008

Quick to be seen; quick to come back: does first visit CTAS-category predict admission for unplanned returns?

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Introduction: The percentage of unplanned return visits (URV) to the Emergency Department (ED) within 48 or 72 hours of discharge that result in an admission to hospital has been recommended as the top

Canadian ED patient safety quality indicator. International data exists although inconsistences exist in the way URV are defined and measured. To our knowledge there are no published Canadian data on the percentage of ED URV admissions. This study examines our own URV data and in particular the correlation between URV admission rates and first visit Canadian Triage Acuity Scale (CTAS) category. **Methods:** A retrospective analysis of 12-month's data (January - December 2015) was completed for URV to the ED of a 445 bed regional tertiary care adult and pediatric teaching hospital with 57,000 annual attendances. URV was defined as any patient registering within 72 hours of an earlier visit that had resulted in a discharge from ED. Planned return visits were excluded. The data was analysed for an overall URV percentage, UV percentage by first visit CTAS category, overall percentage of URV admitted and URV admission percentage by first visit CTAS category. Pearson R correlation and Fishers Exact Test were used to test the relationship. **Results:** During the 12-month period there were 57,025 registrations of which 46,793 patients were discharged. There were 3566 URV (7.62% of those discharged); the number of URV admitted was 532 (1.14 % of those discharged). The return rate/admission rates by CTAS category were: CTAS 1: 6.74%/1.55%; CTAS 2: 7.86%/1.92%; CTAS 3: 8.54%/1.35%; CTAS 4: 5.99%/0.40%; CTAS 5: 5.55%/0.27%. The RR of admission on return for discharged CTAS groups 1 and 2, compared with CTAS 3, 4 and 5 was 1.90 (95 CI 1.57 to 2.30; $p < 0.0001$). Rate of admission on return was negatively correlated with initial CTAS level (Pearson $r = -0.89$ (95 CI -0.99 to -0.03); $R^2 = 0.79$; $F = 11.25$; $p = 0.04$). **Conclusion:** We have demonstrated a relationship between first visit CTAS category and the unplanned return admission rate. If admission is taken as a marker of illness severity, then the likelihood of an inappropriate discharge is inversely proportional to first visit CTAS score. While this makes sense intuitively, our data confirms this relationship in a Canadian tertiary care hospital and supports the reporting of ED URV admission data by first visit triage category as an important quality indicator.
Keywords: CTAS, unplanned return visits, admission rate

MP009

Reliability and interchangeability of measures of two tissue oximeters in healthy volunteers

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Introduction: Near-infrared spectroscopy (NIRS) is a non-invasive, continuous and painless method of monitoring oxygen saturation of hemoglobin in any given superficial tissue. Given that hemodynamic instability can affect the oxygen saturation, NIRS could prove to be an interesting tool in quantifying tissue oxygenation, consequently guiding clinical management. The aim of this study was to compare the reliability of two commonly used tissue oximeters, the INVOS 5100c from Covidien and the Equanox 7600 from Nonin. We postulated the Equanox (a more recent tissue oximeter) would have a better reliability than the INVOS. As a secondary outcome, we evaluated whether the measures given by the two oximeters were comparable. **Methods:** The study population was composed of healthy adult volunteers. Three measurements were taken at six different sites on both sides of the body in a randomized order. Two different sensors were used for each measure. From these measures, two intra-class correlations (ICC) - one inter-sensor and the other intra-sensor - were calculated for each device and compared using the Fisher's r-to-z transformation method. An additional inter-device ICC was also calculated. We considered ICCs over 0.75 as an indicator of good reliability, while ICCs under 0.40 were considered to represent poor reliability. The sample size was calculated based on the calculation of a unidirectional confidence interval for a parametric ICC. Expecting a 0.75 ICC value, we concluded that 53 participants needed to be recruited in order to attain 80% power and a range of 0.1 towards the low values. **Results:** Fifty-three healthy volunteers (27 men and 26 women) with a mean age of 31 years (standard deviation 10) were recruited. We found no differences between the repeatability of the INVOS and the Equanox for both inter and intra-sensor reliability (ICC = 0.94 (95% confidence interval (CI) 0.86-0.97) versus ICC = 0.92 (95%CI 0.86-0.95), $p = 0.42$ and ICC = 0.94 (95%CI 0.89-0.96) versus ICC = 0.96 (95%CI 0.93-0.98), $p = 0.21$, respectively). However, when compared directly, we found that the readings produced by the two oximeters varied considerably (ICC 0.18 (95%CI -0.10 to 0.43). **Conclusion:** When taken individually, both tissue oximeters displayed good inter and intra-sensor reliability. However, they oximeters displayed poor inter-devices agreement, their readings varying considerably amongst each other.
Keywords: reliability, near-infrared spectroscopy, tissue oximetry

MP010

Wraparound care for youth injured by violence: a randomized control trial

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Introduction: Youth injured by violence is a major public health concern in Canada. It is the fourth leading cause of death in youth and the foremost reason youth visit an emergency department (ED). In Winnipeg, 20% of youth who visit an ED with an injury due to violence will have an ED visit for a subsequent violent injury within one year. Youth injured by violence are in a reflective and receptive state of mind, rendering the ED setting appropriate for intervention. **Methods:** We completed a randomized control trial in November 2015 comparing wraparound care for youth age 14 - 24 who were injured by violence to standard ED care. Youth were excluded if their injury was due to child maltreatment, sexual assault or self-harm. An adapted pre-consent randomization methodology was used. The intervention was developed using a community based participatory research approach. Wraparound care was delivered by a support worker with lived experience with violence. Support workers were on call 24/7 in order to start the intervention in the ED and take advantage of the "teachable moment." Care continued in the community for approximately one year. **Results:** A total of 133 youth were randomized (68 intervention, 65 control) in one year. There was no difference in age, gender, or severity of injury between the two groups. Patients randomized to the intervention spent a median of 30 minutes less in the ED than those receiving standard care ($p = 0.22$). Youth are safely housed, have enrolled in education opportunities, and are engaged in addictions care. Results of a chart review examining repeat visits to the ED for violent injury, substance use and mental health will be completed in Spring 2016 and will be presented. **Conclusion:** There were no differences between standard care and intervention groups on baseline characteristics reflecting effective randomization. The introduction of an intervention at bedside in the ED did not have a negative impact on patient length of stay.
Keywords: youth violence, intervention, randomized control trial

MP011

Using GRADE-based recommendations for analgesia and antiemetics in electronic order sets to influence physician behaviour towards best practice and cost-savings

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Introduction: The addition of computerized physician order entry (CPOE) to Emergency Departments in recent years has led to speculation over potential benefits and pitfalls. Recent studies have shown benefits to CPOE, though there lacks sufficient evidence on how it could change physician behaviour. Physician practices are known to be difficult to change, with getting evidence into daily practice being the main challenge of knowledge translation. Our study aims were to determine if well-designed electronic order sets for CPOE improved MD practices. **Methods:** The Calgary Zone Pain Management in the Emergency Department Working Group relied on a GRADE-based literature review for identifying best practices for analgesia and antiemetics, resulting in soft changes to the dedicated analgesia and antiemetic electronic order set noting working group preference, and emphasizing hydromorphone over morphine, as well as 4 mg ondansetron over 8 mg. The new electronic order set was started in the only Calgary Region order entry system on December 11th, 2014. Data was collected from July 2014 - May 2015. A Yates chi-squared analysis was completed on all orders in a category, as well as the subgroups of ED staff and residents, and orders placed using the new order set. **Results:** A total of 100460 orders were analyzed. The use of hydromorphone increased significantly across all 4 EDs. IV hydromorphone use increased (5.82% of all opioid orders up to 26.93%, $P < 0.0001$) with a reciprocal decline in IV morphine (67.81% of all opioid orders down to 46.56%, $P < 0.0001$). Similar effects were observed with ondansetron 4 mg IV orders increasing (1.37% of all ondansetron orders to 18.64%, $P < 0.0001$) with a decrease in 8 mg dosing (15.75% of all ondansetron orders to 7.23%, $P < 0.0001$). These results were replicated to a lesser degree in the non-ED staff and non-order set subgroups. Implementation of the new order set resulted in an increase of its use (37.64% of all opioid orders up to 49.29%, $P < 0.0001$). Finally, a cost-savings analysis was completed showing a projected annual savings of $185,676.52 on medications alone. **Conclusion:** This data supports the manipulation of electronic order sets to help shape physician behaviour towards best practices. This provides another strong argument towards the benefits of CPOE, and can help maintain best practices in Emergency Medicine.
Keywords: analgesia, electronic order sets, knowledge translation

MP012

Is there an association between the use of cardiac ultrasound and survival outcomes in patients arriving to the emergency department in cardiac arrest? The second Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED 2) Study

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Introduction: The use of cardiac point of care ultrasound (PoCUS) to assess cardiac arrest patients is widespread, although not mandated by advanced cardiac life support (ACLS) guidelines. This study aims to examine if the use of ultrasound, along with the findings on ultrasound are associated with a difference in outcomes of cardiac arrest patients in the emergency department (ED). **Methods:** A retrospective database and chart analysis was completed for patients arriving to a tertiary ED in asystole or PEA cardiac arrest, between 2010 and 2014. Patients were excluded if aged under 19, or with a previous DNR order. Patients were grouped based on whether PoCUS was used during ACLS (PoCUS group) and those without PoCUS (control group). Multiple data were abstracted from charts using a standardized form. Data was analyzed for the return of spontaneous circulation (ROSC), survival to hospital admission (SHA), and survival to hospital discharge (SHD), as well as initial cardiac activity findings on PoCUS. **Results:** 230 patients met the study inclusion criteria, with 44 (19%) in the control group, and 186 (81%) in the PoCUS group. In the PoCUS group 20 (11%) had cardiac activity (Positive PoCUS) and 166 (89%) had no cardiac activity recorded. The control group had a higher rate of SHA than the PoCUS group (27%; 95% CI 15-43% vs. 10%: 6-15%, $p = 0.0046$), however there was no difference in frequency of ROSC (control: 37%; 24-55% vs. PoCUS 26%; 20-33%, $p = 0.1373$) or SHD (control: 7%, 95% CI 1-19%; PoCUS: 2%, 95% CI 0-5%, $p = 0.0858$). Positive PoCUS patients had a higher frequency of ROSC (75%; 50-91% vs. 20%; 15-27%, $p < 0.001$) and SHA (25%; 9-49% vs. 8%; 4-13%, $p = 0.0294$) than patients with no PoCUS cardiac activity, however there was no difference in the rate of SHD between the positive PoCUS patients (0%; 0-17%) and patients with no PoCUS cardiac activity (2%; 0-5%, $p = 1.0000$). **Conclusion:** Our results suggest that there is no difference in survival between cardiac arrest patients receiving PoCUS and those who do not. Although finding positive cardiac activity on PoCUS is associated with greater ROSC and survival to hospital admission, it does not identify patients with a final outcome of survival to hospital discharge.
Keywords: point-of-care ultrasound (PoCUS), cardiac arrest, survival

MP013

A portrait of rural pre-hospital services in the province of Québec

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Introduction: Rural emergency departments (EDs) are important safety nets for 20% of Canadian citizens. In Quebec, the province's 26 rural EDs treat an average of 19,000 patients/year and are on average 300 km from levels 1 and 2 trauma centers. These distances signify that Emergency Medical Services (EMS) play a considerable role in the care of rural patients. EMS in Quebec province are private local services. There are no published reports on EMS in rural Quebec. As part of a larger study on rural emergency care, this descriptive study aimed at offering a comprehensive portrait of EMS. **Methods:** We conducted semi-structured interviews with managers of all paramedic services in rural Quebec. Interview questions focused on number of transports, training, availability of telemetry, GPS technologies, and work schedules. **Results:** Fifty managers of the 51 private companies serving the 26 rural EDs in Quebec were interviewed (response rate 98%). All were primary care paramedics (PCP). In 2010, EMS transported 40,671 patients, with 10,228 emergency transports to the rural EDs. A total of 7956 inter-facility transfers were conducted, 1499 of them emergency. Each ED required between 88 and 700 inter-facility transfers. A total of 60% (n = 31/51) had GPS technology, only 25% (n = 13/51) had telemetry features. Work schedules varied with 13% (n = 7/51) of companies offering shifts of less than 12 hours, 28% (n = 14/51) 24/7 weekly shifts, and 56% (n = 29/51) a combination. **Conclusion:** This is the first study to describe rural EMS in Quebec. The finding that Quebec's rural EDs are served by 51 privately-owned companies is unique in Canada. The considerable number of EMS transports, including inter-facility transfers, may reflect lack of local resources in rural EDs, the vulnerable population served, or the increased trauma risk in rural areas. Future studies should examine inter-facility transport reasons, costs, times and adequate training/scope of EMS practice.
Keywords: rural emergency departments, emergency medical services (EMS), transport

MP014

What ultrasonography characteristics predict surgical intervention for children with testicular torsion?

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Introduction: The timely diagnosis and treatment of testicular torsion is essential as a longer duration of symptoms is correlated with testicular necrosis and infertility. Ultrasound imaging assists in separating this diagnosis from other causes of acute scrotal pain. Our objective was to characterize which ultrasound findings predicted surgical intervention. **Methods:** We performed a retrospective health records review of all patients, ages 0-17 years that presented to the emergency department of the Children's Hospital of Eastern Ontario over a 5-year period (2009-14) with scrotal pain <24 hours duration who were assessed by an emergency physician (EP) and received a testicular ultrasound by the Diagnostic Imaging Department. Patients' records and ultrasound reports were reviewed by two reviewers who recorded ultrasound findings, times of EP assessment, ultrasound and surgical intervention in a standardized data extraction form. Sensitivity, specificity and positive and negative predictive values were calculated for the ultrasound findings. **Results:** 190 patients were analyzed of which 34 had a final diagnosis of testicular torsion (mean age 11.5 years, range 0-17.3). The mean time from EP assessment to ultrasound was 67.6 minutes (95%CI 50.5-84.6) during the daytime (800-2159) and 83.2 minutes (95%CI 36.7-130.4) for overnight presentations (2200-759). The absence of blood flow on colour Doppler ultrasound of the affected testicle was the best predictor of surgical intervention (sensitivity = 94.1% [95%CI 80.3%-99.3%], specificity = 99.4% [95%CI 96.5%-99.9%], positive likelihood ratio = 146.8 [95%CI 20.7-1037.7] and negative likelihood ratio = 0.06 [95%CI 0.02-0.23]. Other ultrasound findings that help rule in testicular torsion were the presence of a heterogeneous testicle on the symptomatic side (specificity = 91.0% [95%CI 85.4%-95.0%] and the presence of the whirlpool sign (specificity = 99.4% [95%CI 96.5%-99.9%]). **Conclusion:** The absence of blood flow on ultrasound is the best ultrasound finding for predicting surgical management of testicular torsion. Neither a heterogeneous testicle nor whirlpool sign had strong enough sensitivity to warrant their independent use. Future studies, such as those utilizing point of care ultrasound by EPs, should be conducted to study the affect on delays in treatment.

Keywords: testicular torsion, ultrasound

MP015

Daily encounter cards: evaluating the quality of documented assessments

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Introduction: In response to concerns in the literature over the quality of completed work-based assessments (WBAs), faculty development and rater training initiatives have been developed. The Completed Clinical Evaluation Report Rating (CCERR) was designed to evaluate these interventions by providing a measure of the quality of documented assessments on In-Training Evaluation Reports (ITERs). Daily Encounter Cards (DECs) are a common form of WBA used in the Emergency Department setting. A tool to evaluate initiatives aimed at improving the quality of completion of this widely used WBA is also needed. The purpose of this study was to provide validity evidence to support using the CCERR to assess the quality of DEC completion. **Methods:** This study was conducted in the Department of Emergency Medicine at the University of Ottawa. Six experts in resident assessment grouped 60 DECs into three quality categories (high, average, poor) based on their perception of how informative each DEC was for reporting judgments of the resident's performance. Eight clinical supervisors (blinded to the expert groupings) scored the 10 most representative DECs in each group using the CCERR. Mean scores were compared using a univariate ANOVA to determine if the CCERR was able to discriminate DEC quality. Reliability for the CCERR scores was determined using a generalizability analysis. **Results:** Mean CCERR scores for the high (37.3, SD = 1.2), average (24.2, SD = 3.3), and poor (14.4, SD = 1.4) quality groups differed ($p < 0.001$). A pairwise comparison demonstrated that differences between all three quality groups were statistically significant ($p < 0.001$), indicating that the CCERR was able to discriminate DEC quality as judged by experts. A generalizability study demonstrated the majority of score variation was due to differences in DECs. The reliability with a single rater was 0.95. **Conclusion:** There is strong validity evidence to support the use of the CCERR to evaluate DEC quality. It can be used to provide feedback to supervisors for improving assessment reporting, and offers a quantitative measure of change in assessor behavior when utilized as a program evaluation instrument for determining the quality of completed DECs.

Keywords: daily encounter cards, assessment, residency education

MP016

Measuring frailty can help emergency departments identify seniors at risk of functional decline after minor injuries

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Introduction: The CETI team has shown that around 18% of otherwise independent seniors remain in a state functional decline up to six months after a minor injury. In that context, frailty may be associated with increased likelihood of decline. As most seniors consult Emergency Departments (EDs) when injured, measuring frailty may help identify those at risk of functional decline. **Objectives**: This study aims to 1) describe frailty in the sub-group of independent community-dwelling seniors consulting Emergency Departments (ED) for minor injuries, 2) examine the association between frailty and functional decline three months post-injury, 3) ascertain the predictive accuracy of frailty measures and Emergency Physicians' (EPs) for functional decline. **Methods:** Prospective cohort in 2011-2013 among 1072 seniors aged $\geq$ 65, independent in basic daily activities, evaluated in Canadian EDs for minor injuries and discharged home. Frailty was assessed at EDs using the Canadian Study of Health and Aging-Clinical Frailty Scale (CSHA-CFS) and the Study of Osteoporotic Fracture index (SOF). Functional decline was defined as a loss $\geq$ 2/28 on the Older American Resources Services scale three months post-injury. Generalized mixed models were used to explore differences in functional decline across frailty levels. Areas Under the Receiver operating characteristic curve (AUC) were used to ascertain the predictive accuracy of frailty measures and EPs' clinical judgement. **Results:** The SOF and CSHA-CFS were available in 342 and 1058 participants, respectively. The SOF identified 55.6%, 32.7%, 11.7% patients as robust, prefrail and frail. These CSHA-CFS (n = 1058) proportions were 51.9%, 38.3% and 9.9%. The 3-month incidence of functional decline was 12.1% (10.0%-14.6%). The AUCs of the CSHA-CFS and the EPs' were similar (0.548 - 0.777), while the SOF was somewhat higher (0.704 - 0.859). **Conclusion:** Measuring frailty in community-dwelling seniors with minor injuries in EDs may enhance current risk screening for functional decline. However, before implementation in usual care, feasibility issues such as inter-rater reliability and acceptability of frailty tools in the EDs have to be addressed.

Keywords: frailty, minor injury, functional decline

MP017

Impact of physician payment mechanism on wait times and ED length of stay

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Introduction: Vancouver Coastal Health (VCH) emergency physicians have been on contract based funding models for two decades. On October 1, 2015, physicians at one hospital (SPH) switched to fee-for-service (FFS) payments. Conventional wisdom is that FFS physicians are motivated to see more patients quickly and achieve higher throughput. Our hypothesis was that FFS payment would reduce patient wait times. **Methods:** This interrupted time series analysis with concurrent control was performed in VCH Region, where there are two tertiary EDs. During the 20-week study period (July 15-Nov 30), VGH remained on contract, while SPH converted to FFS (the intervention). VCH administrative data was aggregated by week. Our primary outcome was median wait time to MD. Secondary outcomes were ED LOS and left-without-being-seen (LWBS) rates. **Results:** Interrupted time series plots will be presented for the data. Data from 67,214 ED visits were analyzed (31,733 SPH, 35,481 VGH). Figure 1 shows that baseline wait time was 74 minutes at the control and 53 minutes at the intervention site. During the pre-intervention period, there was a non-significant downward trend of 0.4 minutes per week at the intervention hospital relative to control ($p = 0.26$). After FFS conversion, there was a 4.1 minute increase in wait time at the control site ($p = 0.18$), and a significant downward trend of 1.4 minutes per week ($p = 0.001$). After FFS conversion, wait times at the intervention site increased by 4.8 minutes more than control (p-value for the difference = 0.27), and the wait time trend increased significantly by 1.3 minutes per week relative to the expected counterfactual trend ($p = 0.02$). Baseline EDLOS for discharged patients was 227 minutes at the control hospital and 193 minutes at the intervention site. There were similar pre-intervention LOS increases at both hospitals. Post-intervention, both sites saw significant increases in EDLOS, followed by a similar downward trends of -2.68 minutes per week ($p = 0.001$). Baseline LWBS rate was 3.86% at the control hospital and 3.56% at the intervention site. Pre-intervention trends, and post-intervention level/trend changes did not differ by site. **Conclusion:** Conversion to FFS payment was associated with an increase in wait time trend of 1.3 minutes per week relative to control. There were no significant changes in EDLOS or LWBS rates. In this preliminary analysis, FFS payment had little effect on wait times or patient throughput.

Keywords: physician compensation, efficiency, fee for service

MP018

Exercise prescription by Canadian emergency medicine physicians

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Introduction: Health promotion and disease prevention have been increasingly recognized as activities within the scope of emergency medicine. Exercise prescription by physicians has been shown to improve outcomes in obesity, cardiovascular disease, and many other diseases. An estimated 600,000 Canadians receive the majority of their care from emergency departments (ED), representing a substantial opportunity for health promotion. Our study examined the frequency of exercise prescription by emergency physicians (EPs) and determined factors that influence decisions to prescribe exercise. **Methods:** A national, confidential 22-item survey was distributed to Canadian EPs via email by the CAEP survey distribution protocol in November/December 2015. Demographics, exercise prescription rates and self-reported exercise habits were collected. **Results:** A total of 332 EPs responded. 92.4% of EPs reported being at least moderately active. 62.7% of EPs often or always council their patients about preventative medicine (smoking cessation, drug and alcohol use, diet and safe sex). However, only 23.8% often or always ask about their exercise habits. Even fewer (12.7%) often or always prescribe exercise. Training background significantly predicted level of comfort prescribing exercise. CCFP trained EPs were 5.1 ($p = 0.001$) times more likely than trained EPs to respond 'yes' they feel comfortable prescribing exercise, and 3.7 ($p = .009$) times more likely to respond 'sometimes'. CCFP (EM) trained EPs were 3.5 ($p < 0.001$) times more likely than trained EPs to respond 'yes' they feel comfortable prescribing exercise, and 2.0 ($p = .031$) times more likely to respond 'sometimes'. 76.1% of respondents believe that other EPs rarely or never prescribe exercise. Of respondents, only 36% feel comfortable prescribing exercise. The majority of EPs (73.4%) believe that the ED environment did not allow adequate time for exercise prescription. **Conclusion:** The majority of EPs council their patients regarding other forms of preventative medicine but few prescribe exercise to their patients. Available time in the ED was cited as a significant barrier to exercise prescription. CCFP trained EPs are more comfortable prescribing exercise, suggesting that their training may better educate and prepare them to council patients on exercise compared to trained EPs. Further education may be required to standardize an approach to prescribing exercise in the ED.

Keywords: exercise, health promotion, education

MP019

Systematic review of the management of lateral epicondylitis using transdermal nitroglycerin

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Introduction: Lateral epicondylitis (LE), also known as tennis elbow, is an overuse-underuse tendinopathy originating from the forearm extensor tendons of the elbow. An emerging therapy for the treatment of LE is the use of transdermal nitroglycerin (NTG) patches for pain relief and improved function. Our systematic review assesses 18 to 65 year old patients with clinically diagnosed LE and no structural damage or longstanding elbow injury to determine if transdermal NTG patches provide improved short term and long term pain relief as well as improved function in comparison with placebo. **Methods:** We included randomised controlled trials (RCT's) of NTG patch use versus placebo for the treatment of LE. Prospective comparison studies were also eligible for assessing the long term pain relief of NTG patch use. We performed a literature search using MEDLINE, EMBASE, SportDiscus and the Cochrane Database of Systematic Reviews. English language articles were retrieved for review up to November 2015. Risk of bias within the studies was assessed regarding randomisation, allocation sequence concealment, blinding and selective outcome reporting. **Results:** Three RCT's were included that compared transdermal NTG patch use (two studies with 1.25mg/24h and one study comparing 0.72, 1.44 and 3.6mg/24h) versus a placebo to treat LE. One prospective comparison study of five years duration was included as a follow-up to one of the included RCT's to assess pain and function five years after the discontinuation of therapy. Data was not pooled because of heterogeneity in study methods and outcomes. The use of transdermal NTG patches provided short term pain relief (2-6 weeks for dosing of 0.72mg/24h or 1.25mg/24h) compared with placebo as suggested by three RCT's. Long term pain relief was improved by NTG patch use compared with placebo

at six months in one RCT, but not at five years in a prospective comparison study. Function improved in two different RCT's with NTG patch use at 0.72mg/24h and 1.25mg/24h when compared to placebo. Five years after cessation of treatment, there was no difference between NTG patch and placebo. **Conclusion:** Overall, the included studies demonstrate that the use of NTG patches compared to placebo improves short term and long term pain relief, as well as elbow function. However, more studies are required to bridge the gaps between the existing studies and reduce heterogeneity between the study designs.
Keywords: lateral epicondylitis, nitroglycerin

MP020

Do real-time Twitter metrics correlate with traditional emergency medicine post-conference speaker evaluations?

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Introduction: Traditional post-conference speaker evaluations are inconsistently completed; meanwhile, real time social media tools such as Twitter are increasingly used in conferences. We sought to determine whether a correlation exists between traditional conference evaluation for a speaker and the number of real-time tweets it generated using data from a CAEP conference. M**ethods:** This study utilized a retrospective design. The hashtag #CAEP14 was prospectively registered with Symplur, an online Twitter management tool, so that all tweets related to CAEP conference 2014 were stored. A tweet was associated with a session if it mentioned the speaker name, or if the tweet content and timing closely matched that of the session in the schedule. A tweet classification system was developed to differentiate original tweets from retweets, and quotes from comments generating further discussion. Two authors assessed and coded the first 200 tweets together to ensure a uniform approach to coding, and then independently coded the remaining tweets. Discrepancies were resolved by consensus. One author reviewed post-conference speaker evaluation, and abstracted the value corresponding to the question "The speaker was an effective communicator". We present descriptive statistics and correlation analyses. **Results:** A total of 3,804 tweets were collected, with 2,218 (58.3%) associated with a session. Forty-eight (48%) (131 out of 274) of sessions receiving at least one tweet, with a mean of 11.7 tweets per session (95% CI of 0 to 57.5). In comparison, only 31% (85 out of 274) of sessions received a formal post conference speaker evaluation ($p < 0.005$). For sessions that received at least one traditional post-conference evaluation, there was no significant correlation between the number of tweets and evaluation scores ($R = 0.087$). This can be attributed to the fact that there was minimal variation between evaluation scores (median = 3.6 out of 5, IQR of 3.4 to 3.7). **Conclusion:** There was no correlation between the number of real-time tweets and traditional post-conference speaker evaluation. However, many sessions which received no formal speaker evaluation generated tweets, and the number of tweets was highly variable between sessions. Thus, Twitter metrics might be useful for conference organizers to supplement formal speaker evaluations.
Keywords: social media, altmetrics, program evaluation

MP021

Contributing factors and time delays in management of difficult airways in the emergency department - a retrospective analysis

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Introduction: Delays in definitive management of difficult airways in the Emergency Department (ED), often involving coordination with expert consultation from Anesthesia and/or Otolaryngology, can lead to devastating outcomes. Currently at our ED there is no standardized approach to identifying and/or managing predicted difficult airway scenarios. We sought to determine the most common factors contributing to predicted difficult airways in the ED, and areas of time delays in securing a definitive airway. **Methods:** We conducted a retrospective analysis at a tertiary academic centre (>160,000 ED visits/yr) over a 5 year period. A research assistant screened all cases of "Stat" pages from the ED to the Anesthesia service. An ED clinician performed a thorough review of the charts to confirm difficult airway cases. A single reviewer extracted data on patient demographics, factors associated with a difficult airway, and specific time intervals throughout a patient's clinical course. We present descriptive statistics with 95%CI. **Results:** 45 cases met our inclusion criteria between Jan 2010-Dec 2014. 16 were excluded and a total of 29 cases of difficulty airways in the ED were included in our final analysis. The average age was 56.7 (95% CI 50.1-63.4) years, and 68.9% were male. The most common factors contributing to difficult airway included: Obesity (48.2%), previous history of head/neck malignancy/radiation (27.6%), and facial edema (20.7%). 25 (86.2%) required expert assistance from Anesthesia/Otolaryngology for definitive airway, and 8 (27.6%) survived to hospital discharge. The mean time between decision to intubate and "Stat" anesthesia page was 14.0 (95% CI 8.7-19.3) mins. The mean time from "Stat" anesthesia page to arrival of anesthesia MD was 8.4 (95% CI 6.0-10.7) mins. The mean time between arrival of anesthesia MD and definitive airway was 12.1 (95% CI 7.4-16.8) mins. The mean time between decision to intubate and definitive airway was 35.5 (95% CI 27.9-43.1) mins. **Conclusion:** We found a number of common factors contributing to a patient's risk of having a predicted difficult airway in the ED, as well as areas of significant time delays in the unstandardized, multidisciplinary management of these cases. Future work is needed on developing, implementing, and evaluating more standardized difficult airway response protocols in the ED.
Keywords: difficult airway, anesthesia, quality improvement

MP022

Anticoagulation use in patients with atrial fibrillation/flutter in Canadian emergency departments since the introduction of the novel anticoagulants

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Introduction: Despite strong evidence that antithrombotic drugs in atrial fibrillation/flutter (AF) patients reduce stroke risk, previous emergency department (ED) pre-novel anticoagulant (NOAC) studies have shown that most discharged patients are not optimally treated. This study sought to determine baseline antithrombotic management in AF patients, and appropriate antithrombotic prescription upon ED discharge since the introduction of NOACs. **Methods:** Consecutive AF patients discharged by the ED physician from three academic EDs in Toronto, Canada were retrospectively identified using ECG data. Primary AF was defined as AF in patients ≥ 18 years without congenital heart disease or other acute medical conditions. All management and disposition decisions were left to the discretion of the emergency doctor. **Results:** From July 2012 to October 2014, 691 patients with primary AF were identified. Of these, 34.4% (n = 238) had new onset AF and 66.4% (n = 459) were discharged home directly from the ED. Of those with previously known AF (n = 453), 44.2% (n = 200) were on anticoagulation at ED arrival (warfarin 59.5%, dabigatran 23.0%, rivaroxaban 11.5%); 25.6% (n = 116) on antiplatelets, and 29 (6.4%) on both.

Based on 2012 Canadian AF guidelines, 60.1% of those who should have received anticoagulation were receiving it. In discharged patients meeting de novo criteria *for anticoagulation* (n = 130), 20.0% (n = 26) were started on anticoagulation and 23.1% (n = 30) on antiplatelets. In patients with CHADS2 score ≥ 2 (n = 61), 26.2% (n = 16) were started on anticoagulation. Warfarin (73.1%) was most commonly prescribed followed by dabigatran (15.4%) and rivaroxaban (11.5%). Age was the only inverse independent predictor for appropriate anticoagulation (OR 0.92 per 5 year of age 95% CI 0.89-0.95, p <0.0001) i.e. older patients were less likely to be anticoagulated. The CHADS2 score was not an independent predictor of appropriate anticoagulation. **Conclusion:** Our study shows a persistent gap in the antithrombotic treatment of ED AF patients irrespective of their risk.
Keywords: atrial fibrillation/flutter, novel anticoagulants, stroke prevention

MP023

Reasons for referral and hospitalization among emergency department patients with syncope

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Introduction: Syncope can be caused by serious life-threatening conditions not obvious during the initial ED assessment leading to wide variations in management. We aimed to identify the reasons for consultations and hospitalizations, outcomes, and the potential cost savings if an outpatient cardiac monitoring strategy were developed. **Methods:** We conducted a prospective cohort study of adult syncope patients at 5 academic EDs over 41 months. We collected baseline characteristics, reasons for consultation and hospitalization, hospital length of stay and average total inpatient cost. Adjudicated 30-day serious adverse events (SAEs) included death, myocardial infarction, arrhythmia, structural heart disease, pulmonary embolism, significant hemorrhage and procedural intervention. We used descriptive statistics with 95% CI. **Results:** Of the 4,064 patients enrolled (mean age 53.1 years, 55.9% female), 3,255 (80.1%) were discharged from the ED, 209 (5.2%) had a SAE identified in the ED, 600 (14.8%) with no SAE were referred for consultation in the ED and 299 (7.4%) were hospitalized: 55.5% of referrals and 55.2% of hospitalizations were for suspected cardiac syncope (46.5% admitted for cardiac monitoring of whom 71.2% had no cause identified). SAE among groups were 9.7% in total; 2.5% discharged by ED physician; 3.4% discharged by consultant from ED; 21.7% as inpatient and 4.8% following discharge from hospital. The mean hospital length of stay for cardiac syncope was 6.7 (95%CI 5.8, 7.7) days with total estimated costs of $7,925 per patient (95% CI: 7434, 8417). **Conclusion:** Suspected cardiac syncope, particularly arrhythmia, was the major reason for ED referral and hospitalization. The majority of patients hospitalized for cardiac monitoring had no identified cause. An important number of patients suffered SAE, particularly arrhythmias outside the hospital. These findings highlight the need to develop a robust syncope prediction tool and a remote cardiac monitoring strategy to improve patient safety while saving substantial health care resources.
Keywords: cardiac, resource utilization, syncope

MP024

Ultrasound-guided femoral nerve block versus fascia iliaca block for hip fractures in the emergency department: a randomized pilot study

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Introduction: Regional anesthesia has been shown to be an effective pain control strategy for patients presenting with hip fractures in the emergency department. There are two common methods for performing this block: the femoral nerve block (FNB) and the fascia iliaca compartment block (FICB). The objective of this pilot study is to determine whether one of these two ultrasound-guided block techniques provides superior analgesia to emergency department patients with hip fractures. **Methods:** Emergency physicians at a single institution were randomized to the FNB or FICB training groups. Participants completed a 2-hour practical workshop covering the technique, followed by a questionnaire to assess their comfort with the block. They were asked to perform their assigned nerve block on any patient in the ED presenting with a hip or femur fracture. Physician comfort level and patient pain scores using a visual analog scale (VAS) were recorded before and after the nerve block were recorded. Comparisons were performed using Student's t-test and Fisher's exact test. **Results:** A total of 20 physicians were enrolled in the study, 10 in the FNB group and 10 in the FICB group. There were no significant baseline differences between the groups with respect to ultrasound or nerve block experience. Following the training, 100% of participants in both the FNB group and FICB group felt comfortable performing the block. Nerve blocks were performed in 30/51 (58.8%) of eligible patients in the FNB group and 6/11 (54.5%) in the FICB group (p = 1.0). On the 10-point VAS, pain scores decreased by a mean of 4.9 (SD 3.5) in the FNB group and 8.3 (SD 2.4) in the FICB group (p = 0.056). In practice, physicians felt comfortable performing the FNB in 52.8% of cases, and the FICB in 85.7% of cases (p = 0.21). Mean time to completion of the blocks was similar between the two groups (19 vs 18 mins, p = 0.83). **Conclusion:** In this pilot study, we found a non-significant trend towards improved analgesia and higher physician comfort with the ultrasound-guided FICB compared with the FNB in patients with hip fractures. We found no differences in time to performing the blocks. These results require confirmation with a larger sample size.
Keywords: ultrasound, regional anesthesia, hip fracture

MP025

Does your patient really need intravenous therapy? A multicenter variation analysis of physician practice in low-acuity presentations

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Introduction: The decision to treat with parenteral therapy may reflect a variable practice pattern among emergency physicians and represent an opportunity to standardize care. Our objective was to describe physician level practice variation for IV therapies in patients with low-acuity presentations and quantify the contribution of IV therapy to prolonging ED LOS. **Methods:** Using administrative data merged with computerized physician order entry information we sampled 48 months of patient variables across four urban EDs (Jan 1, 2014 - Dec 22, 2015). Eligible patients: 1. presented with complaints of abdominal pain, nausea and vomiting or diarrhea or had a discharge diagnosis of cellulitis 2.were in a low acuity category (Canadian Triage and Acuity Scale - CTAS 3 or 4) 3.were triaged to non-stretcher zones of the ED and 4.were not admitted to hospital. The primary outcome was the physician-level variation in the decision to order IV therapies for this patient group; namely one or more of the following: IV fluids, opioid analgesia, antiemetics and antibiotics. Secondary outcomes were a comparison of ED LOS, ED revisits at 7 days and ED revisits resulting in admission at

7 days for the IV and non-IV groups. **Results:** Our analysis included 31 802 patient visits treated by 185 physicians. The average patient age was 37.8 years with 64.3% being female and the majority triaged as CTAS 3 (82.5%). On average 24% of these visits were treated with IV therapies; 90th percentile; 34%. For physicians seeing in excess of 100 cases, the variation in IV therapy use ranged from 1% to 47%. Patients receiving IV therapies demonstrated a 44% greater average LOS (6.2 hours vs 4.3 hours) and those receiving IV therapies had higher 7-day ED revisit rates (12.0% vs 8.8%) as well as 7-day ED revisits resulting in readmission (2.4% vs 1.0%). 'mso-spacerun:yes'> Secondary outcomes were a comparison of ED LOS, ED revisits at 7 days and ED revisits resulting in admission at 7 days for the IV and non-IV groups. **Conclusion:** This is the first study to examine physician preference for the use of IV therapies in a low-acuity population and has demonstrated in excess of a 47-fold variation between both extremes of use. Reducing practice variation in this area of ED care by standardizing indications for IV therapies could result in more rational resource utilization and improved throughput.
Keywords: resource utilization, low-acuity visits, IV therapies

MP026

Implementation of an ED atrial fibrillation and flutter pathway improves rates of appropriate anticoagulation in patients not previously on these medications

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Introduction: Atrial fibrillation and flutter (AFF) are the most common arrhythmias presenting to the emergency department. Without anticoagulation, AFF increases stroke risk; individuals with paroxysmal AFF have a similar prognosis. A coordinated ED AFF electronic order-set and management pathway was developed at our institution. The primary objective of this study was to measure rates of appropriate anticoagulation (AAC) on discharge from the ED for patients presenting with AFF not previously on antithrombotic or anticoagulant medications. Secondary objectives included comparison of the following outcomes pre and post-pathway (PRE & POST): AFF Clinic referral rates, ED return rates, and mortality. **Methods:** This was a retrospective case series of patients presenting to our quarternary care ED with AFF pre and post AFF pathway implementation. Cases were identified using an administrative database covering 120 000 annual ED visits. Trained research assistants and the primary investigator extracted data from the electronic medical record. 20% of all charts were double collected to ensure accuracy (k = 0.85). Descriptive variables were described using counts, means, medians and confidence intervals. Chi-square statistics of dependent samples were calculated for the primary outcome. **Results:** We examined 307 cases of AFF presenting to our ED (n = 130 PRE; n = 177 POST). Demographic variables were similar PRE and POST: mean age (66.0 [95%CI 63.8-68.3] PRE; 65.0 [63.0-67.0] POST), % male (59.2% PRE; 59.3% POST), presenting rhythm (66.2% A.fib [58.0-74.3] A. flutter 29.2% [21.4-37.0] PRE; 61.0% A.fib [53.8-68.1] A. flutter 17.5% [11.9-23.1] POST), and CHADS2VASC score (2.1 [1.8-2.4] PRE; 1.9 [1.7-2.1] POST). The rate of AAC rose from 39.1% PRE to 77.8% POST (P < 0.01). AFF clinic referral rates increased from 16.9% PRE to 25.4% POST (not significant). ED return rates within 30 days for AFF, CHF, major bleeding and CVA were unchanged. 30 day mortality rates were not statistically different (1.5% PRE vs. 2.8% POST). **Conclusion:** The implementation of a coordinated ED AFF pathway was associated with significant improvements in the proportion of patients discharged with appropriate anticoagulation who had not previously been on antithrombotic or anticoagulant
medications. ED return rates and mortality did not change significantly.
Keywords: atrial fibrillation, anticoagulation, emergency medicine

MP027

Automated cardiopulmonary resuscitation quality data abstraction for complete episodes of out-of-hospital cardiac arrest resuscitation

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Introduction: Cardiopulmonary resuscitation (CPR) quality assurance and research has traditionally been limited to the first five minutes of resuscitation due to significant costs in time, resources and personnel from manual data abstraction. Moreover, CPR quality can be affected during prolonged resuscitations, which represents significant knowledge gaps. The objective of this study was to develop a software program to help automate the abstraction of CPR quality data from electronic defibrillators. **Methods:** We developed a software program to facilitate and help automate data abstraction from electronic defibrillator files for entire resuscitation episodes. Internal validation of the software program was performed on 50 randomly selected cardiac arrest cases with resuscitation durations of up to 60 minutes. CPR quality data variables such as number of ventilations, number of compressions, minute compression rate, minute compression depth, minute compression fraction, minute end-tidal CO2, were manually abstracted independently by two trained data abstractors and by the automated software program. Error rates and the time needed for data abstraction were measured. **Results:** A total of 9826 data points were abstracted. Manual data abstraction resulted in a total of six errors (0.06%) compared to zero errors by the software program. The mean time ± SD needed for manual data abstraction was 20.3 ± 2.7 minutes compared to 5.3 ± 1.4 minutes using the software program (p = 0.003). **Conclusion:** Our CPR quality data abstraction software was 100% accurate in abstracting CPR quality data for complete resuscitation episodes and showed a significant reduction in data abstraction duration. This software will enable quality assurance programs and future cardiac arrest studies to evaluate the impact of CPR quality during prolonged resuscitations.
Keywords: cardiopulmonary resuscitation (CPR), quality, emergency medical services (EMS)

MP028

Dynamic changes of prehospital serial 12-lead electrocardiogram for remote diagnosis of suspected ST-segment elevation myocardial infarction

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Introduction: Accurate and efficient interpretation of prehospital 12-lead electrocardiogram (ECG) in patients with suspected ST-segment elevation myocardial infarction (STEMI) can improve outcomes, especially in rural regions. In the Chaudière-Appalaches region, Quebec, a prehospital serial 12-lead ECG monitoring system is used for remote interpretation of ECG abnormalities by emergency physicians via a telemedicine platform, the Unité de Coordination Clinique des Soins Préhospitaliers d'Urgence (UCCSPU). The objective of the study was to evaluate the use of serial monitoring of dynamic ECG changes in patients with suspected STEMI during emergency medical services

(EMS) transport. **Methods:** A retrospective cohort study with suspected STEMI patients monitored with prehospital serial ECGs was performed from August 2006 to December 2013. The data was extracted from UCCSPU clinical databases and verified by an emergency physician supervisor. During EMS transport, the serial ECG monitoring system automatically produced and transmitted every 2 minutes a 12-lead ECG without artefacts. STEMI criteria were based on the Third Universal Definition of Myocardial Infarction. Dynamic ECG change was defined as an ST-segment elevation or depression that meets diagnostic criteria (eg. initial non STEMI (NSTEMI) changing to STEMI and vice versa). **Results:** Among the 752 patients identified with suspected STEMI, 728 (96.8%) were included in the study due to missing data. The majority (614/728; 84.3%) had a consistent ST segment without significant dynamic changes throughout transport, of which 521 were identified as STEMI and 93 as NSTEMI. The remaining 114 patients (15.7%) had dynamic ECG changes: 41 (36%) evolved from NSTEMI to STEMI, 40 (35.1%) changed from STEMI to NSTEMI, and 33 (28.9%) had more than one dynamic ST-segment change. Overall, 59 patients (8.1%) had a final STEMI ECG diagnosis after an initial NSTEMI ECG interpretation. **Conclusion:** In this study, the serial ECG system enabled the remote diagnosis of STEMI in 8.1% of patients during EMS transport following an initial NSTEMI diagnosis. Serial monitoring of dynamic changes can allow for more rapid diversion to primary percutaneous coronary intervention facilities, potentially improving patient outcomes. Further studies are needed to evaluate the clinical impact, and costs and benefits of implementing this technology.

Keywords: ECG interpretation, STEMI, emergency medical services (EMS)

MP029

Mobilizing citizens, decision-makers and healthcare professionals to find solutions for improving emergency care in a remote Northern emergency department: a pilot study

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Introduction: Our national study of rural EDs showed they have limited access to CT scans, ICU, and most specialities, while Level 1 and Level 2 trauma centers are on average 300 km away. However, equivalent information on Northern/remote EDs is scarce. **Objectives**: This pilot study aimed to: 1) describe local access to services; and 2) mobilize citizens, decision-makers and healthcare professionals to envisage solutions to improving emergency care in a Northern/remote hospital. **Methods:** This descriptive, qualitative study was performed in a northern ED in Quebec. The head nurse received a prevalidated questionnaire about access to specific services, ED and patient characteristics (Objective 1). Focus groups (5) and individual interviews (11) were conducted with citizens/patients, decision-makers, physicians, nurses, paramedics, pharmacists, and mental health workers (Objective 2). Descriptive statistics are reported as means, medians and percentages for Objective 1. A thematic analysis was conducted for Objective 2. **Results: Objective 1**: The city (population 2875) is a mining community 962 km from Quebec City. The 2010 annual ED census was 6692. Proportions of patient visits at triage levels 1-5 were 0.2%, 3.2%, 13.4%, 25.4% and 56.7% respectively. The ED was staffed by one physician and two nurses per shift. The hospital had 24/7 access to basic X-ray and laboratory but no local access to speciality care, ICU, CT scan or ultrasound, with nearest services 28 km away. **Objective 2:** Analysis of qualitative data highlighted concerns for personal safety; telecommunication problems; lengthy transports; limited access to in-service training, advanced imaging, and consultants; and recruitment and retention difficulties. Solutions included pre-hospital training, telemedicine, protocols, and networking with academic centers/medical schools, North Shore colleagues, and Labrador City Hospital. **Conclusion:** This isolated northern ED has limited access to services. Valuable qualitative information obtained enabled us to better understand the challenges and explore solutions towards improving Northern/remote emergency care.

Keywords: Northern emergency department, improving emergency care, mobilization

MP030

Problems in paramedic-physician telecommunication

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Introduction: Clear paramedic-physician telecommunications (patches) are critical in systems utilizing on-line medical control. In systems using extensive medical directives individual paramedics patch infrequently. Investigations of specific problem calls indicated that communication problems were more common than believed. Existing literature on this topic is sparse. This project is a quality assurance exercise undertaken to understand the extent and nature of problems in paramedic-physician telecommunications **Methods:** Retrospective analysis of anonymized transcriptions made from MP3 audio files recorded as part of normal operating procedures by the Central Ambulance Communication Centre during January-March 2014. All calls where telecommunication occurred between paramedics from 4 ambulance services and base hospital physicians providing on-line medical oversight during ambulance calls were included. Transcripts were read multiple times and data extracted onto spreadsheets for frequency analysis. Further thematic framework analysis of emergent themes was done. **Results:** All 42 patches were transcribed and used for analysis. 36 (85.7%) were for termination of resuscitation orders, 4 (9.5%) were for advice, and 2 (4.8%) were for orders not covered by medical directives. Communication problems were identified in 40 (95.2%) patches. Most had multiple problems. These included disconnections (23.8%), difficulty hearing one another (40.5%) - indicated by phrases such as "sorry?" "what?", "I can't hear you" - or caused by individuals interrupting each other (83.3%), and talking simultaneously (47.6%). Signaling the end of "talk turns" - such as "10-4" or "over" - was never used. Instead, terms like "yah" and "OK" were used. When communication went awry, time was spent trying to repair the mis/poor communication. This led to repeating information or attempting to 'sell' the case by providing information unnecessary for decision making - such as during a request for termination of resuscitation, "there is vomit on the floor". **Conclusion:** Paramedic-physician telecommunication problems were extremely common. They involved technical (mechanical problems) and human factors (disorganized radio 'technique'). The high incidence of telecommunication problems identified is concerning. Critical clinical decisions (e.g. ceasing resuscitation) depend on clear communication. Further study of these issues is warranted.

Keywords: telecommunication, paramedic, patch

MP031

Synovial fluid analysis in the diagnosis of septic arthritis: comparing local data to the literature

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Introduction: A hot, painful, swollen joint is a common presentation to the emergency department. Of the potential etiologies, septic arthritis (SA) is the most devastating. Prompt diagnosis and treatment are

essential to improve outcomes. Both culture proven and clinically suspected SA are thought to have the same prognosis, with similar morbidity and mortality estimates. No clinical exam or serum lab finding has the sensitivity or specificity to diagnose or exclude SA. Instead, diagnosis relies mainly on joint aspiration and synovial fluid analysis. A synovial white blood cell count (sWBC) greater than 50,000 cells/microliter is suggestive of SA and organisms seen on gram stain or growing in culture effectively makes the diagnosis. However, culture and gram stain are positive in only 67% and 50% of cases respectively. The objective of this study was to analyze the accuracy of synovial fluid analysis in our local practice environment. **Methods:** All those encounters with diagnoses related to SA at four adult emergency departments in Calgary between 2013-2014 were reviewed. Hospital records were analyzed for synovial analysis, antibiotic usage and surgical procedures. **Results:** Of 286 encounters, 87 were determined to satisfy the definition for SA in that culture was positive, gram stain was positive or clinical findings lead to treatment with antibiotics and/or surgical intervention. Gram stain was positive in 22% of cases with cultures positive in 51% of patients. sWBC were less than 50000 in 55% of cases and less than 25000 in 24% of cases. Of 88 gram stains performed, 28% were negative but had positive culture. All positive gram stains were associated with positive cultures. **Conclusion:** Culture, gram stain and sWBC of patients diagnosed with SA in Calgary show differences compared with the published literature. In Calgary, the majority of SA diagnoses were made clinically. The sWBC is central to making the diagnosis. Interestingly, 55% of patients diagnosed with SA had a count less than 50,000. It remains unclear what features of history, physical exam, imaging and lab analysis lead to the diagnosis of SA in these cases. Future studies will focus on these outliers to see if a more appropriate diagnostic algorithm would be useful in Calgary. Collaboration between infectious disease specialists, orthopedics, and emergency departments guided by local data is needed to ensure accurate and timely diagnosis.

Keywords: septic arthritis, diagnosis

MP032

Do urine cultures in the emergency department change management of young women with symptoms of uncomplicated urinary tract infection?

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Introduction: Current guidelines do not recommend the routine use of urinary cultures in the management of uncomplicated urinary tract infection (UTI) in premenopausal, non-pregnant women. Complicating factors include atypical presentation, structural abnormalities or recent recurrent infection/antibiotic use. The objective of this study was to determine the number of urine cultures ordered for women who presented to the emergency department (ED) with symptoms of uncomplicated UTI, and whether a culture result impacted subsequent management. **Methods:** This was a retrospective chart review of women aged 18-39 presenting to one of two academic EDs with a discharge diagnosis of uncomplicated UTI from Jan-Dec 2014. Patients were excluded if any of the following were documented: pregnancy, fever, immunocompromised state, diabetes mellitus, absence of lower urinary tract symptoms, ED administration of intravenous antibiotics, a previous UTI treated with antibiotics in the last 90 days, two weeks post-partum or post-instrumentation. **Results:** Of the 512 charts included in the analysis, 494 (96.5%) patients had a urinalysis, of which 463 (93.7%) had positive leukocyte esterase and 90 (18.2%) had positive nitrites. 370 patients (72.3%) had urine cultures performed, of which 236 (63.8%) were positive. 505 (98.6%) patients received antibiotics (53.9% Macrobid; 22.6% Ciprofloxacin; 15.0% Septra; 6.7% other; 1.8% not documented). 7 (1.9%) cultures grew organisms resistant to the prescribed antibiotic; 2 (0.5%) patients received new prescriptions. **Conclusion:** For the majority of young female patients with uncomplicated UTI, urine cultures did not change management. Almost all of these patients had a positive leukocyte esterase and were treated with antibiotics, yet approximately 40% of the patients tested did not return positive urine cultures, suggesting that better algorithms for the diagnosis of UTI in the ED are required. Unnecessary treatment with antibiotics is expensive, contributes to the development of multidrug resistant organisms, and exposes the patient to the unnecessary risks of possible allergic reactions, drug interactions and side effects.

Keywords: urinary tract infection, culture, antibiotic

MP033

The use of femoral nerve blocks in the emergency department for hip fracture patients

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Introduction: Hip fractures affect over 30,000 Canadians each year. Delirium, or acute confusion, occurs in up to 62% of patients following a hip fracture. Delirium substantially increases hospital length of stay and doubles the risk of nursing home admissions and death. Previous studies have shown that regional anesthesia is the optimal pain management strategy for hip fracture patients and has been shown to independently reduce the rate, severity and duration of delirium. However, very few emergency physicians (EPs) have the necessary training and experience to use regional anesthesia for hip fracture in the emergency department (ED). The objective of this study was to determine the number of femoral nerve blocks performed within the ED for the management of hip fracture patients. **Methods:** This was a retrospective chart review of patients aged 65 years and older, presenting to an academic ED (annual census 60,000) with a discharge diagnosis of hip fracture from January 1st 2014 to July 31st 2015. **Results:** Of the 243 hip fractures included in this study, mean (SD) age was 82.9 (8.2) years and 187 (77.0%) were female. The majority (214, 88.1%) of patients arrived to the ED by ambulance and 182 (74.9%) were categorized as CTAS 3. The most common analgesics used in the ED were intravenous (IV) hydromorphone (51.4%), IV morphine (32.1%), or dual therapy with both IV hydromorphone and IV morphine (4.9%). Femoral nerve blocks were initiated for 13 (5.3%) patients and successfully completed in 12 (4.9%) patients in the ED. Median (IQR) ED and hospital length of stay was 5.0 (3.7, 6.6) hours and 6.0 (4.1, 10.2) days, respectively. Forty-three (17.7%) patients experienced in-hospital acute delirium. **Conclusion:** Despite evidence to suggest regional anesthesia may be the optimal pain management strategy for hip fracture patients, the use of femoral nerve blocks in the ED remains low. Future research should attempt to elucidate barriers to use of this procedure by emergency physicians.

Keywords: analgesia, hip fracture, delirium

MP034

What is the diagnostic accuracy of Canadian emergency physicians and cardiologists interpreting potential acute ST-elevation myocardial infarction (STEMI) electrocardiograms?

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Introduction: The accurate interpretation of potential ST-segment elevations on electrocardiograms (ECGs) to diagnose acute myocardial infarction (MI) is a critical competency for emergency physicians (EPs) and cardiologists. There is conflicting evidence on the diagnostic accuracy of EPs and cardiologists interpreting potential STEMI ECGs. **Methods:** We conducted a web-based assessment of the diagnostic accuracy of potential STEMI ECGs of Canadian EPs and cardiologists. They were identified using the membership lists of the Canadian Association of Emergency Physicians and the academic departments of cardiology at Canadian medical schools. When provided with 20 ECGs of confirmed STEMI patients, EPs and cardiologists were asked to provide a binary Yes/No answer to the question, "In a patient with ischemic chest pain, does this ECG represent a STEMI?" EPs and cardiologists were blinded to the correct answers while completing the web-based assessment. Descriptive statistics were used to described frequencies and counts. Analysis using Rasch Measurement Theory was used to explore the relationship between correct interpretation of ECGs and predictive variables such as age, years in practice or type of practice. **Results:** Two hundred and fifty EPs and 30 cardiologists (n = 280) responded to our survey (total response rate 25%). Average years in practice were 12.5 for EPs (SD 10.6; median 10) and 14.6 for cardiologists (SD 10.6; median 11); 52% of EPs and 93% of cardiologists practiced in an academic setting. Seven of the cardiologists were interventionalists, while 47.6% of EPs and 97% of cardiologists practiced at hospitals with 24-hour catheterization capability. The diagnostic accuracy of EPs for identifying STEMI ECGs was 75% (SD 15%); cardiologists' accuracy was 76% (SD 15.5%). The ability to correctly interpret the ECGs was independent of age, years in practice, or type of practice (community vs academic). **Conclusion:** EPs and cardiologists display similar diagnostic accuracy for interpreting STEMI ECGs, regardless of age, years in practice or type of practice. The findings of our study suggest the need for focused ECG education for both EPs and cardiologists.

Keywords: acute myocardial infarction, electrocardiogram (ECG), diagnostic accuracy

MP035

Point-of-care-ultrasound to diagnose appendicitis in a Canadian emergency department

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Introduction: Appendicitis is a common surgical condition that frequently requires patients to undergo diagnostic imaging. Abdominal computed tomography is the gold standard imaging technique for the diagnosis of appendicitis, but exposes patients to radiation. Ultrasound offers an alternate radiation-free imaging modality for appendicitis. However, the availability of ultrasound during off-hours is limited in many Emergency departments (EDs). Clinician performed point-of-care ultrasound (POCUS) is increasingly used by emergency physicians as a bedside tool to evaluate suspected appendicitis. The purpose of this study is to evaluate the test characteristics of emergency physician performed POCUS to diagnose appendicitis in a Canadian ED. **Methods:** A pragmatic, retrospective chart review was performed on all patients for whom a POCUS was performed to diagnose appendicitis at St. Joseph's Healthcare Hamilton in Ontario from December 1, 2010 to December 4, 2015. All POCUS scans were performed by physicians with Registered Diagnostic Medical Sonographer (RDMS) credentials or resident physicians undergoing POCUS fellowship training. All scans were over-read by RDMS credentialed faculty and subject to a rigorous quality assurance (QA) process. POCUS findings and patient outcomes were reported. **Results:** A total of 90 patients were included in the study. 24 patients were diagnosed with appendicitis on POCUS. Ultimately, 18 were diagnosed with appendicitis through formal imaging, laparoscopy, and pathology. The sensitivity and specificity for POCUS to diagnose appendicitis was found to be 69.2% (95% CI, 48.1%-84.9%) and 90.6% (95% CI, 80.0%-96.1%) respectively. **Conclusion:** Bedside ultrasound is a reliable imaging modality for ruling in acute appendicitis. In cases where POCUS is negative or indeterminate for appendicitis, further imaging should be obtained as clinical suspicion warrants. The use of POCUS has the potential to reduce patient exposure to ionizing radiation and decrease the costs of obtaining CT scans, while hastening the process of achieving definitive management through earlier surgical consultation.

Keywords: appendicitis, point-of-care-ultrasound (PoCUS), diagnostic imaging

MP036

Trauma Resuscitation Using in-situ Simulation Team Training (TRUST): a novel approach to latent safety threat identification in trauma care

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Introduction: Resuscitation of a trauma patient requires a multidisciplinary team to perform in a dynamic, high-stakes environment. Error is ubiquitous in trauma care, often related to latent safety threats (LSTs) - previously unrecognized threats that can materialize at any time. In-situ simulation (ISS) allows a team to practice in their authentic environment while providing an opportunistic milieu to explore critical events and uncover LSTs that impact patient safety. **Methods:** At a Canadian Level 1 trauma centre, regular, unannounced trauma ISSs were conducted and video-recorded. A retrospective chart review of adverse events or unexpected deaths informed ISS scenario design. Each session began with a trauma team activation. The on-duty trauma team arrived in the trauma bay and provided care as they would for a real patient. Semi-structured debriefing with participant-driven LST identification and ethnographic observation occurred in real time. A framework analysis using video review was conducted by human factors experts to identify and evaluate LSTs. Feasibility was measured by the impact on ED workflow, interruptions of clinical care and participant feedback. **Results:** Six multidisciplinary, high-fidelity, ISS sessions were conducted and 70 multidisciplinary staff and trainees participated in at least one session. Using a framework analysis, LSTs were identified and categorized into seven themes that relate to clinical tasks, equipment, team communication, and participant workflow. LSTs were quantified and prioritized using a hazard scoring matrix. ISS was effectively implemented during both low and high patient volume situations. No critical interruptions in patient care were identified during ISS sessions and overall participant feedback was positive. **Conclusion:** This novel, multidisciplinary ISS trauma training program integrated risk-informed simulation cases with human factors analysis to identify LSTs. ISS offers an opportunity for an iterative review process of high-risk situations beyond the traditional morbidity and mortality rounds; rather than waiting for an actual case to generate discussion and review, we prophylactically examined critical situations and processes. Findings form a framework for recommendations about improvements in

equipment, environment layout, workflow, system processes, effective team training, and ultimately patient safety.
Keywords: simulation, trauma, patient safety

Posters Presentations

P001

Concussion patients in the emergency department: assessing a new triaging tool for follow-up and prompt long term management

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Introduction: Concussion is a common emergency department (ED) presentation. Most patients improve with expectant management. A subset with risk factors for post-concussion syndrome (PCS) may require closer outpatient follow-up. A novel emergency department (ED)/head injury clinic (HIC) triaging system has been created to allow concussed patients rapid access to educational information and specialized consultant services. This system has been well received by patients and physicians alike; however, objective measures are needed to determine if this system ultimately decreases excessive healthcare utilization (HCU) and improves symptom management of PCS. **Methods:** Single centered prospective observational study. Control population of 42 mTBI patients referred to the HIC through the Ontario Acquired Brain Injury (ABI) Network within 3-12 months of injury. These patients have received little concussion education or treatment and will be compared to 50 concussion patients seen in the ED and HIC. Rivermead scores, a validated likert scale of PCS symptoms (1-4, maximum score of 64) and HCU (patient reported number of healthcare visits post injury) will be collected on their initial clinic visit and subsequent follow up phone interview. **Results:** Control ABI network patients were 50% male, mean age 40 yrs (18-90, ± 16.3) while 83% (35/42) reported >1 subsequent visit to ED or family physician and 39% (16/42) visited neurologist. Mean Rivermead Score was 32.6 (7-58, ± 12). **Conclusion:** A significant proportion of control patients utilized multiple healthcare resources and were still symptomatic 3-6 months following injury. Data collection is currently ongoing to determine if rapid outpatient follow-up and education decreases HCU and PCS symptoms.
Keywords: concussion, triaging tool, Rivermead

P002

Ten patients, one ventilator: how to best allocate critical care resources during mass disaster

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Introduction: Any large-scale disaster may place a hospital system in a precarious position. Planning is fundamental to facilitate an equitable process for allocating scarce critical care resources, yet there is a paucity of literature guiding protocol development, and few Canadian hospitals have done this planning. We performed a scoping review of the available literature, and used this data to develop a hospital-wide policy to guide critical care resource allocation as part of the hospital emergency management planning process. **Methods:** A primary search of MEDLINE (1946-2015), EMBASE (1980-2015), Disaster Lit (2002-2010) and Pubmed focusing on *a priori* criteria was completed. A secondary search of the grey literature served to increase sensitivity and rigor. Two independent reviewers manually reviewed the citations, and selected eligible abstracts for full-text. Qualitative thematic analysis was undertaken of the selected articles. The results then informed the development of a hospital-wide policy and protocol to guide critical care resource allocation. **Results:** The search identified 832 citations; 134 papers were reviewed and 11 selected for qualitative analysis. All included papers were expert opinion and reviews. All suggested that an ethical framework be used; eight discussed this in detail. Ten recommended allocating a triage team to implement the protocol. Nine papers recommended specific resource allocation protocols with inclusion/exclusion criteria, physiologic scores, and reassessment at varying time intervals (12-120 hours). **Conclusion:** Effective planning, prior to a disaster, is critical to saving as many lives as possible. Based on our scoping review, we have developed a hospital-wide protocol that incorporates ethical principles and clear inclusion and exclusion criteria, to help avoid inequity and promote transparent decision-making. Next steps include a public consultation process and review, prior to implementation testing and educational roll-out.
Keywords: critical care, mass disaster, policy development

P003

Do all clavicle fractures in children need to be managed by orthopaedic surgeons?

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Introduction: Although many uncomplicated pediatric fractures do not require routine long-term follow-up with an orthopedic surgeon, practitioners with limited experience dealing with pediatrics fractures will often defer to a strategy of frequent clinical and radiographic follow-up. Development of an evidence-based clinical care pathway can help unnecessary radiation exposure to this patient population and reduce costs to patient families and the healthcare system. **Methods:** A retrospective analysis including patients who presented to the Hospital for Sick Children (SickKids) for management of clavicle fractures was performed**. Results:** Three hundred and forty patients (227 males, 113 females) with an average age of 8.1 (range 0.1-17.8) were included in the study. The mean number of clinic visits including initial consultation in the emergency department was 2.1 (±1.3). The mean number of radiology department appointments was 1.8 (± 1.3) where patients received a mean number of 4.2 (±3.0) radiographs. Complications were minimal; 2 refractures in our series and no known cases of non-union. All patients achieved clinical and radiographic union and returned to sport after fracture healing. **Conclusion:** Our series suggests that the decision to treat operatively is made at the initial assessment. If no surgical indications were present at the initial assessment by the primary-care physician, then routine clinical or radiographic follow up is unnecessary. Our paediatric clavicle fracture pathway will reduce patient radiation exposure and reduce costs incurred by the healthcare system and patients' families without jeopardizing patient outcomes.
Keywords: clavicle fracture, clinical pathway, management

P004

What happens to cognitive load during trauma skill training using computer based video instructions?

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Introduction: In the clinical settings, emergency physicians are faced with situations that require multitasking such as interacting with other team members, documentation and utilization of computer resources whiles ensuring competency on a particular trauma skill. The purpose of

this study was to assess the effect of multitasking on cognitive load when learning a common trauma skill. **Methods:** Sixteen students who had no previous experience with the one-handed square knot were randomly assigned to one of the two groups: practice and non-practice groups. A pre-recorded instructional video of a one-hand knot tying was presented to all participants. Next, the practice group completed a single session of 10 trials of the one-hand knot tying using a benchtop simulator, while the non-practice group did not. All returned a week later for a transfer task on a different simulator. On trials 1, 4, 7,10 and during the transfer performance the participants performed under dual task conditions, where they were asked to focus on the knot-tying task, but also to react as fast as possible to the illumination of an incandescent light bulb by pressing a foot pedal. Subjective ratings of mental effort, and reaction time to the visual stimulus were used as indices of cognitive load. **Results:** A repeated measure ANOVA showed a significant effect of dual task on subjective measure of mental effort ($F_{(4, 28)} = 10.35$, $p = .001$, $\omega = .60$) and reaction time ($F_{(4, 28)} = 7.93$, $p = .001$, $\omega = .53$), with plots indicating cognitive load plateaued by the 7th trial. **Conclusion:** These findings highlights the number of trials necessary to attain a level of proficiency in a basic trauma skill such as the one-hand knot tying, ease the level of cognitive load and possibly enhance transfer to more challenging tasks.
Keywords: dual-task, trauma skills, cognitive load

P005

Pre-hospital dexamethasone administration in children with croup: the Edmonton experience

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Introduction: Croup is one of the most common childhood respiratory illnesses, affecting more than 80,000 Canadian children per year. Early dexamethasone administration in croup can reduce admission rates and length of stay (LOS), as well as return visits to the emergency department (ED). Pre-hospital emergency medical services (EMS) teams in Edmonton administer dexamethasone to children with croup. The objectives of this study were to (a) assess the clinical impact of pre-hospital administration of dexamethasone to children with croup and (b) compare clinical outcomes of these patients to those who did not receive their first dose of dexamethasone via the EMS providers. **Methods:** This study was a retrospective medical record review that included children between 6 months and 6 years of age who were brought via EMS to the Stollery Children's Hospital ED with a final diagnosis of croup, between January 1st 2010 and December 31st 2012. Data were collected regarding pre-hospital presentation and management, ED presentation and management, ED LOS and final disposition, and patient demographics. **Results:** 188 patients were enrolled, 35.1% (66/188) of whom received a pre-hospital diagnosis of croup. The mean age of the participants was 32.96 months (SD ± 17.18). Overall, 10.6% patients (20/188) were given dexamethasone in the pre-hospital setting, while 30.3% patients (57/188) were given nebulized epinephrine by EMS. Out of the 66 patients with a pre-hospital diagnosis of croup, 10.6% (n = 7) were given dexamethasone by EMS. In the ED, dexamethasone was administered to 88.3% of patients (166/188) while 56/188 participants (29.8%) received nebulized epinephrine. There was no statistically significant difference in ED LOS stay between those who received pre-hospital dexamethasone (2.6 hours, SD ± 1.6, n = 18) and those who did not (3.3 hours, SD ± 2.7, n = 159). The number of in-hospital epinephrine doses per patient was influenced by the administration of pre-hospital dexamethasone ($p = 0.010$). **Conclusion:** Pre-hospital administration of dexamethasone likely influences the severity and short-term persistence of croup symptoms, as evidenced by less epinephrine use in the ED. Contrary to current EMS guidelines, very few patients with a pre-hospital diagnosis of croup received dexamethasone by EMS personnel. This likely represents a missed opportunity to decrease the severity of the patients' disease.
Keywords: emergency medical services (EMS), croup, dexamethasone

P006

A qualitative study of the language of satisfaction for children in the emergency department

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Introduction: Measures of satisfaction are essential to understanding patient experience, and pain management. Currently, there are no validated tools to quantify children's satisfaction. To develop such a tool, we must first understand which words children use to communicate satisfaction. Our objectives were to (A) to identify the words commonly used by children of different ages to communicate satisfaction, in general, and in the context of pain management, and (B) to determine if this vocabulary is similar to that used by their caregiver. **Methods:** A qualitative study of 105 children-parent pairs, aged 3-16 years, who were evaluated at a pediatric emergency department (PED) from July-November 2014 was conducted. Children were interviewed using a semi-structured format of ten open-ended questions. They were asked to describe their feelings when 1) they received something they wanted/needed, 2) their expectations were met or not met in the ED, and 3) their pain was or was not relieved. A written survey was also completed by the caregiver. Interviews were transcribed and grounded theory was employed for data coding and analysis. **Results:** 105 child interviews were completed (n = 53 female, mean age 9.91 SD 3.71, age range 4-16). 105 caregiver surveys were completed (n = 80 female). "Good", "better," and "happy" were most commonly used by all children (n = 99) to express satisfaction with pain management (27%, 21% and 22%, respectively), with PED care (31%, 14% and 33%) and in general (13%, 5% and 49%). Children (n = 99) used the words "sad", "bad," and "not good" to communicate dissatisfaction with pain management (21%, 7% and 11% respectively), and with PED care (21%, 13% and 12%, respectively). Only 55% of children understood the meaning of the word 'satisfaction'. Children used words that were similar to their caregiver 14% of the time. **Conclusion:** The word "satisfaction" should not be used to communicate with children in the emergency department, as many lack understanding of the term. The vocabulary that children use to describe satisfaction does not largely vary with context and involves simpler words than their parents. Caregiver vocabulary should not be used as a surrogate for pediatric patients. This study will inform the development of a validated tool to measure children's satisfaction with pain management.
Keywords: children, pain, satisfaction

P007

Association between serum biomarkers and frailty level in seniors with minor injurys

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Introduction: Frailty is associated with mobility & physical impairment in seniors with minor injuries. Serum biomarkers have also been

suggested as potential markers of these impairments in clinical studies. No study has examined if serum biomarkers could contribute to the diagnosis of frailty in seniors with minor injuries. **Objectives:** To explore the association between several serum biomarkers (Ferritin, Creatinine, Vitamin D, Albumin, Glucose, Estradiol, Testosterone, Thyroid Stimulating Hormone (TSH), Insulin-Growth Factor (IGF-1) C-reactive protein (CRP)) and frailty level in seniors treated in emergency department (ED) for minor injuries. **Methods:** Cross-sectional study within the larger CETI cohort. It includes 142 seniors discharged home from 4 EDs after treatment of minor injuries. Their frailty status was measured by the Canadian Study of Health & Aging-Clinical Frailty Scale (CSHA-CFS). Biomarkers were obtained from blood samples. Pearson's correlations (r) were performed to examine the relation between serum biomarkers and frailty levels. Partial correlation controlled for age and sex, were also performed. **Results:** Due to inclusion criteria, no patient was severely frail. Overall, these preliminary analyses seem to indicate that robust patients tended to have lower Glucose & Vitamin D levels ($-0.264 \leq r \leq -0.230$; $p < 0.05$), higher Estradiol ($r = 0{,}230$; $p < 0.05$) & Testosterone ($r = 0{,}295$; $p < 0.05$), while prefrail/frail patients tended to have higher Glucose & Vitamin D levels ($0{,}235 \leq r \leq 0{,}238$; $p < 0.05$), lower Estradiol levels ($r = -0{,}235$; $p < 0.05$) & more elevated Ferritin levels. Due to the small number of patients, controlling for age and sex lead to non-significant results of the most associations. **Conclusion:** Pre-frail/frail seniors presenting to EDs with minor injuries tend to have higher Ferritin, Glucose & Vitamin D levels as well as lower sexual hormones levels than robust individuals. Larger samples are needed in order to elucidate which biomarkers could be most useful to identify frail seniors needing clinical attention and to assess a possible association with mobility impairments in this population.

Keywords: functional decline, biomarkers, frailty

P008

Addressing chronic pain and problematic substance use of opioids in the emergency department: can a comprehensive framework for care work?

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Introduction: Chronic pain and substance misuse are complex chronic illness that are subject to prejudice, misinterpretation and cultural biases. They require a broad, multi-disciplined approach if they are to be effectively managed. Barrier's to effective care in the emergency department include our reliance on pain scales alone to effectively triage and manage chronic pain, differing philosophy's and attitudes regarding the appropriate use of high risk pain pharmacology including opioids and confusing classifications systems used to describe pain and problematic substance use which can often lead to further stigmatization and over medicating. **Methods:** The charts of thirteen patients with complex pain and problematic substance use who had more than 360 visits to a regional emergency department in one year were reviewed retrospectively and data collected regarding frequency of visits and disposition after the implementation of a comprehensive pain and addiction strategy from April 2011 to August 2015. **Results:** In the first year of implementation there was a 70% drop in the frequency of emergency department visits. Five patients (38%) required a comprehensive pain plan. Six agreed (46%) to a direct referral to our mental health, addiction and chronic pain services. Two patients (15%) were lost to follow-up. Review of the electronic record to track patient visits to provincial emergency departments did not show an increase in visits to other facilities within the province. Review of visits in 2015 show a 97% drop in the frequency of visits. Family Physicians in the community did not report an increase in the frequency of patient visits as a direct result of the implementation of this strategy nor was there an increase in complaints to administration regarding ineffective pain management. **Conclusion:** Although survey numbers are low it suggests that a framework for the management of complex pain and substance use disorders can be successfully implemented in the emergency department improving timely access to appropriate management and resources for patients based on best practice to address their complex needs.

Keywords: complex pain, substance use disorders, comprehensive care plan

P009

Violence against health care professionals in Karachi: results from a mixed methods study

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Introduction: The right to live is the supreme human right and according to Article 3 of the Universal declaration of human rights everyone has a right to life, liberty and security. In Karachi, Pakistan huge numbers of health care professionals (HCP) have been subjected to violence inclusive of money extortion, kidnapping, mental & physical torture, murders etc. A recent study from Karachi's four major hospitals reported that 72.5% of HCP have experienced abuse (verbal and physical) in the past 12 months. The goal of this study was to develop strategies for preventing violence against health care after collecting baseline data. **The objectives of the study were to:** Identify the magnitude, threshold and impact of violence against HCPs. **Methods:** This was a mixed methods study design with a QUAN-QUAL approach. Structured questionnaire was used after pilot testing and filled by the surveyors. Focus group discussion and In-depth interviews were conducted with HCPs, NGOs, Law enforcement agencies, ambulance services, hospital administrators and LHW programs. Frequencies and proportions were compared for different cadres of HCPs for the quantitative data analysis. Thematic content analysis with inductive and deductive reasoning was used for analysing qualitative data. **Results:** Data on 822 HCPs revealed that 33% had faced violence and 49 % had experienced it, 89% was verbal and 43% was physical abuse, 2% had died and 22% were injured. Ambulance services and physicians were the most common victims of violence. The main reasons were grouped as institutional, behavioral (victims and perpetrators) and general situation of the city. There is high acceptance of violence among HCPs and lack of training in dealing with it was the most common reason given. Sequlae included effects on victim, family, institution and the reporting agencies. The final paper will have complete details on the baseline and the recommendations proposed by the stakeholders. **Conclusion:** Violence faced by HCP's is a multifactorial complex issue. There is a dire need to design interventions which can help in addressing the behavioral, Institutional and sociopolitical factors promoting violence among HCP's. The interventions based on recommendations by the respondents have been developed and implementation has started as a pilot in the city of Karachi.

Keywords: violence, health care professionals, ambulance services

P010

Use of the emergency department by refugees under the Interim Federal Health Program

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Introduction: In June 2012, the federal government made cuts to the Interim Federal Health (IFH) Program that reduced or eliminated health insurance for refugee claimants in Canada. The purpose of this study was to examine the effect of the cuts on emergency department (ED) use among patients claiming IFH benefits. **Methods:** We conducted a health records review at two tertiary care EDs in Ottawa. We reviewed all ED visits wherein an IFH claim was made at triage, for 18 months before and 18 months after the changes to the program on June 30, 2012 (2011-2013). Claims made before and after the cuts were compared in terms of basic demographics, chief presenting complaints, acuity, diagnosis, presence of primary care, and financial status of the claim. **Results:** There were a total of 612 IFH claims made in the ED from 2011-2013. The demographic characteristics, acuity of presentation and discharge diagnosis were similar during both the before and after periods. Overall, 28.6% fewer claims were made under the IFH program after the cuts. Of the claims made, significantly more were rejected after the cuts than before (13.7% after vs. 3.9% before, $p < 0.05$). The majority (75.0%) of rejected claims have not been paid by patients. Fewer patients after the cuts indicated that they had a family physician (20.4% after vs. 30% before, $p < 0.05$) yet a higher proportion of these patients were still advised to follow up with their family doctor during the after period (67.2% after vs. 41.8% before, $p < 0.05$). **Conclusion:** A higher proportion of both rejected and subsequently unpaid claims after the IFH cuts in June 2012 represents a potential barrier to emergency medical care, as well as a new financial burden to be shouldered by patients and hospitals. A reduction in IFH claims in the ED and a reduction in the number of patients with access to a family physician also suggests inadequate care for this population. Yet, the lack of primary care was not reflected in the follow-up advice offered by ED physicians to patients.
Keywords: refugee, Interim Federal Health (IFH), international

P012

Equity of care between First Nations and non-First Nations patients in Saskatoon emergency departments

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Introduction: Studies have shown that First Nations patients have poorer health outcomes than non-First Nations patients. This has raised concerns that they receive unequal treatment from the health care system in general and the Emergency Department (ED) in particular. We sought to determine if there was such a difference and what it was so that it could be corrected. **Methods:** We performed a retrospective chart review to compare the care received by status First Nations and non-First Nations patients presenting to two hospital ED's (Royal University Hospital and St. Paul's Hospital) in Saskatoon, Saskatchewan with the chief complaint of abdominal pain and a Canadian Triage and Acuity Scale (CTAS) score of three. A total of 200 charts were reviewed (100 from each site and 100 from each group) by two medical students. One student was involved in blinding the charts; the other was responsible for analyzing the charts. Identifying information on the charts was redacted to blind the reviewer to the patient's group during the chart review. Data extracted from each chart included time to doctor, time to analgesia given, length of stay, referral for consultation, blood work, imaging, bounce backs, reassessment, physical and history exam, and final disposition. This data will then be compared between the two population groups to find if there is equality in care given. **Results:** Data is currently being analyzed and will be available for presentation at CAEP 2016. **Conclusion:** The goal of our health care system is to provide the same level of excellent care to every patient that arrives in the ED. If care is not being provided equitably to First Nations patients this must be identified for it to be addressed. This study aimed to determine whether disparities in care exist. If they are found subsequent research could be done to determine why these differences exist while at the same time working to minimize and eliminate them for the benefit of First Nations patients.
Keywords: triage, First Nations, equity

P013

Inter-facility transfers for CT scans from a rural emergency department: a pilot study

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Introduction: Rural emergency departments (EDs) are an important gateway to care for the 20% of Canadians who live in rural areas. We recently reported that fewer than 15% of rural EDs in Canada have access to a CT scanner. Lack of CT scanners in rural hospitals can result in frequent inter-facility transfers and delays in diagnosing and treating life-threatening conditions. No recent study has examined this issue. **Objective:** With a future larger study in mind, we did a pilot assessment of inter-facility transfers for CT scans from one rural ED and evaluated the quality of the data and feasibility. **Methods:** This pilot study was part of our province-wide study on rural emergency care. Criteria were having 24/7 physician coverage and acute-care hospitalization beds. The hospital was also selected for its proximity and local interest. Two medical students collected data from hospital databases to determine annual number of ED visits, ED transfers, proportion of transfers for CT scans, reasons for examinations, and transfer times from April 1, 2010 to March 31, 2015. Descriptive statistics were reported as well as data quality and feasibility indicators. **Results:** For each year from 2010 to 2014, there was an average of 13,341 ED visits, 444 inter-facility transfers, and 125 CT scans. Over the five years an average of 28% of the inter-facility transfers were for CT scans, and the majority were abdominal CT scans. Inter-facility transfer data was 100% accessible through hospital databases but inter-facility transfer times and final diagnoses were not. **Conclusion:** More than a quarter of inter-facility transfers were for CT imaging. The limited electronic data in this Quebec rural ED precluded analysis of inter-facility times. While further cost-benefit analysis is required, preliminary data suggests local CTs may save time, money and lives.
Keywords: rural emergency departments, computed tomography, inter-facility transfer

P014

An investigation to determine if being roomed next to a psychiatric patient affects patient satisfaction and perception of care in those not being evaluated for a psychiatric complaint

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Introduction: Nearly 12 million emergency department (ED) visits in the USA annually are related to a mental health and/or substance abuse condition. This is equivalent to 1 out of every 8 ED visits or 12.5 percent of all ED visits annually. States cut $5 billion in mental health services from 2009 to 2012. In the same period, the country eliminated at least 4,500 public psychiatric hospital beds. This has led to an increase in psychiatric boarding. Boarding consumes scarce ED resources and prolongs the amount of time that all patients must spend waiting for services. The aim of this study is to determine if being

roomed next to a psychiatric patient affects patient satisfaction and perception of care. **Methods:** A survey consisting of 15 patient satisfaction questions was distributed to patients over a period of three months in the ED at a tertiary care center with >125,000 visits a year. Patients included were English-speaking adults (18 years or older) with an Emergency Severity Index of 3-5. Responses were analyzed with a chi-square across 2 groups with p-value of 0.05 considered as significant. **Results:** A convenience sample of 78 surveys was obtained. 40 surveys were completed by those roomed next to a patient with a psychiatric complaint and 38 surveys were completed by patients not roomed next to a patient being seen for a psychiatric complaint. For every satisfaction question asked, the patients placed away from mental health encounters gave significantly higher ratings than the patients roomed near psychiatric patients. Patients roomed next to psychiatric patients had a statistically significant decrease in satisfaction in nursing attentiveness, nursing promptness in responding to the call bell, attentiveness of the physician team, and of the overall encounter itself. All values were significant with all but one p-value being < 0.01.There was no difference between the 2 groups with respect to gender, age range, reason for visit or wait time. **Conclusion:** This study suggests that patients being roomed next to a patient with a psychiatric complaint had significantly decreased patient satisfaction.

Keywords: patient satisfaction, psychiatric complaint

P015

Implementing the Canadian CT Head Rule in a community emergency department

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Introduction: The Canadian CT Head Rule ('the rule') is widely used across the country and its use is specifically recommended by Choosing Wisely Canada. Studies in Canadian hospitals have shown appropriate declines in CT scans when decision tools have been made readily available and useable at the point of care. Research into the implementation of the Canadian CT Head Rule in particular has shown that barriers to its use include an inability to accurately recall each criteria and forgetting to attempt to apply the rule altogether. In an attempt to provide our clinicians with effective access to the rule, we modified CT requisitions and order procedures to facilitate the use of the rule for every head CT in our emergency department (ED). **Methods:** A quality improvement (QI) approach was used to pilot, implement, and evaluate the modified CT requisition at our hospital. Several Plan-Do-Study-Act cycles involving stakeholders in the hospital resulted in iterative changes to the requisition leading to the implemented version. The new requisition required physicians to indicate which rules or exclusion criteria were met and this was made mandatory for all head CTs ordered. Demographic data was collected on all patients presenting to the ED on age, gender, CTAS level, disposition, and length of stay. Data on which exclusion criteria were appropriate, the rules met leading to CT scans, whether each requisition was used appropriately, and whether there was a significant injury found was collected for each patient receiving a head CT after implementation. **Results:** In our primary outcome (% of ED visits receiving a head CT), preliminary results have demonstrated a relative reduction in head CT ordering of 10.9%. Our study at completion is powered to detect a ~10% relative change in ordering behaviour, and a Chi square of the data to date yields a P-value of 0.0147. There are no significant differences in visit volume or any of the demographics collected to date. Final results including analysis are anticipated in March, 2016. **Conclusion:** Preliminary results on this simple, no-cost intervention are very promising. The reduction in head CTs ordered suggests that with mandated access to an easy-to-use, well validated decision tool, ED physicians have been able to confidently defer scans that have a very low risk of having any significant injury present, reducing cost, radiation exposure, and perhaps time in department.

Keywords: decision tool, computed tomography, quality improvement

P016

Evaluating the impact of a novel mobile care team (MCT) on the prevalence of ambulatory care sensitive conditions presenting to emergency medical services in Nova Scotia

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Introduction: Hospitalization due to ambulatory care sensitive conditions (ACSC) is a proxy measure for access to primary care. Emergency medical services (EMS) are increasingly called when primary care cannot be accessed. A novel paramedic-nurse EMS Mobile Care Team (MCT) was implemented in an under-serviced community. The MCT responds in a non-transport unit to bookings from EMS, emergency and primary care and to low-acuity 911 calls in a defined geographic region. Our objective was to compare the prevalence of ACSC in ground ambulance (GA) responses before and after the introduction of the MCT. **Methods:** A cross-sectional analysis of GA and MCT patients with ACSC (determined by chief complaint, clinical impression, treatment protocol and medical history) one year pre- and one year post-MCT implementation was conducted for the period Oct. 1, 2012 to Sept. 30, 2014. Demographics were described. Predictors of ACSC were identified via logistic regression. Prevalence was compared with chi-squared analysis. **Results:** There were 975 calls pre- and 1208 GA/95 MCT calls post-MCT. ACSC in GA patients pre- and post-MCT was similar: $n = 122$, 12.5% vs. $n = 185$, 15.3%; $p = 0.06$. ACSC in patients seen by EMS (GA plus MCT) increased in the post-period: 122 (12.5%) vs. 204 (15.7%) $p = 0.04$. Pre vs post, GA calls differed by sex ($p = 0.007$) but not age (65.38 ± 15.12 vs. 62.51 ± 20.48; $p = 0.16$). Post-MCT, prevalence of specific ACSC increased for GA: hypertension ($p < 0.001$) and congestive heart failure ($p = 0.04$). MCT patients with ACSC were less likely to have a primary care provider compared to GA (90.2% and 87.6% vs. 63.2%; $p = 0.003$, $p = 0.004$). **Conclusion:** The prevalence of ACSC did not decrease for GA with the introduction of the MCT, but ACSC in the overall patient population served by EMS increased. It is possible more patients with ACSC call or are referred to EMS for the new MCT service. Given that MCT patients were less likely to have a primary care provider this may represent an increase in access to care, or a shift away from other emergency/episodic care. These associations must be further studied to inform the ideal utility of adding such services to EMS and healthcare systems.

Keywords: emergency medical services (EMS), ambulatory care sensitive conditions, community paramedicine

P017

Does a busy day predict another busy day? A time-series analysis of multi-centre emergency department volumes

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Introduction: Variations of patient volumes in the ED according to days of the week and month of the year are well-established. Anecdotally, ED volumes follow 'waves' that correlate with previous

days. Time-series models have traditionally been used in econometrics to develop financial models, but have been adapted in other fields, such as health informatics. This study uses a time-series approach to assess whether these impressions are valid. **Methods:** The daily volume of patients presenting to four emergency departments (ED) at the Nova Scotia Health Authority from Jan 2010 to May 2015 were analyzed to assess for the effect of previous volumes on future volumes. Parameters were selected using the auto-correlation (ACF) and partial auto-correlation functions (PACF) for a Seasonal Auto-regressive Integrated Moving Average (SARIMA) model. The Box-Jenkins statistic was assessed for model suitability. To assess for accuracy, a forecast of the model was evaluated with a year of volumes set aside for testing. **Results:** The EDs saw an average of 365.1 patients per day, with a minimum of 188 patients and a maximum of 479. The increasing trend in volumes consistent with the increasing number of ED presentations nation-wide was detrended using linear regression. There was a significant correlation in ACF with the previous day ($\rho_1 = 0.297$). A seasonal, periodic trend was seen weekly. Significant correlations occurred annually ($\rho_{365} = 0.279$) and at 29 days ($\rho_{29} = 0.339$), consistent with the lunar cycle. A seasonal model was postulated incorporating an auto-regressive (AR) coefficient, and a moving average (MA) coefficient for the previous day's volume. An AR and MA seasonal coefficient were each incorporated using the weekly period. When using the model on the test data, the model predicted 4 more patient presentations on average than the true value, with 90% of the values within 37 presentations of the true volume. The Box-Jenkins statistic was non-significant, indicating no problems with model specification. **Conclusion:** The volume of patients presenting to an ED system is correlated with that of the previous day. A weekly seasonal variation was confirmed. Auto-correlations also occur annually and possibly associated with the lunar cycle. Previous ED volumes may be useful in forecasting patient volumes. The time-series approach may discover further ways to predict ED volumes.

Keywords: crowding, time-series, forecasting

P018

A prospective diagnostic support tool for the differentiation of abdominal pain in the adult emergency department population

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Introduction: The chaotic environment of the emergency department has a deleterious effect on clinical judgement. The diagnosis of abdominal pathology is difficult to differentiate. There are also many diagnoses that could be considered abdominal in nature, exacerbating the task of diagnosing these patients. We propose a novel machine-learning method, Hierarchical Structured Models (HSMs), to provide an adjunct to clinician judgement, that provides a ranking of the probabilities of a patient having each of 39 abdominal pathologies, using only variables at the triage stage of emergency department care, and compare its performance to several machine-learning methods. **Methods:** This was a retrospective analysis of 25,861 patients that presented with one of 39 ICD-9 abdominal pathologies. 90% of the data was used to build and fine-tune the model, and 10% was used for testing. Predictors included age, gender, triage vitals and presenting complaint. All variables were solely collected from the Emergency Department Information System (EDIS). A decision tree structure was built using hierarchical clustering algorithms, and then a support vector machine (SVM) was fit at each node. To optimize the parameters for each node, a grid-search method was used to maximize ten-fold classification accuracy. The output of the decision tree was the probability of a particular presentation having each of the 39 diagnoses. This output was translated to a ranking of the relative likelihood of each of the diagnoses as a suggestion system for the treating physician. The accuracy of the system on the test set was compared to conventional machine-learning methods: pair-wise SVMs, gradient boosted models (GBM), neural networks (NN) and k-nearest neighbours (KNN). **Results:** The HSM ranked the correct diagnosis first 51.0% of the time, and ranked the correct diagnosis within the top three ranks 67.6% of the time. The most accurate model was GBMs (52.3%), and the least was neural networks (50.4%). **Conclusion:** The HSM approach using only variables available electronically at triage successfully ranked the correct diagnosis 51.0% of the time, and within the top three 67.6% of the time. Future research will focus on the inclusion of clinically lab results and radiology reports that are available electronically to improve HSM accuracy, and supplement physician diagnosis.

Keywords: machine-learning, artificial intelligence

P019

Understanding patient perceptions of emergency department wait time publication: a mixed-methods needs assessment

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Introduction: Many emergency departments (EDs) have begun publishing wait times. This study seeks to develop an understanding of patients' needs with respect to publishing ED wait times, which, to our knowledge, has not been described in the literature. **Methods:** We conducted a two-stage mixed methods study at a dual campus tertiary care academic center. First, we held focus group discussions comprising of 7 patient advocacy hospital committee members. Themes generated from focus group discussions were then utilized to create a patient survey. Focus groups were analyzed using content theme analysis. Hospital sites for survey administration were randomized and pre-assigned shifts were established to ensure a balance of weekdays, weekends, days, evenings, and overnights. All adult patients (age > 18) in the waiting room were eligible, but excluded if they were directly referred to a specialty service or did not speak French or English. Survey data was analyzed using descriptive statistics. **Results:** We found 9 dominant focus group themes: definition of wait time, wait time posting, lack of communication, education in waiting room, patient expectations, utilization of the ED, patient behavior, physical comfort, and patient empowerment. Of the 240 patient questionnaires administered, 81.3% (195) wanted to know ED wait times before arrival to hospital and 90.8% (217) wanted ED wait times posted in the ED waiting room. The most popular choice for publishing wait times outside the ED was a website (46.7%) whereas, within the ED, patients were not particular about the specific display modality as long as times were displayed (39.6%). Overall, 76.7% (184) stated their satisfaction with the ED would be improved if wait times were posted. **Conclusion:** ED patients we surveyed strongly supported both the idea of having access to wait time information prior to arrival, as well as physical display of wait times in the waiting room.

Keywords: wait-times, patient-centered, waiting room

P020

Paramedic comfort with providing palliative support: pre-implementation survey

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Introduction: Paramedics are sometimes called for crisis management and relief of symptoms or for patients receiving palliative care. To address the mismatch between the system protocols and resources, and patient's goals of care, a new protocol, new medications, and an 8-hour training program Learning Essentials Approach to Palliative Care (LEAP) were implemented in our provincial EMS system. **Methods:** Prior to attending their training session paramedics received an invitation to complete an online survey regarding their comfort, confidence, and attitudes toward delivering palliative care. Comfort and confidence questions were scored on a 4-point Likert scale, while attitudes toward specific aspects of care were scored on a 7-point Likert scale. Descriptive statistics were calculated. Identifiers will permit linkage of these responses to a repeat survey post-implementation. **Results:** 188 (58%) paramedics completed the survey of the 325 who opened the link. 134 (68%) were male with a mean age of 38.5 years. 95 (50%) were primary care paramedics. The average experience as a paramedic was 12.7 years, with an estimated mean number of palliative calls per year of 9.6 each. On a 4 point scale, most (156, 83%) were comfortable with providing care to someone with palliative goals, and 130 (69.1%) were comfortable providing care without transport. Only 82 (43.6%) were confident they had the tools to deliver this care, and 76 (40.4%) were confident they could do so without transport to hospital. On a 7 point scale, paramedics disagreed with the statement "caring for dying persons is not a worthwhile experience for me", median 7 (IQR 5-7). Paramedics also disagreed with the statement "Dying persons make me feel uneasy", median 5 (IQR 4-6). **Conclusion:** Prior to the implementation of the new protocol, medications, and training, most paramedics were comfortable with the concept of providing care with palliative goals and felt that caring for dying persons is a worthwhile experience, but they were not confident that they have the tools and resources to do so. This suggests paramedics would be open to system improvements to meet an unmet healthcare need for crisis management of patients with palliative goals of care.

Keywords: system design, paramedic, expanded scope

P021

Impact of emergency department surge and end of shift on patient workup and treatment prior to referral to internal medicine

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Introduction: The goal of this study was to determine if emergency department (ED) surge and end of shift assessment of patients affect the extent of diagnostic tests, therapeutic interventions performed and accuracy of diagnosis prior to referral of patients to Internal Medicine as well as the impact on patient outcomes. **Methods:** This study was a health records review of consecutive patients referred to the internal medicine service with an ED diagnosis of heart failure, COPD or sepsis, at two tertiary care EDs. We developed a scoring system in consultation with senior emergency and internal medicine physicians to uniformly assess the treatments and investigations performed for patients diagnosed in the ED with heart failure, COPD or sepsis. These scores were then correlated with surge levels and time of day at patient assessment and disposition. Rate of admission and diagnosis disagreements were also assessed. **Results:** We included 308 patients (101 with heart failure, 101 with COPD, 106 with sepsis). Comparing middle of shift to end of shift, the overall weighted mean scores were 92.2% vs. 91.7% for investigations and 73.5% vs. 70.0% for treatments. Comparing low to high surge times, the overall weighted mean scores were 89.9% vs. 92.6% for investigations and 68.6% vs. 71.7% for treatments. Evaluating each condition separately for investigations and treatments according to time of shift or surge conditions, there were no consistent differences in scores. We found overall high admission rates (93.1 % for heart failure, 91.1% for COPD, 96.2% for sepsis patients), and low rates of diagnosis disagreement (4.0 % heart failure, 10.9% COPD, 8.5% sepsis). **Conclusion:** We found that surge levels and end of shift did not impact the extent of investigations and treatments provided to patients diagnosed in the emergency department with heart failure, COPD or sepsis and referred to internal medicine. Admission rates for the patients referred were above 90% and there were very few diagnosis disagreements or diversion to alternate service by internal medicine. We believe this supports the emergency physician's ability to adapt to time and surge constraints, particularly in the context of commonly encountered conditions.

Keywords: Surge

P022

Geriatrics care in the ED: Acute care use after the introduction of an interdisciplinary care program in Sunnybrook Health Sciences Centre's Emergency Department

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Introduction: Currently the top 5% of complex patients consume 84% of Ontario's Hospital and Home Care costs. There is a critical need for a dynamic, person-centred care planning process for medically complex patients with real time dialogue between ED/acute care and community care providers at care transitions. A care pathway was developed in the Sunnybrook Health Science Centre's Emergency Department using quality improvement methodology and team. The purpose of this study is to evaluate the impact of the emergency room huddle for complex care patients on emergency doctors' perceptions of patient safety and ED efficiency measures such as department flow and delays. **Methods: Intervention -** Medically complex patients with frequent ED use are now automatically flagged upon registration in the Emergency Department (ED) and an ED Care Coordination team is notified by secure email: GEM nurse, ED CCAC Care Coordinator, SW, OT/PT. The GEM nurse initiates a comprehensive patient assessment in the Emergency Department right after triage and the CCAC Care Coordinator initiates a teleconference with the patient's family physician and community Care Coordinator with the patient's consent. Usual physician assessment is preceded and followed by an inter-professional huddle (including the EM doctor, GEM nurse, CCAC nurse and SW, OT, PT) to ensure patient's needs, goals and team recommendations are clear. Emergency doctors who have participated in an inter-professional huddle for complex care patients are contacted via a semi-structured interview and Qualtrics surveys evaluating perceptions of patient safety and ED efficiency measures such as department flow and delays. **Results:** Qualitative analysis of the results will be conducted and results updated at a later date. **Conclusion:** Safety is enhanced through better communication between ED providers, patients, their family physicians and community care providers. It is essential that the inter-professional huddle is recognized by emergency physicians as an important element of patient safety and care. An evaluation of ED doctor's perception of the huddle will help us understand enablers and barriers to the process and inspire further quality improvements to enhance patient care.

Keywords: geriatrics, communication, patient-centered care

P023

Code Resus - using a quality improvement approach to improve health care provider response during resuscitations

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Introduction: In order to achieve the best possible outcomes for patients requiring resuscitation (PRRs) in the emergency department (ED), health care providers (HCPs) must provide an efficient, multidisciplinary and coordinated response. A quality improvement (QI) project was undertaken to improve HCP response to PRRs at two tertiary care hospital EDs in Toronto. **Methods:** We conducted a before-and-after mixed-method survey to evaluate the perception of the adequacy of HCP response and clarity of HCP role when responding to PRRs. The results were compared using the Chi-square test. Qualitative responses to the first survey were also used to inform the development of the QI project. Through interviews of key stakeholders and with continuous input from front-line ED HCPs, a multi-disciplinary team modified the ED resuscitation protocol. This included standardized pre-hospital communication form with paramedics, ED-wide overhead announcement of 'Code Resus', dedicated HCPs assigned to respond to PRRs, and specific duties assigned to each responder. Change initiatives were reinforced through education and posters in the ED. Six months after implementation, a second survey was conducted to evaluate the sustained effects of the intervention. **Results:** Baseline measures indicated that 16 of 52 (30.8%) nurses surveyed believed their role was often or always apparent to themselves and others when they attended to a PRR (on a 5-point rating scale). This proportion increased to 35 of 55 (63.6%) nurses in the post-implementation survey ($p < 0.001$). Regarding adequacy of the number of HCPs responding to PRRs, 17 of 39 (43.6%) physicians and 23 of 53 (43.4%) nurses surveyed thought the appropriate number of HCPs responded to PRRs; the remainder thought that there were too few or too many HCPs. In the post-implementation survey, 34 of 41 (82.9%) physicians ($p < 0.001$) and 36 of 56 (64.3%) nurses ($p = 0.029$) surveyed felt that the appropriate number of HCPs attended to PRRs. **Conclusion:** Using a quality improvement approach, we identified and quantified perceived deficiencies in HCP response to PRRs in the ED. Through feedback-based modifications of the ED resuscitation protocol and by engaging HCP stakeholders, change initiatives were implemented to improve HCP response. As a result, this project achieved significant and sustained improvements in HCPs' perceived response to PRRs.

Keywords: quality improvement, resuscitation

P024

Extracurricular podcast use behaviour and effect on knowledge retention in undergraduate medical students

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Introduction: Podcasts have become increasingly popular as a medium for free online access medical education (FOAM). However, little research has examined the naturalistic use of podcasts as a tool in undergraduate medical education. This study aims to determine usage conditions, preferences, and level of retention of information from podcasts by medical students at a Canadian University. **Methods:** Medical students (Years 1 to 3) were instructed to complete an online test assessing their baseline knowledge on the topics of the podcasts and for qualitative data on podcast usage and preferences. Audio podcasts on two topics (adult asthma, and introduction to toxicology) were then distributed to study participants. One week and two weeks after the initial survey students were asked to complete a follow-up survey for knowledge assessment and further podcast usage data. Simple descriptive statistical generated using Microsoft Excel. Paired samples t-tests were utilized to assess knowledge acquisition using Microsoft SPSS version 23. **Results:** Participants who successfully completed the knowledge assessments demonstrated a significant effect of learning (Asthma, average test score improvement of 30%, $p = 0.002$; Toxicology, average test score improvement of 13%, $p = 0.004$). The majority of participants who stated a preference in podcast length indicated they preferred podcasts of 30 or less minutes (85%). The top three activities participants were engaged in while listening to the podcasts were driving (46%), completing chores (26%), and exercising (23%). A large number of participants who did not complete the study in its entirety cited a lack of time and podcast length to be the top two barriers to completion. **Conclusion:** This is one of the first studies to examine podcast usage data and preferences in a Canadian undergraduate medical student population. This information may help educators and FOAM producers to optimize educational tools for medical education.

Keywords: medical education, podcast

P025

Optimizing practice for learning emergency department transthoracic echocardiography using an ultrasound simulator

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Introduction: Emergency department (ED) transthoracic echocardiography (TTE) is an important application of emergency department bedside ultrasound. Given limited curricular hours and economic constraints, training using ultrasound simulators represents an attractive alternative to using live-human models. Despite increased uptake of ultrasound simulator technology, educators lack evidence informing how best to use this technology. Three educational paradigms will be explored in this study: self-guided theory (learners are able to determine when they have had "enough practice"), desirable difficulties (manipulating practice conditions to create more durable and flexible learning), and the challenge point framework (avoiding cognitive overload). The question we seek to answer is: in novice medical trainees, which practice condition leads to improved learning in a test of retention when assessing the ability to generate and interpret a parasternal long axis (PLAX) and apical four-chamber view (A4CH) of the heart? **Methods:** Ultrasound-novices will be recruited from rotators in the ED. Participants will be allocated to one of three groups based on a 2x2 orthogonal design: Group A (variable difficulty × self-determined practice); Group B (variable difficulty × fixed practice); Group C (static difficulty × fixed practice). A standardized didactic lecture will be presented to each participant. Practice conditions with respect to difficulty level (easy, medium, hard) and structure of practice (learner-determined or fixed practice) will vary according to assigned groups. All groups will receive standardized feedback. The ability to identify anatomy and pathology will be assessed. At the conclusion of practice, a post-practice skills assessment and survey will be administered. Two to three weeks later, participants will be retested using three case scenarios. Screenshots of the participant-determined "best image" and video of the performance will be taken to be evaluated by two blinded (to group allocation) reviewers. **Results:** We have currently enrolled 14 participants. We aim to complete enrollment by April 2016. **Conclusion:** We anticipate that our study will provide evidence to inform the best use of ultrasound simulators for teaching TTE in the ED. It will also provide insight into the ability of three educational theories to predict best learning using a novel educational intervention.

Keywords: ultrasound, simulation, echocardiography

P026

Pilot-testing an adverse drug event documentation form prior to its implementation in an electronic health record

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Introduction: Adverse drug events (ADEs), harmful and unintended consequences of medications, account for 1.7M emergency department (ED) visits in Canada each year. Up to 30% are due to unintentional re-prescribing of culprit drugs, partly due to lack of accessible, succinct, and comprehensible ADE information at the time of prescribing. Through a systematic review and workshops with physicians and pharmacists, we designed new ADE documentation fields. Our objective was to pilot-test the fields to anticipate and address problems prior to their integration into an electronic medical record (EMR). **Methods:** We seek to introduce structured ADE documentation into an EMR and PharmaNet, BC's medication-dispensing database, to generate patient-level alerts when attempts to re-prescribe culprit drugs are made. We conducted this qualitative study in the EDs and on the wards of two BC hospitals. The ADE fields collect information about the culprit drug, its effect on the patient, treatment and outcome. We recruited a convenience sample of pharmacists, and distributed paper forms with the ADE fields to them before data collection shifts. We recorded how pharmacists evaluated patients for ADEs and completed the forms. We collected completed forms, and conducted semi-structured interviews for feedback. We analyzed data for common themes using inductive reasoning and constant comparison methods. **Results:** We observed 6 pharmacists documenting 24 ADEs. The field design was perceived as simple, clear, with sufficient detail to capture ADE information. Users identified fields to be omitted (*e.g.,* excess details of culprit drug), modified (*e.g.,* reporting options), or needing clarification (*e.g.,* treatment details). Users were uncertain about what to report when the differential diagnosis included an ADE, but diagnostic uncertainty remained. Thus, ADE fields should enable communication about suspected events and potential alternative diagnoses. Pharmacists required follow-up in some cases to complete their determination (e.g., *C. difficile toxin assay),* emphasizing the need to be able to modify an ADE report. **Conclusion:** Paper-based pilot testing uncovered barriers to ADE documentation, and allowed us to plan for modifications and required linkages between electronic systems. In order to be functional, electronic ADE documentation must be dynamic, representing a departure from previous reporting platforms.

Keywords: patient safety, adverse drug events, electronic medical records

P027

Emergency medical services (EMS) assist-requiring hypoglycemia in Southwest Ontario

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Introduction: Hypoglycemia is a common treatment consequence in diabetes mellitus (DM) and the second most common cause of Emergency Department (ED) visits for adverse drug events. Prior studies have examined the rates of ED visits and inpatient hospitalizations for hypoglycemia. These represent only a small proportion of severe hypoglycemic events, as many do not present to hospital. To date, there have been no Canadian population-based studies examining the rates of EMS assist-requiring hypoglycemia in DM patients in the pre-hospital setting. The objective of this study was to determine the prevalence and describe the EMS assist-requiring hypoglycemia in DM patients in Southwestern Ontario. **Methods:** A population-based retrospective cohort study was conducted on all EMS calls for diabetic emergency from 2008-2014 in Southwestern Ontario, Canada. Data was extracted from the electronic ambulance call records for 11 EMS services in the region. **Results:** There were 9,265 EMS calls for a diabetic emergency (mean age 59 $\pm$ 20 years, 57% male, 82% DM). For 223 calls (2.4%) patients were younger than 19 years of age. The mean blood glucose level on presentation was 2.49 $\pm$ 1.02 mmol/L and 2,116 (24%) call subjects had initial GCS score less than 9. Treatment (intravenous glucose or IM glucagon) was given in 7,126 (77%) calls. There were 3,884 (51 %) hypoglycemia episodes with documented insulin use and 1,436 (19 %) documented oral hypoglycemia agents use. Between 2008 and 2014, rates of calls increased by 7.4% ($p < 0.0001$). Prevalence of hypoglycemia calls during the study period was estimated at 189 per 10,000 diabetes patients per year. In 2,297 (24.8%) instances, the patient refused transport to the ED. **Conclusion:** The rates of EMS assist-requiring hypoglycemia are almost double the rates of hospitalization/ED visits for acute DM complications in our region. Many life threatening episodes of hypoglycemia may go unreported and subsequently not followed by the patient's primary health care provider. Further assessment and proper education following those episodes may help decrease the rate of severe hypoglycemia.

Keywords: hypoglycemia, emergency medical services (EMS)

P028

Implementation of an emergency department outpatient deep venous thrombosis treatment guideline: a quality improvement initiative

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Introduction: Deep venous thrombosis (DVT) is a common diagnosis in the Emergency Department (ED). Despite evidence that Rivaroxaban is non-inferior to the low molecular weight heparin (LMWH) bridge to Warfarin approach for anticoagulation, there is still variability in physician practice. A collaborative ED-Hematology quality improvement initiative, that included a treatment guideline and increased access to a thrombosis clinic, was introduced to guide anticoagulation. **Methods:** A retrospective chart review of ED patients with DVT one-year pre (April 1, 2013-March 31, 2014) and one-year post (April 1, 2014-March 31, 2015) implementation of an outpatient DVT treatment guideline was conducted. Primary outcomes were percentage of patients discharged from the ED on Rivaroxaban or LMWH/Warfarin. Secondary outcomes included mean ED length of stay (ED LOS), mean number of return ED visits per patient and percentage of thrombosis clinic referrals. Balance measures included percentage of return ED visits with pulmonary embolism (PE) within one month and percentage of return ED visits with bleeding (major bleeding or clinically relevant non-major bleeding) due to anticoagulation use. Clinical and administrative data was extracted with 15% independently reviewed for inter-rater reliability. **Results:** 95 patients met inclusion criteria (52 patients pre and 43 post guideline implementation). The prescribing of Rivaroxaban increased from 9.6% (5/52) to 62.7% (27/43). Mean ED LOS for the Rivaroxaban group was 7.5 hours (95% CI, 5.8-9.2) versus 10.0 hours in the Warfarin group (95% CI, 8.5-11.4) [$p = 0.04$]. The mean return ED visits for the Rivaroxaban group was 0.2 (95% CI, 0-0.3) versus 3.9 in the Warfarin group (95% CI, 3.2-4.6) [$p < 0.001$]. The thrombosis clinic referrals increased from 29.5% (13/44) to 86.0% (37/43). There was one PE

diagnosed in the Warfarin group within one month of treatment and zero in the Rivaroxaban group. There were 7.9% (5/63) return visits for bleeding in the warfarin group and 3.1% (1/32) in the Rivaroxaban group. **Conclusion:** By implementing an outpatient DVT treatment guideline at our academic center, we increased the prescribing of Rivaroxaban. This significantly decreased both the ED LOS and return ED visits in the Rivaroxaban group. There was also a threefold increase in referrals to a thrombosis clinic. This was all achieved without increasing patient harm.

Keywords: deep vein thrombosis, quality Improvement, anticoagulation

P029

A novel use of a point-of-view camera for teaching lateral canthotomy and cantholysis to emergency physician trainees

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Introduction / Innovation Concept: Orbital compartment syndrome (OCS) is a vision threatening ocular emergency that occurs when there is a sudden rise in orbital pressure resulting in damage to intraocular structures. Lateral canthotomy and cantholysis (LCC) is a simple procedure used to decompress the orbit. Emergency physicians should be comfortable evaluating and diagnosing OCS, and performing a LCC to decrease the risk of vision loss in the event that consultation and intervention by an ophthalmologist is not possible in a timely manner. Developing this skill is challenging as this procedure is seldom performed, therefore resources need to be available. Current training videos are an excellent learning tool but are limited by several factors, such as not capturing from the perspective of the physician performing the procedure. Point-of-view (POV) cameras show the physician's perspective, which is more conducive to training as it mimics the experience for trainees. We report our novel technique of recording a LCC using a head-mounted POV camera as a resource for emergency physician trainees in learning this procedure. **Methods:** We used a head mounted POV GoPro Hero 4 Silver camera (GoPro, San Mateo, CA, U.S.A.) with a modified 5.4mm f/2.5 aftermarket lens with a 60° field of view (Peau Productions Inc, San Diego, CA, U.S.A.). This lens was pre-focused to a working distance of 17 inches, set to 1080P on narrow recording at 48 frames per second, and had spot metering and the low light functions turned on. The camera functions were controlled remotely by an assistant with the use of GoPro App on a tablet computer to ensure proper framing of the camera. **Curriculum, Tool, or Material:** Our novel use of a POV camera for recording LCC is an efficient, cost effective tool useful for medical education at an academic institution as well as a valuable resource for emergency room clinicians. The POV recording system can be a training device in an emergency setting for performing a LCC or other procedures that emergency physicians may seldom encounter. **Conclusion:** Point-of-view cameras have great potential in assisting the education at the post-graduate level within residency training programs. Video recording from the physician's perspective simulates the experience for trainees and could leave them feeling more confident in their ability to perform the procedure.

Keywords: innovations in EM education, simulation, online educational resources

P030

The FAN study: intranasal fentanyl and inhaled nitrous oxide for fracture reduction

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Introduction: Recently, intranasal (IN) fentanyl and inhaled nitrous oxide/oxygen (N_2O) mixture have been increasingly used for procedural sedation and analgesia (PSA) alone or in combination. There is a lack of data on the efficacy of these combined agents. **Methods:** The objective was to evaluate the efficacy of IN fentanyl and N_2O as PSA for the reduction of mildly-to-moderately displaced fractures and dislocations. We performed a prospective, observational cohort study between September 2014 and October 2015. Patients were recruited at CHU Sainte Justine (Montréal) and Royal Children Hospital (Melbourne, Australia). Patients aged 4 to 18 years were eligible if PSA consisted of IN fentanyl and N_2O for the reduction of mildly-to-moderately displaced fractures or dislocations. Patients received at least IN fentanyl 1.5 mcg/kg (100 mcg max) and at least a 50/50% mixture of N_2O with oxygen. Primary outcome was the efficacy of PSA measured by the patient assigned Facial Pain Scale-Revised (FPS-R). The Face, Legs, Activity, Cry, Consolability (FLACC) scale was also recorded. Depth of sedation was evaluated using University of Michigan Sedation Scale (UMSS). Adverse events were recorded following criteria of the Consensus Panel on Sedation Research of PERC/PECARN. Additional data concerning satisfaction or discomfort were evaluated via questionnaires, and follow-up telephone calls were made to elicit information on adverse events after discharge. **Results:** A total of 91 patients aged 9.7 $\pm$ 3.0 years were enrolled. There was no difference between the median FPS-R score during the procedure compared to before: Median 2 and 2 (median difference 0 [95% CI 0, 0]), respectively. The FLACC score was higher during the procedure than before: Median 4 and 0 (median difference 2 [95% CI 1, 3]). UMSS was 1 (95% CI 1, 2) during the procedure. 42 (46%) patients had adverse events, all mild: vertigo (20%), nausea (16%)]or vomiting (12%). A total of 85/88 (97%) parents and 82/85 (96%) ED physicians would want the same sedation in another procedure. **Conclusion:** PSA with IN fentanyl and N_2O seems effective in our study, as evaluated by patient assigned FPS-R. Patients were minimally sedated. Adverse events were frequent but mild. Overall, parents and medical staff would want the same agents used in another procedure. Thus, PSA with IN fentanyl and N_2O appears to be an attractive option for reduction of mildly displaced fractures or dislocations.

Keywords: procedural analgesia and sedation, fracture reduction, intranasal fentanyl

P031

Assessing differences between high- and low-performing resuscitation team leaders using gaze-tracking technology

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Introduction: Crisis decision-making is an important responsibility of the resuscitation team leader but a difficult process to study. The purpose of this study was to evaluate visual and behavioural differences between team leaders with different objective performance scores using gaze-tracking technology. **Methods:** Twenty-eight emergency medicine residents in different stages of training completed four simulated resuscitation scenarios. Participants wore gaze-tracking glasses during each station. An outside expert blinded to participant training level assessed performances using a validated assessment tool for simulation scenarios. Several visual endpoints were measured, including

time, frequency, order, and latency to observation of task-relevant and task-redundant items. Non-visual endpoints included behaviours such as summarizing, verbalizing concerns, and calling for definitive treatments, among others. **Results:** Preliminary findings suggest significant differences between high and low performers. High performers check vitals signs faster, and look at patients and vital signs more often than low performers. Low-performing leaders display a more fixed gaze when starting a scenario. Lastly, high performers summarize, verbalize concerns, predict and prepare for future steps, and call for definitive treatment more often than low performers. **Conclusion:** There are significant differences between high and low-performing resuscitation team leaders in terms of their visual and behavioural patterns. These differences identify potential focus points for competency evaluations, and may direct educational interventions that could facilitate more efficient development of expertise. The potential to study crisis decision-making behaviours and performances using the methods and metrics identified, both in simulated and real-world settings, is substantial.
Keywords: simulation, resuscitation, gaze-tracking

P032
ISAEM and the push for emergency medicine worldwide
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Introduction: The International Student Association of Emergency Medicine (ISAEM) is a non-profit organization composed of medical students and student groups who believe that everyone deserves high-quality emergency care. Our aim is to promote and foster the concept, philosophy, and art of Emergency Medicine (EM). More specifically, we seek to 1) create an international network of medical students interested in EM, 2) support EM Interest Groups (EMIGs) and medical students in accomplishing their goals, 3) call for the recognition of EM as an independent specialty in countries where it does not exist, 4) help medical students learn, practice, and advance EM in countries where it is already established, and 5) carry out international projects for the benefit of medical students interested in EM. **Methods:** ISAEM tries to accomplish its goals primarily by connecting interested medical students and EMIGs with each other, as well as with EM professionals and organizations around the world. Additionally, we support medical students and EMIGs financially, offer them extensive benefits through a free membership, represent their local interests through our National Ambassadors, and advocate on their behalf at the local, national, and international level. **Results:** ISAEM's membership base is rapidly growing and our organization is currently represented by students in over 20 countries. In areas where the specialty of EM is not yet recognized, such as in Cameroon, ISAEM helped create the first EMIG and assists students with local projects. In countries where EM is new, such as Brazil, ISAEM helps students discover, explore, and advance this specialty. In countries where EM is thriving, like Canada, ISAEM offers students academic and personal opportunities to advance their careers and the specialty of EM internationally. Additionally, with the help of EM leaders worldwide, ISAEM has recently launched the FOAMed (Free Open Access Medical education) Translation Project and the International Observership Program. In the future, we aim to offer students international research, clinical, and mentorship programs, as well as more financial support. **Conclusion:** ISAEM is the international voice of medical student interested in promoting access to and expertise in emergency medical services worldwide. Through international collaboration, we hope to create an extensive network that will benefit medical students and the specialty of Emergency Medicine for many years to come.
Keywords: international, students, global

P033
Engaging Indigenous patients in addressing cultural safety in an emergency department: a pilot initiative
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Introduction: Cultural safety is integral to good clinical care, particularly for Indigenous patients. However, it remains poorly defined in emergency department care (ED). Practitioners at an urban Canadian ED serving a significant Indigenous population sought to engage with the community to define areas for improvement in culturally safe emergency department care. **Methods:** A participatory action approach was used. A Steering Committee was created, including emergency clinicians and Indigenous health researchers. The Committee collaborated with a local Indigenous health study (Our Health Counts) to aid recruitment. Relevant Indigenous community organizations were identified and engaged via email and personal visits. Recruitment posters were placed in common areas at community sites and the ED. Convenience and snowball sampling was used - potential participants called an ED research coordinator and inclusion criteria were confirmed (self identify as Indigenous, >18 years old, ED visit within the past year). Eligible participants were invited to attend a focus group facilitated by an Aboriginal Elder. **Results:** 31 individuals called to enroll for a total of 4 potential focus groups. 1 was successfully held: 5 participants were confirmed, 2 attended. Many recruitment challenges were identified, including difficulty maintaining contact/follow-up with a transient population, poster dissemination before recruitment start date, non-Indigenous patients attracted by compensation, and potential participant safety concerns regarding non-Indigenous contact point. **Conclusion:** Our initiative highlights challenges in engaging vulnerable populations in a large city. Focus groups may be logistically too challenging for this transient population. Other real-time data collection methods, such as phone interviews or surveys may be promising. An Indigenous contact point would likely improve perceived safety. The lack of socio-demographic data collection makes identifying potential participants challenging.
Keywords: Indigenous/Aboriginal health, emergency department, cultural safety

P034
Réanimation cardio-pulmonaire sans période de "no-flow": un nouveau dispositif
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Introduction: La b-card (Boussignac Cardiac Arrest Resuscitation Device) est un dispositif permettant d'assurer une oxygénation passive continue lors des manoeuvres de compressions/décompressions réalisées dans le cadre d'un arrêt cardiaque. Ce dispositif fonctionne par création d'une valve virtuelle induite par l'accélération d'un débit d'oxygéne via des micro-canalicules. Cette valve est censée s'opposer aux flux de gaz entrant et sortant de la cage thoracique lors des compressions/décompressions. Elle permettrait d'obtenir une pression positive intra thoracique lors des compressions, et une pression intra thoracique négative lors des décompressions. L'expérimentation conduite a pour but de mesurer la pression statique créée dans le dispositif par le débit d'oxygène, ainsi que les valeurs de pressions et de flux générés en intra thoracique. **Methods:** La b-card est almimentée par

un débit d'oxygène de 15 L/min, et connectée via différentes interfaces à un poumon test pourvu de capteurs:
-Capteur de pression des voies aériennes (PAW en cm H_2O).
-Capteur de débit au niveau des voies aériennes.
-Capteur de pression "intra thoracique" (PIT max et min; et Pression Expiratoire Intra Thoracique).
Les mesures sonrt effectuées sans b-card, puis avec b-card connectée à un masque facial, un masque laryngé, une sonde trachéale.
Results: La pression "statique", celle de la valve virtuelle, mesurée au niveau de la b-card reste stable à 6 cm d'H2O, sous un débit de 15 L/min. Elle permet une résistance à hauteur de cette valeur aux flux de gaz entrant ou sortant du thorax expérimental en fonction des compressions/décompressions. Les pressions intra thoraciques positives mesurées lors des compressions restent équivalentes autour de 25 à 30 cm H_2O, et ce quelle que soit l'interface utilisée. Les pressions intra thoraciques négatives mesurées lors des décompressions restent équivalentes autour de 10 à 15 cm d'H_2O, et ce quelle que soit l'interface utilisée. **Conclusion:** Les pressions intra thoraciques obtenues en associant une oxygénation passive par la b-card à des compressions/décompressions continues permettent d'assurer une ventilation efficace et synchrone. Les pressions mesurées au niveau du dispositif sont constamment inférieures à la pression d'ouverture moyenne oesophagienne, ce qui éviterait toute insufflation gastrique.
Keywords: arrét cardiaque, oxygénation passive, compressions thoraciques continues

P035

Optimization of indirect pressure to temporize life-threatening haemorrhage: a simulation study

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Introduction: Minimizing haemorrhage using direct pressure is intuitive and widely taught. In contrast, this study examines the use of indirect-pressure, such as external aortic compression which has been identified as an immediately applicable maneuver to address the leading cause of battlefield mortality: junctional hemorrhage. However, it is currently unclear how to optimize this technique. **Methods:** This prospective, block-randomized, cross-over simulation study of compression optimization was performed on a model of central vessel compression that recorded weight (lbs) and pressure (mmHg). Forty participants simulated external aortic compression on the ground as well as a stretcher with and without a backboard. Participants were blinded to compression weight and pressure, as well as the purpose of the study, to minimize preparation bias. Manoeuvres were performed in alternating order to control for skill acquisition and fatigue. Scripted instructions were followed to compress with 1 then 2 hands, and to apply "sustainable effort" and then "maximal effort". **Results:** The greater the compressor's bodyweight the greater their mean compression (Pearson's correlation 0.9342). Using one-hand, a mean of 28% participant bodyweight (95%CI, 26% - 30%) could be transmitted at sustainable effort, waist-height, and on a stretcher. A second compressing hand increased rescuer bodyweight transmission by 10-22% regardless of other factors (i.e. presence/absence or a backboard; rescuer position) ($p < 0.001$). Adding a backboard increased transmission of rescuer bodyweight 7%-15% ($p < 0.001$). Lowering the patient from waist-height backboard to the floor increased transmission of rescuer bodyweight 4%-9% ($p < 0.001$). Kneeling on the model was the most efficient method and transmitted 11% more weight compared to two-handed maximal compression ($p < 0.001$). **Conclusion:** Efficacy is maximized with larger-mass, two hands, and compression on hard surfaces/backboards. Knee compression is most effective and least fatiguing, thus assisting rescuers of lower weight and lesser strength, where no hard surfaces exist (i.e. no available backboard or trauma on soft ground), or when lengthy compression is required (i.e. remote locations). This study demonstrates the feasibility of indirect pressure as a potential temporizing measure for life-threatening haemorrhage not amenable to direct compression.
Keywords: junctional trauma, hemorrhage, prehospital care

P036

A clinical decision support intervention to increase usage of probenecid in the ED

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Introduction: In certain circumstances, skin and soft tissue infections are managed with intravenous (IV) antibiotics. In our center, patients initiated on outpatient IV antibiotics are followed up by a home parental therapy program the following day. A significant number of these patients require a repeat visit to the ED because of clinic hours. Probenecid is a drug that can prolong the half-life of certain antibiotics (such as cefazolin) and can therefore avoid a repeat ED visit, reducing health care costs and improve ED capacity. Our goal was to increase probenecid usage in the ED in order to optimize management of skin and soft tissue infections (SSTI) in the ED. The primary outcome was to compare the usage of probenecid in the pre and post-intervention phase. Secondary outcomes were to compare revisit rates between patients receiving cefazolin alone vs cefazolin + probenecid. **Methods:** Using administrative data merged with Computerized Physician Order Entry (CPOE), we extracted data 90 days pre- and 90 post-intervention (February 11, 2015 to August 11, 2015). The setting for the study is an urban center (4 adult ED's with an annual census of over 320,000 visits per year). Our CPOE system is fully integrated into the ED patient care. The multi-faceted intervention involved modifying all relevant SSTI order sets in the CPOE system to link any cefazolin order with an order for probenecid. Physicians and nurses were provided with a 1 page summary of probenecid (indications, contra-indications, pharmacology), as well as decision support with the CPOE. Any patients who were receiving outpatient cefazolin therapy were included in the study. **Results:** Our analysis included 2512 patients (1148 and 1364 patients in the pre/post phases) who received cefazolin in the ED and were discharged during the 180 day period. Baseline variables (gender, age, % admitted) and ED visits were similar in both phases. In the pre-intervention phase 30.2% of patients received probenecid and in the post-intervention phase 43.0%, for a net increase of 12.8% ($p = < 0.0001$). Patients who received probenecid had a 2.2% (11.4% vs 13.6%, $p = 0.014$) lower re-visit rate in the following 72H. **Conclusion:** We have implemented a CPOE based clinical decision support intervention that demonstrated significant increase in probenecid usage by emergency physician and resulted in a decrease in ED revisits. This intervention would result in health care cost-savings.
Keywords: probenecid, decision support, infection

P037

The impact of fever on corrected QT interval in a general emergency department population

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Introduction: Fever is one of the most common reasons for presentation to the emergency department (ED). Interestingly, a number of small

studies suggest that fever may function as a modulator of the QT interval in healthy individuals and an arrhythmogenic trigger in patients with occult congenital QT abnormalities. The objective of this study was to explore whether presence of fever adversely affects the QT interval, and whether medications known to prolong this interval affect any association found. **Methods:** We performed a retrospective, single center study identifying patients (age > 18 years) presenting to the ED with fever (temperature > 38.0 °C) between January 1st, 2012 and December 31st, 2013 via electronic chart review. The subset for analysis were those who had an ECG both at time of fever and while afebrile (within 30 days of initial ECG). Temperature measurement was within 30 minutes of ECG. Actively paced patients were excluded. Univariate and multiple regression analysis were used to determine risk factors for QT derangement in patients with fever. **Results:** 2018 febrile visits occurred during the reviewed period, 181 of these patients went on to be included in the study. 54.1% of study subjects were female, and the average age was 68.9 years old. The etiology of fever was predominately infectious (69.6%), with community acquired pneumonia being the most frequent cause (24.3%). We found the median corrected QT interval to be significantly shorter in febrile as compared to afebrile patients [QTc = 388.7ms, (371.5-407.5) vs 406.7, (386.7-434.4); p < 0.001]. This difference was observed in both sexes. Males were found to be more likely to experience medication induced QTc prolongation [OR 5.35, 95% CI = 1.46 - 19.68; P < 0.05]. Two instances of Torsades de pointes were identified in our study, both occurring in males on QT prolonging medications. **Conclusion:** In an ED patient population, fever generally shortens the QT interval independent of sex. Prolongation of the QT interval during fever should thus increase clinical suspicion of congenital or acquired QT disorders. Additionally, males appear to be more susceptible to medication-induced derangements in the QT interval and may require more vigilant monitoring when treated with multiple QT prolonging medications.

Keywords: arrhythmia, fever, QT interval

P038

How frequently is hypoglycemia found in ambulance calls for "seizure"?

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Introduction: Paramedics often attend seizure patients in the pre-hospital setting. Received wisdom is that hypoglycemia is frequently present during a seizure or is a 'cause' of seizures. Recent literature disputes this. The purpose of this study was to determine the frequency of hypoglycemia in patients identified as having "seizure" listed as the primary or final problem code in Ambulance Call Reports from a large regional paramedic base hospital program. **Methods:** Retrospective analysis of a database of ambulance call reports (ACRs) from January 01-December 31, 2014. All 2854 ACRs with paramedic determined primary or final problem codes of "seizure" were identified from a database of all calls performed by 8 municipal paramedic services covering a total urban and rural population of 1.4 million. Municipal paramedic services used iMedic electronic ACRs. A 10% sample generated by a random number table was analyzed. ACRs were manually searched and data extracted onto spreadsheets. Results were described using frequencies and summary statistics. **Results:** A total of 285 call were analyzed. 207 (72.6%) calls were adults and 78 (27.4%) were paediatric (age < 18). Seizures were witnessed by paramedics in 23/285 (8.1%) calls; adults 17/207 (8.2%), paediatric 6/78 (7.7%). A blood sugar was determined in 237/285 (83.2%) of all calls; adults 182/207 (87.9%), paediatric 55/78 (70.5%). In calls were paramedics witnessed a seizure a blood sugar was determined 17/21 (80.9%) of the time; adults 13/17 (76.5%), paediatric 6/6 (100%) Hypoglycemia (BS < 4.0 mm/L) was found in only 1 case - 1/237 (0.4%); adults 0/ 207 (0%), paediatric 1/78 (1.3%). The child was age 1, had a GCS 13, and the blood sugar was 3.9 mm/L. **Conclusion:** Hypoglycemia was rarely found in patients who had a seizure and were attended to by paramedics in the pre-hospital setting. The routine determination of blood sugars in all patients who have had a seizure prior to paramedic arrival should be reconsidered.

Keywords: hypoglycemia, seizure, paramedic

P039

What are the frequencies of interventions performed by paramedics during seizure calls?

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Introduction: Paramedics frequently attend out-of-hospital seizure patients. They administer oxygen, check blood glucose levels and if within scope of practice, start IVs and administer benzodiazepines. Little is know about how frequently these procedures are performed. The objective of this study was to determine the frequency of procedures performed by paramedics (Advanced Care (ACP), Primary Care IV (PCP-IV) and Primary Care non-IV (PCP)) attending seizure patients in a regional paramedic base hospital program. **Methods:** Retrospective analysis of a secondary database of ambulance call reports (ACRs) (January 01-December 31, 2014). All 2854 ACRs with paramedic determined primary / final problem codes of "seizure" were identified from total calls performed by 8 municipal paramedic services (MPSs), covering an urban and rural population of 1.4 million. MPSs used iMedic electronic ACRs. A 10% sample, generated using a random number table, was analyzed. ACRs were manually searched and data extracted onto spreadsheets. Findings were summarized using descriptive statistics. **Results:** 285 calls were analyzed; (adult 72.7%, paediatric (age < 18) 27.3%). Paramedics witnessed seizures in 8.1% of all calls they attended; (paediatric 7.8%). The blood sugar was checked in 87.9% of adult calls; (ACP 88.7%, PCP-IV 89%, PCP 77.8%) and in 70.5% of paediatric calls; (ACP 72.0%, PCP-IV 63.3%, PCP 70.5%). Oxygen was administered in 80.7% of adult calls; (ACP 85.9%, PCP-IV 78.0%, PCP 80.7%) and 83.3% of paediatric calls; (ACP 92.0%, PCP-IV 80.1%, PCP 82.4%). IVs were started by paramedics (if in scope of practice) in 28.0% of adult calls; (ACP 47.9%, PCP-IV 16.1%) and 6.6% of paediatric calls; (ACP 8.0%, PCP-IV 5.6%) Midazolam was administered in 10.4% of ACP attended calls and in 91.0% of the calls were they witnessed seizures. Transport occurred in 93.2% of adult calls and 100% of paediatric calls. **Conclusion:** ACPs were more likely to perform procedures on seizure patients than PCPs or PC-IVs. Children were much less likely to have procedures performed on them - blood sugar checks, and IV starts - but more likely receive oxygen and be transported. These findings have training implications.

Keywords: paramedic, seizure, procedure

P040

Development of a categorization tool for delayed hemothoraces in patients with closed minor thoracic trauma

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Introduction: Thoracic trauma is, depending on severity, a frequent cause of mortality, morbidity, hospitalization and incapacity. Minor

closed thoracic injuries are often discharged from Emergency Departments (ED) and treated on an outpatient basis. One potential complication is the development of a delayed hemothorax (DHx). Currently, there exists no consensus on the best method for classifying DHx. The goal of this study is to evaluate the level of interrater and intrarater agreement with respect to three classification schemes for DHx. **Methods:** This was a secondary analysis drawn from a prospective multicenter cohort study of consecutive patients presenting to one of four Canadian ED for minor closed thoracic trauma over a four-year period. Using intraclass correlation (ICC), chest radiographs of 50 patients previously diagnosed with new DHx within 2 weeks of discharge were randomly selected and subjected to analysis by emergency physicians, radiologists, surgeons and family physicians using three different methods of classification to study their reliability, both between raters and for the same rater on two separate evaluations, at determining hemothorax severity. **Results:** Analysis of ICC values demonstrates poor interrater agreement (Global ICC 0.44, 0.35-0.52) for the current classification method, based on professional experience and opinion. The second method, based on hemothorax / total thorax ratio calculation, showed good Global ICC (0.58, 0.49-0.67) on lateral films. The third method, based on presence / absence of overflow from the costo-phrenic angle, showed equally good Global ICC (0.56, 0.47-0.64) on postero-anterior films and was more homogenous across the four different groups of physicians. **Conclusion:** Our results demonstrate that the current method used to classify DHx, based on gestalt, shows poor interrater agreement. Two innovative classification methods achieved good interrater agreement. Future studies, analyzing possible correlation of this more reliable classification method to objective, clinical measures would be of value to management decisions.

Keywords: delayed hemothorax, minor chest trauma, classification

P041

Accuracy of medical student-performed point-of-care ultrasound in the diagnosis of distal radius fractures in adults

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Introduction: Previous investigations of the diagnostic accuracy of point-of-care ultrasound (POCUS) in distal radius fractures (DRF) report a wide range of sensitivities (71%-98%) and specificities (73%-100%) when performed by medical professionals, which may reflect inconsistencies in POCUS training or sonographer experience. The purpose of this study was to determine the accuracy of POCUS performed by pre-clerkship medical students with minimal POCUS training compared to standard radiography in diagnosing DRF in adult patients with traumatic wrist injuries, in order to assess POCUS as an alternative to traditional radiographic imaging. **Methods:** This prospective observational study was conducted from June to September 2015. The study population consisted of adults presenting to the emergency department (ED) with distal forearm pain secondary to traumatic injury within the past seven days and for whom radiographic imaging was ordered. Patients were evaluated using POCUS performed by medical students with no prior experience who had received one hour of POCUS training taught by an emergency ultrasound fellowship-trained ED physician. A pre-test probability of fracture was stratified as low or high and documented independently by the treating physician. Students were blinded to pre-test probability and radiography results. **Results:** Of the 52 patients enrolled, 18 had DRF diagnosed by radiographic imaging. Compared to radiography, student-performed POCUS had 72% overall sensitivity (95% CI, 47%-90%) and 85% specificity (95% CI, 69%-95%), with 81% overall accuracy. In the high pre-test probability group (N = 20), POCUS had 80% sensitivity (95% CI, 52%-96%) and 60% specificity (95% CI, 15%-95%). In the low pre-test probability group (N = 32), POCUS had 33% sensitivity (95% CI, 1%-91%) and 90% specificity (95% CI, 73%-98%). **Conclusion:** POCUS performed by medical students demonstrated reasonable success in diagnosing DRF, with overall sensitivity and specificity in keeping with published data. Within the low pre-test probability group, the diagnostic accuracy of POCUS suggests that ultrasound was an unreliable alternative to radiographic imaging for DRF in this cohort. Future analysis of the factors leading to DRF missed by POCUS as being related to adequacy of POCUS training, image capture, or sonographer experience will further explore the utility of POCUS as a diagnostic alternative.

Keywords: point-of-care ultrasound (PoCUS), diagnostic accuracy, distal radius

P042

Use of technology to create economically sustainable supplemented triage: a feasibility study at an urban tertiary care centre

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Introduction: Decreasing patient Length of Stay (LOS) in the Emergency Department (ED) improves patient safety. Numerous studies have taken differing approaches to supplementing care at triage in order to decrease LOS, however, have not proven to be financially sustainable. The goal of this study was to explore financially viable options to expedite care in a safe way and reduce patient LOS. **Methods:** The ED process chain was identified. Two reviewers observed triage for a 4-hour period following patients. Times from patient arrival to: completion of triage, completion of registration, test ordering, physician assessment and final disposition were measured. Results were presented at departmental rounds. Nursing staff, Physician Assistants, Residents and Physician staff were paired in interdisciplinary groups to brainstorm and trial approaches to expedited test ordering and use of technology to carry out orders. **Results:** Triage interruptions increased time to triage a patient up to 3 times baseline, and 33% of triage interactions were interrupted. A bottleneck occurred at registration, increasing time to be registered by up to 30 minutes. Also, registration is using antiquated technology, significantly increasing registration time. Average patient LOS was 249 min, but was only 120 min if there was no delay in test ordering for patients. Average time for MD disposition was 129 min, but was only 47 minutes if there was no delay in ordering tests. Brainstorming lead to the following ideas: 1) use of companion phones to access already-working ED MD for test ordering and ECG interpretation 2) the use of the computer system to flag new orders or ECG for triage patients 3) use of a dedicated iPad in zones 4) increased standing orders for RNs to order diagnostic imaging. **Conclusion:** Patient LOS was reduced by lack of delay in test ordering, in keeping with previous studies. Numerous points in the process chain were identified for creating an economically sustainable supplemented triage to improve patient flow. These were: interruptions to triage, registration bottleneck, technology at registration, test ordering at triage. Ways in which to effectively order tests at triage include: MD-companion phones, pre-existing computer program, dedicated iPad in zones. The next step in this study is to trial each of these low-cost technologies.

Keywords: supplemental triage, technology, economic feasibility

P043

Education innovation: a postgraduate emergency medicine musculoskeletal medicine curriculum

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Introduction / Innovation Concept: Musculoskeletal medicine (MSKM) complaints account for a significant portion of emergency room visits. Furthermore, MSKM diagnostic and management skills are poorly taught in undergraduate medicine and emergency medicine (EM). Here, we successfully developed an MSKM curriculum resulting in objectively improved resident acumen. **Methods:** Curriculum development was achieved by surveying local EM residents on their perceived MSKM deficits, and effective MSK teaching strategies. A literature search was also completed identifying MSKM teaching shortcomings. Finally, orthopaedic surgeons were asked which clinical entities they thought should be emphasized in our curriculum. **Curriculum, Tool, or Material:** A case-based MSKM curriculum was created. Cases emphasized commonly occurring emergency department presentations, topics that EM practitioners self-identified as requiring further teaching, commonly missed problems at first presentation, and high-risk cases if mismanaged. Curriculum implementation consisted of three, half-day, workshops. Workshops included didactic lectures, MSKM physical exam practice, and MSKM cases. MSKM cases required resident history taking and physical exam practice, radiography interpretation, and management plan formulation. Objective assessments of resident MSKM knowledge and skill were given to the learners before and after the workshops. Survey questions were grouped into 3 categories: MSK assessment, investigation, and management. Questions were scored on a 5-point Likert scale, ranging from "not at all confident" to "very confident". A Wilcoxon Signed Rank Test indicated statistically significant improvement in learner confidence within all three domains after the first workshop ($n = 19$ learners; assessment: $p < 0.001$, investigation: $p < 0.001$, management: $p < 0.001$), and after the second workshop ($n = 24$ learners; assessment: $p < 0.001$, investigation: $p < 0.001$, management: $p < 0.001$). **Conclusion:** We successfully incorporated MSKM teaching into our academic curriculum based on previously identified weaknesses, resulting in improved resident MSKM case management. Further MSKM teaching sessions and evaluations to facilitate knowledge and skill maintenance are currently under development.
Keywords: innovations in EM education, curriculum, medical education

P044

HEADSTRONG: helmet education, advocacy, distribution & social media trial to reduce obstacles & nudge group behaviour

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Introduction: Head injury is a major cause of bicycling-related disability and death, and more likely to occur in unhelmeted riders. Legislation regarding helmet use varies by province. In Ontario, helmet use is not mandatory for cyclists >= age 18, and approximately 50 % of adult cyclists do not routinely wear helmets. Non-legislative approaches to increase helmet use have included education, public health campaigns, and helmet giveaways, but sustained effect is typically limited. The goal of the HEADSTRONG Behaviour Study is to identify injured adult cyclists who do not regularly wear helmets, and effect *sustained* helmet use. The strategy incorporates evidence-based elements of health behaviour change, including: reducing barriers, education and modelling, providing necessary materials, and social support. **Methods:** Prospective cohort study in downtown Toronto teaching hospital, launched Nov 2015. ED clinician (EP or NP) will recruit injured cyclists (consecutive, convenience sample) who report not regularly wearing a helmet nor owning a suitable one. Study endpoint: 100 enrolled (to estimate prevalence of usage of +/- 10%, alpha 0.05, power > 90%, assuming 80% study completion and 50 % helmet wearing at 12 months). Exclusion criteria: unable to consent, admitted to hospital, age <18. Each element of the HEADSTRONG Behaviour Strategy is intended to facilitate patient adoption and maintenance of the desired behaviour, including: 1) enrolment/education by research associate while still in the ED; 2) provision and fitting of a free bicycle helmet; 3) social contract commitment and tailored reminders to document ongoing helmet use: participant agrees to respond to brief electronic survey follow-ups at two weeks, two months, six months, and twelve months; 4) social media engagement with participation in the HEADSTRONG Twitter group, which engages other enrolees and cycling advocacy groups; 5) peer nomination: the participant who is complying with the social contract is encouraged to nominate an uninjured non helmet-wearing colleague to enrol in the study. **Results:** Primary outcomes include: recruitment rate, enrolment, and sustained participation through follow-up period. Secondary outcomes include age, gender and social demographics of helmet recipients, and participation of peers. **Conclusion:** Discussion of strategy and interim results at six month interval will be presented at CAEP.
Keywords: injury prevention, bicycling, helmets

P045

What do we know about pediatric palliative care patients who consult the emergency department?

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Introduction: There is very little data about pediatric palliative care (PPC) patients' visits to the emergency department (ED). This study's goal was to determine the characteristics of PPC patients who consult the ED. **Methods:** A five-year retrospective chart review, conducted at a tertiary care pediatric university-affiliated hospital. Eligible patients initially consulted with the PPC team between April 1st 2007 and March 31st 2012. For each eligible patient, ED visits between these dates were included, using the ED's electronic data system. Data about each visit was drawn from the electronic data system and the patient's medical chart. This study was IRB approved. **Results:** During the study period, 290 new patients were followed by the PPC team; of these, 94 (32.4%) consulted the ED at least once (total of 219 visits). The median number of visits per patient was 2 (range: 1-8). Patient median age was 7 years 5 months (range: 1 month-22 years) and most common baseline diagnoses were: oncological diagnosis (39.4%), encephalopathy (27.7%) or genetic/chromosomal anomaly (13.8%). No patients died in the ED, but 36 (38.3%) died during the episode of care following one of their ED visits and 18 (19.1%) of them died within 72h of admission. PPC patients presented to the ED 219 times acutely ill: 11.4% of visits were triaged CTAS (Canadian Triage and Acuity Scale) level 1, 39.3% CTAS 2, 39.3% CTAS 3 and 10% CTAS 4 or 5. Many patients (37.9%) arrived by ambulance, 24.2% were admitted to the resuscitation room. Most patients consulted during day (45.2%) or evening (41.1%) shifts. Median length of stay was 3h50min (range: 13min - 15h10min). Reasons for consultation were respiratory distress/dyspnea (30.6%), pain (12.8%), seizure (11.4%), fever (9.1%), gastrointestinal symptoms (8.2%), fatigue (7.3%) and technical issues with catheters (5.9%). Most (79%) patients had investigations in the ED; 61.2% were admitted to wards, 7.3% to the PICU, and 20.5% were discharged. Two-thirds of patients (65.7%) had previously signed an advanced care directive at the time of their ED visit; discussions about goals of care were present in 37.4% of medical charts. **Conclusion:** Most PPC patients presented to the ED acutely ill, requiring work-up and admission. One-third presented in their end of life. Understanding the characteristics of PPC patients who consult the ED is the first step in offering better care for these complex patients.

Keywords: palliative care, pediatrics, ethics

P046

The "Nightmares-FM" course: an effective simulation-based acute care training method for family medicine residents

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Introduction / Innovation Concept: Acute care skills are difficult to teach but can be improved using high-fidelity simulation training. We developed a comprehensive acute care "Nightmares-FM" simulation course (NM) for our Family Medicine residents and compared it to our standard simulation teaching- episodic Acute Care Rounds (ACR). **Methods:** NM course consisted of an initial 2 day session followed by 3 follow-on sessions interspersed throughout the PGY-1 year. ACR participants got access to 3 sessions interspersed throughout the PGY-1 year, each focusing on a different aspect of acute care. Both groups got access to the NM manual which covered the relevant topics: shock, arrhythmias, shortness of breath, altered level of consciousness and myocardial infarction. The manual is physiology-based and written specifically at the level that an average Family Medicine resident would be expected to perform at during on-call crises or emergency medicine rotations. 12 residents participating in the NM and 12 residents in time-matched ACR filled out questionnaires asking them to rate their level of knowledge of various aspects of acute care. Self-reported changes before and after each session, and at the end of the year, were analyzed using Wilcoxon matched pairs test. End of the year mean scores were compared using a two sided t-test. Finally, we developed a high-complexity acute care Objective Structured Clinical Examination (OSCE): COPD exacerbation with septic shock requiring use of positive pressure ventilation, fluids and vasopressors. The groups participated in the OSCE in February of their PGY-2 year and were graded using a validated scoring sheet marked by two independent expert video reviewers. **Curriculum, Tool, or Material:** NM initial 2-day session significantly improved the resident's self-assessment scores on all 20 items of the questionnaire ($p < 0.05$). Time matched ACR improved 11 out of 20 items ($p < 0.05$) level. Follow-up NM sessions improved 5-8 out of 20 items, ($p < 0.05$). Follow-up ACR sessions improved 1-5 out of 20 items, ($p < 0.05$). End of the year means were higher for 13/20 items in the NM group ($p > 0.05$) The NM group scored significantly higher on both the mean scores of OSCE individual categories: Initial assessment, Diagnostic workup, Therapeutic interventions and Communication and teamwork ($p < 0.05$) and the Global Assessment Score ($p < 0.026$). **Conclusion:** "Nightmares-FM" course is more effective than our standard curriculum at teaching acute care skills to Family Medicine residents.

Keywords: innovations in EM education, simulation, acute care

P047

Frailty assessment to help predict patients at risk of ED-induced delirium

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Introduction: Delirium is a frequent complication among seniors in the emergency department (ED). This condition is often underdiagnosed by ED professionals even though it is associated with functional & cognitive decline, longer hospital length of stay, institutionalization and death. Frailty is increasingly recognized as an independent predictor of adverse events in seniors and screening for frailty in EDs has recently been recommended. The aim of this study was to assess if screening seniors for frailty in EDs could help identify those at risk of ED-induced delirium. **Methods:** This study is part of *the Incidence and Impact measurement of Delirium Induced by ED-Stay* study, an ongoing multicenter prospective cohort study in 5 Quebec EDs. Patients were recruited after 8 hours in the ED exposure & followed up to 24h after ward admission. Frailty was assessed at ED admission using the Canadian Study of Health and Aging-Clinical Frailty Scale (CSHA-CFS) which classified seniors from robust (1/7) to severely frail (7/7). Seniors with CSHA-CFS $\geq$ 5/7 were considered frail. Delirium was assessed using the Confusion assessment method and Delirium Index. **Results:** Of the 380 patients recruited, mean age was 76.5 ($\pm$8.9). Male were 50%. Mean stay in the ED was 1.4 day ($\pm$0.82). Preliminary data show an incidence of ED-induced delirium of 8.4%. Average frailty score at baseline was 3.5/7. 72 patients were considered frail, while 289 were considered robust. Among the frail seniors, there were 48.4% (30-66%) patients with ED-induced delirium vs 17.9% (13.7-22.0] in the non-frail ones ($p < 0.0001$). **Conclusion:** Increased frailty appears to be associated with increased ED-induced delirium. Screening for frailty at emergency triage could help ED professionals identify seniors at higher risk of ED-induced delirium. Further studies are required to confirm the importance of the association between frailty and ED-induced delirium

Keywords: delirium, frailty, seniors

P048

Listening to care partners: a feasible method to screen for frailty in emergency medical services?

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Introduction: Frailty is a state of vulnerability, and may go unrecognized in emergency medical services (EMS). Identifying frailty earlier may allow for services to be offered proactively to maintain function and prevent further health deterioration. The Clinical Frailty Scale (CFS) can be used to screen for frailty, but has only been validated when used by physicians. Our objective was to evaluate the feasibility and validity of a Care Partner-completed CFS, facilitated by a paramedic or nurse. **Methods:** A prospective sample of older adults (age $\geq$ 70 years) presenting in two settings (to EMS, following a 911 call, and to Geriatric Ambulatory Care) between February 2009 and March 2010 were included. Care partners completed a survey that included the nine-point CFS, which grades from 1 (very fit) to 9 (terminally ill). Demographic, clinical and outcome data were collected from the health care record, with one year follow-up. Based on clinical evaluations a frailty index was calculated for each patient. In each setting, descriptive statistics were used to compare fitter patients (CFS scores <5) to frailer ones (CFS scores >4). **Results:** The mean age was 82.2 $\pm$ 5.9 years ($n = 198$) and most were women ($n = 118$, 62.1%). The Care Partner-CFS was incomplete for 3 surveys. The median CFS score in both the clinic and EMS groups was 5 (interquartile range = 4-6). The Care Partner-CFS correlated moderately with their independently assessed frailty index (0.64; $p < 0.01$; $n = 195$). Most patients ($n = 125$; 64%) had frailty scores > 4. Frail patients were older and had worse health outcomes than the patients with score <5. More EMS patients were severely frail or very severely frail compared to the geriatric clinic patients ($n = 19$, 19% vs. $n = 5$, 5%). **Conclusion:** The Care Partner-CFS is a feasible and valid method for evaluating frailty in the EMS and medical clinic settings where frailty was common. It may be a useful EMS screening tool to identify those that could benefit from comprehensive assessment and follow-up after emergency care. Future

research will evaluate this approach in multiple populations with community based follow-up intervention for those at higher risk.
Keywords: frailty, geriatrics, risk screening

P049

A novel administrative database solution for capturing ED patient co-morbidity - the derived Charlson Comorbidity Index

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Introduction: ED patient comorbidity is difficult to ascertain for research. Traditional surrogates such as triage acuity, admission rate, and age have been used to approximate patient complexity. Differences between EDs for the management of similar conditions are nevertheless difficult to reconcile. The Charlson Comorbidity Index (CCI) contains 19 categories and is a validated predictor of the ten-year mortality for a patient who may have a range of comorbid conditions. CCI is based on the International Classification of Diseases (ICD) diagnosis codes found in administrative data such as the Discharge Abstract Database (DAD). The DAD collects this, and other inpatient information, for all Canadian hospitals. We sought to develop a linkage between the regional ED database and the regional inpatient DAD in order to derive a CCI score for each ED patient as a surrogate of comorbidity. **Methods:** We used regional data from Vancouver Coastal Health (VCH) over a 2.5 year period from April 2013 - September 2015. An algorithm was created to identify CCI conditions in the regional DAD. Whenever a patient visited the ED a query was made to the DAD going back for 5 years to acquire CCI relevant diagnoses and enter these diagnoses as well as the CCI weighting into the ED database. Patient DAD records from VCH were utilized no matter in which ED a patient presented. No information from admissions outside the region was available. **Results:** There were 931,596 regional ED visits made by 446,579 unique patients in a total of 11 EDs (6 urban and 5 rural). In total there were 127,233 patients with a CCI score (13.7% of total visits). The average CCI was 0.40 (SD 1.31) with a range of 0.12 at the urban urgent care centre to 0.52 at the urban tertiary care centre. More isolated rural EDs tended to have higher percentages of patients with CCI scores than community urban EDs. Higher acuity, age, and ambulance arrival, ED death, all correlated to higher CCI scores. The most common CCI conditions were "diabetes with complications" (10/11 EDs) and was present in 35,816 (3.8%) visits and "cancer" (10/11 EDs) present in 34,624 (3.7%) ahead of COPD (26,451 visits) and CHF (25,233 visits). **Conclusion:** Use of the CCI is a novel way to passively capture patient comorbidities without reliance on a data entry technician. Limitations include the inability to link to hospitalization data outside a specific health region.
Keywords: comorbidity, Charlson Comorbidity Index, international classification of diseases (ICD)

P050

Electronic health record perceptions and utilization by physicians in urban emergency departments

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Introduction: In 2006, Alberta implemented an Electronic Health Record called the Alberta Netcare Portal (ANP). The ANP provides provincial read-only access to lab tests, diagnostic imaging, medication information and numerous text reports. There is no computerized order entry, and care is coordinated using a hybrid of paper charting and various electronic systems. Here, we quantify observed ANP use by physician participants providing care in four urban Emergency Departments (EDs) in Alberta. The results form part of a larger mixed methods research project aimed at detecting broader implications of ANP use for patient care. **Methods:** Between October 2014 and July 2015, ED physicians at four EDs (University of Alberta Hospital [UAH], Grey Nuns Community Hospital [GNCH], Foothills Medical Centre [FMC], Peter Lougheed Centre [PLC]) participated in structured clinical observations. Observations were purposively sampled during the first hours of shifts, when physicians orient themselves to the patients they will see during the rest of their shift, including reviewing available historic patient information. Observers used a tablet based tool to generate a time-stamped record of the information tools used alongside patient care. Information tools included permanent paper records, paper excluding permanent documentation, the ANP, clinical and other applications accessed via desktop computers, and mobile devices. Observers also recorded contextual data, including participant commentary, on paper field notes. **Results:** Across the 4 sites, 142 physicians participated in 376 sessions for a total of 566 observed physician-hours. Participants accessed information in different computerized applications and on paper (i.e., a 'hybrid' care environment). The highest proportion of observed physician time interacting with ANP was observed at the UAH (7.0%-8.1%, all values 95% Confidence Intervals). Physicians spent less time using ANP at GNCH (4.1%-4.8%), which was similar to the Calgary EDs (FMC: 4.4-5.3% and PLC: 5.2%-5.9%). Thematic analysis of field notes showed that ANP acceptance was very high. Patient safety concerns were recorded related to care provided alongside 'hybrid' patient records. **Conclusion:** We found high physician acceptance of ANP based on documented comments and observed usage. We posit a high potential for EHRs such as ANP to support improved care coordination which remains partly realized.
Keywords: electronic health record, medical informatics, decision making

P051

Validation of the Sainte-Justine head trauma pathway for children younger than 2 years of age

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Introduction: The PECARN head CT scan rule helps to identify children at risk of clinically important Traumatic Brain Injury (ciTBI) but many children fall in a grey zone while applying the rule (observation vs. CT scan). The C-3PO rule identifies children at risk of skull fracture. The Ste-Justine Head Trauma pathway comprises both rules for the management of all children younger than two years who suffered a head trauma. The primary objective of this study was to measure the capacity of the Ste-Justine Head Trauma pathway to identify children with ciTBI. **Methods:** This was a retrospective study of all children younger than two years old who visited a university affiliated pediatric emergency department (ED) for a head trauma between Sept. 2013 and Aug. 2015. Participants were all patients admitted for a head trauma and a randomly selected sample of 5% of non-admitted patients. Independent variables of the algorithm were recorded for each patient. The primary outcome was the presence of a ciTBI defined by any of the following secondary to TBI: death, neurosurgery, intubation of more than 24 hours or hospitalization for more than one night. Participants were identified using the computerized database of the ED and all charts were reviewed using a standardized report form. The primary analysis was the proportion of children with ciTBI accurately identified using the pathway. A secondary analysis was to compare the performance of the pathway in comparison to the PECARN rule alone. **Results:** During the study period a total of 2,258 children were seen in the ED for head

trauma. The charts of all hospitalized (n = 100) and a sample (n = 101) of non-hospitalized children were reviewed. A ciTBI was found in 26 participants (3 neurosurgical interventions, 4 intubated and 26 admitted > one night). Among them, 18 were classified at high risk, 7 at moderate risk and 1 at low risk according to the clinical pathway. Using the PECARN rule alone would have classified 17 at high risk, 5 at moderate risk and 4 at low risk. Using the pathway to the entire population would yield the following risk of cTBI: High-risk: 25%; moderate risk: 1%; low risk < 0.1%. **Conclusion:** The Ste-Justine Head Trauma pathway effectively identifies children younger than two years at risk of ciTBI following head trauma while triaging effectively children at low risk. The pathway is more sensitive than the PECARN rule to identify children at risk of ciTBI.

Keywords: head trauma, children, pathway

P052

The effect of blood alcohol on outcomes in patients with major traumatic brain injury in Nova Scotia

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Introduction: Although alcohol use increases the risk of experiencing a traumatic brain injury (TBI), it remains unclear whether outcomes in alcohol-impaired patients are different from those of unimpaired patients. The objective of this study was to evaluate the effect of alcohol on length of stay (LOS) and mortality in patients with major TBI. **Methods:** Using data collected from the Nova Scotia Trauma Registry, we performed a retrospective analysis of all patients with major TBI (defined as having an abbreviated injury score (AIS) head ≥ 3) seen in Nova Scotia hospitals between 2002 and 2013. Patients were compared by blood alcohol concentration (BAC) at time of injury: negative (0-1.9 mmol/L), low (2-21 mmol/L), and moderate/high ($\geq$22 mmol/L). A logistic regression model was constructed to test for outcomes and adjusted for the effects of age, gender, location, injury severity score (ISS), and BAC level. **Results:** In a twelve-year period, there were 4152 major TBI patients in Nova Scotia. Alcohol testing was performed in 43% of cases (80% male, mean age 44 ± 20 years), with 48% having a positive BAC. Mean acute LOS was similar for all three BAC groups. Increasing age (odds ratio [OR] = 1.01; $p < 0.001$), high ISS (OR = 4.92; $p < 0.001$), injuries occurring outside of Halifax Regional Municipality (OR = 1.72; $p < 0.001$), and having a lower BAC level (OR = 0.99; $p < 0.001$) independently predicted mortality. **Conclusion:** Our findings suggest that low BAC levels are associated with increased mortality in major TBI patients. Further study is warranted to elucidate alcohol's mechanism in TBI outcomes.

Keywords: alcohol, traumatic brain injury, outcomes

P053

Characteristics and patterns of major traumatic brain injury in Nova Scotia: a 12-year retrospective analysis

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Introduction: Traumatic brain injury (TBI) is a leading cause of death and disability in Nova Scotia. TBI occurs in approximately 50% of major trauma seen annually in the province. The purpose of this study was to describe the characteristics and patterns of major TBI seen in Nova Scotia over a 12-year period. **Methods:** This was a retrospective case series. Data were obtained from the Nova Scotia Trauma Registry for all patients presenting with major TBI (abbreviated injury score [AIS] head ≥ 3) between 2002 and 2013. Injury rates were calculated on the basis of 100,000 population (all ages) using population estimates from Statistics Canada. **Results:** Overall, 4152 major TBI patients were seen in Nova Scotia hospitals during the study period. Mean age of TBI patients was 51 ± 25 years; 73% were male. The majority of injuries were the result of blunt trauma (93%), with relatively few major TBIs resulting from penetrating trauma (7%). The most common mechanisms of injury were falls (44%) and motor vehicle crashes (27%). Analysis of census-based subpopulations of the province showed that injury rates varied significantly among counties (from 25 to 63 per 100,000 population). We observed an increase in the number of major TBI patients over twelve years. **Conclusion:** Our findings suggest significant regional variation in major TBI rates in Nova Scotia. There are ongoing needs for prevention and intervention efforts that focus on unintentional falls and motor vehicle crashes, especially in older adults. These results also suggest that geographically targeted efforts may be warranted.

Keywords: traumatic brain injury, patterns, retrospective

P054

Development of a hospital-wide program for simulation-based training in trauma care and management

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Introduction: The Queen Elizabeth II Health Sciences Centre (QEII HSC) is a Level I trauma center that provides tertiary care services to the province of Nova Scotia (pop. 940,592) and quaternary care services to Atlantic Canada (population > 2.4 million). The objective of this study was to describe and evaluate the development of an inter-professional hospital-wide trauma simulation that was performed at the QEII HSC in June of 2015. **Methods:** The simulation was performed in the dedicated trauma resuscitation bay in the emergency department of the trauma centre using SimMan equipment. The scenario involved a 35-year-old male pedestrian versus car at approximately 70 km. The patient required immediate resuscitation and transfer to the operating room for an emergency laparotomy. Evaluation of the simulation was through video feedback, time stamping, piloting of resident Trauma Team Activation evaluation, observation for latent safety issues, and participant feedback. Trauma team members were unaware of simulation prior to arrival. **Results:** Feedback received from simulation participants indicated that this exercise was incredibly "real" for them. Using the usual emergency department patient registration proved difficult in this simulation exercise, both for activation of the massive transfusion protocol and transfer of the patient to the operating room. Latent safety issues identified included a lack of communication with the operating room and unavailability of some resuscitation equipment. Debriefing after the event was felt to be important by all participants of the simulation. Having evaluators dedicated to observing specific aspects of the simulation would facilitate these exercises. Patient care was not interrupted in the emergency department or the operating room. **Conclusion:** The in situ simulation was a valuable experience for the trauma program, stakeholders, and all participants. Based on this trial simulation, additional simulations will be held within our trauma program. Further research is required to validate long-term retention of skills and knowledge, and to evaluate the impact of simulation training on staff performance and trauma patient outcomes.

Keywords: trauma, simulation, inter-professional

P055

State of the evidence for emergency medical services (EMS) provision of palliative care: an analysis of appraised research from the Canadian Prehospital Evidence-based Practice (PEP) Project

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Introduction: Patients who require end of life (EoL)/palliative care occasionally need assistance from paramedics. This review evaluated the evidence for paramedic-delivered EoL/palliative care interventions. **Methods:** The Canadian Prehospital Evidence-based Practice (PEP) Project methodology was used. A PubMed search was conducted, using Medical Subject headings and title/abstract key words. Titles and abstracts were reviewed for relevance. Studies were not required to be EMS based but must have focused on interventions available to EMS personnel. Included full text studies were scored by trained primary appraisers on a three-point Level of Evidence (LOE) scale (high = 1, moderate = 2 and low = 3) and three-point Direction of Evidence (DOE) scale (supportive, neutral, or opposing). Studies were categorized by clinical condition (n = 5) and by intervention (n = 25), and plotted on 3×3 (DOE × LOE) tables. The study primary outcome and setting were determined. **Results:** The search returned 3255 articles; 86 were selected for abstract review; with 30 full text articles ultimately included. Intervention recommendations were: LOE 1-supportive (n = 3, 12%), 2-supportive (n = 2, 8%), 3-supportive (n = 2, 8%), 1-neutral (n = 2, 8%), 2-neutral (n = 2, 8%), 3-neutral (n = 4, 16%). No primary studies were identified for 10 (40%) interventions. Conditions with 1-supportive studies were: 'breathlessness' and 'analgesia'. 'Secretions' condition had no relevant evidence. Interventions with 1-supportive evidence were: Haldol for agitation (n = 1), fentanyl and morphine for analgesia (n = 3 and n = 1), narcotics for breathlessness (n = 1). No intervention had opposing evidence. Primary outcomes were more commonly related to symptom relief (n = 26, 87%), safety (n = 3, 10%), or tolerability (n = 1, 3%). Only one included study was conducted in the EMS setting. **Conclusion:** Evidence for interventions used by paramedics in the treatment of patients requiring EoL/palliative care was identified, as were evidence gaps. Little research was conducted in the EMS setting, and most interventions had few studies. These PEP findings highlight topics requiring high quality EMS research specific to EoL/palliative care to inform this growing aspect of paramedic practice.

Keywords: palliative care, emergency medical services (EMS), end-of-life care

P056

The state of the evidence for emergency medical services (EMS) care of blunt spinal trauma: an analysis of appraised research from the Canadian Prehospital Evidence-based Practice (PEP) Project

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Introduction: The Canadian Prehospital Evidence-based Practice (PEP) project is an online, freely accessible, continuously updated EMS evidence repository. The summary of research evidence for EMS interventions used to care for blunt spinal trauma is described. **Methods:** PubMed was systematically searched. One author reviewed titles and abstracts for relevance. Included studies were scored by trained appraisers on a three-point Level of Evidence (LOE) scale (based on study design and quality) and three-point Direction of Evidence (DOE) scale (supportive, neutral, or opposing results). Second party appraisal was conducted for included studies. Interventions were plotted on a 3x3 table (DOE × LOE) for the spinal injury condition based on appraisal scores. The primary outcome was identified for each study and categorized. **Results:** Seventy-seven studies were included. Evidence for adult and paediatric blunt spinal trauma interventions was: supportive-high quality (n = 1, 7 %), supportive-moderate quality (n = 3, 21.4%), supportive-low quality (n = 1, 7%), neutral-high quality (n = 1, 7%), neutral-moderate quality (n = 5, 35.7%), neutral-low quality (n = 1, 7%), opposing-high quality (n = 0, 0%), opposing-moderate quality (n = 0, 0%), opposing-low quality (n = 1, 7%). One (7%) intervention had no evidence. Interventions with supportive evidence were: steroids, cervical-spine clearance, scoop stretcher, self-extrication and "leaving helmet in place". The evidence weakly opposed use of short extrication devices. Leading study primary outcomes were spinal motion, diagnostic accuracy, and pressure/discomfort. **Conclusion:** EMS blunt spinal trauma interventions are informed by moderate quality supportive and neutral evidence. Future research should focus on high quality studies filling identified evidence gaps using patient-oriented outcomes to best inform EMS care of blunt spinal injury.

Keywords: spinal trauma, emergency medical services (EMS), immobilization

P057

Performance of a national simulation-based resuscitation OSCE for emergency medicine trainees

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Introduction: The use of high-fidelity simulation is emerging as an effective method for competency-based assessment in postgraduate medical education. We have previously reported the development of the Queen's Simulation Assessment Tool (QSAT), for use in simulation-based Objective Structured Clinical Examinations (OSCEs) for Emergency Medicine (EM) trainees. We aimed to demonstrate the feasibility and present an argument for the validity of a simulation-based OSCE utilizing the QSAT with EM residents from multiple Canadian training sites. **Methods:** EM post-graduate trainees (PGY 2-5) from 9 Canadian EM training programs participated in an 8-station simulation-based resuscitation OSCE at Queen's University in Kingston, ON. Each station was scored by a single trained rater from a group of 9 expert Canadian EM physicians. Raters utilized a station-specific QSAT and provided an Entrustment Score. A post-examination questionnaire was administered to the trainees to quantify perceived realism, comfort and educational impact. Statistical analyses included analysis of variance to measure the discriminatory capabilities and a generalizability study to examine the sources of variability in the scores. **Results:** EM postgraduate trainees (N = 36) participated in the study. Discriminatory validity was strong, with senior trainees (PGY4-5) outperforming junior trainees (PGY2-3) in 6 of 8 scenarios and in aggregated QSAT and Entrustment Scores across all 8 stations ($p < 0.01$). Generalizability studies found the largest sources of random variability was due to the trainee by station interaction and the error term, with a G coefficient of 0.84. Resident trainees reported reasonable comfort being assessed in the simulation environment (3.6/5), indicated significant perceived realism (4.1/5), and found the OSCE valuable to their learning (4.8/5). **Conclusion:** Overall, this study demonstrates that a large-scale simulation-based EM resuscitation OSCE is feasible, and an argument has been presented for the validity of such an examination. The incorporation of simulation or a simulation-based OSCE in the national certification process in EM may help to satisfy the increased demand for

competency-based assessment required by the Royal College of Physicians & Surgeons of Canada's Competency by Design transition.
Keywords: simulation, objective structured clinical examination (OSCE), competency

P058

Improving patient safety and streamlining care at a community hospital through spread and scale of a trauma care bundle: a quality improvement pilot project

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Introduction: Non-trauma centers (NTC) and community hospitals commonly deliver medical care during the "golden hour" of trauma, which has significant implications on the health outcomes of patients. The Niagara Health System (NHS) and its 3 community NTC hospitals provide trauma care to over 100 patients annually during this critical period. NTCs lack standardized resources commonly found in trauma centers. Checklists and bundles have been effective in streamlining process to ensure health care providers provide the right care, at the right time and address critical points during patient care. A trauma care bundle was designed and implemented in the NHS as a means to improve trauma care and patient outcomes. **Methods:** A quality improvement (QI) approach was used to design, implement and evaluate a trauma care bundle at one of the NHS's community hospitals. These interventions were adapted and modified for community trauma care purposes. We piloted the trauma care bundle using rapid cycle improvements, known as Plan-Do-Study-Act (PDSA) cycles. We assessed outcome and process measures through a chart audit of all trauma care patients in the NHS from July 2015-December 2015. A safety attitudes questionnaire (SAQ) was administered to health system staff who were involved in the pilot to assess balancing measures. **Results:** Improvements to the bundle and its implementation from 4 PDSA cycles resulted in increased utilization. This continuous monitoring of the bundle and ongoing, conscious efforts to improve the intervention were used to spread and scale across all 3 sites of the NHS. 30% of patients received the trauma care bundle during phase 1 of the pilot from July 1- October 31, 2015. We are presently analyzing preliminary data to understand how the trauma care bundle impacts health outcomes and process and will present a comparative analysis between patient groups. **Conclusion:** Trauma care bundles may foster safer and more efficient patient care in community hospitals where the golden hour of trauma often occurs. This community trauma care bundle shows promising results for streamlining the care process to ensure patients receive appropriate care during the golden hour. Spread and scale of this bundle across other community hospitals will likely yield similar improvements in patient care.
Keywords: quality improvement, patient safety, trauma

P059

"Rate and See" – a pilot evaluation of a short duration atrial fibrillation pathway linking the emergency department to specialty care

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Introduction: Rapid atrial fibrillation (AF) and flutter remains a common cause of emergency department (ED) visits. Canadian guidelines recommend a rhythm control strategy for patients presenting to ED within 48 hours of arrhythmia onset or who are anticoagulated. However, up to 70% of patients spontaneously convert within 24 hours, mitigating the need for urgent cardioversion. Moreover, education, risk stratification, appropriate anticoagulation, and follow-up may be challenging in the ED setting. Therefore, direct and rapid linkage to an AF clinic was proposed to address these gaps in care. **Methods:** A pilot evaluation of a "Short Duration AF Pathway" was performed at Kelowna General Hospital, B.C., from June 2014 to Feb 2015. This care pathway–consisting of a treatment algorithm, ED order set, and referral process–was applied to patients with AF $\leq$ 48 hours or those who were anticoagulated. Patients received initial rate control medication in the ED and were referred for reassessment in a collaborative cardiologist/nurse practitioner AF clinic and seen within 24 hours. Data was collected prospectively; descriptive statistics are presented. **Results:** Twenty patients were enrolled during the pilot period. Mean age was 69 (SD = 10) years, 6/20 (30%) female, mean CHADS65 score 1.35 (SD = 1.1), with 15/20 (75%) CHADS65 $\geq$ 1. On presentation, 4/20 (20%) were taking anticoagulants and 12/20 (60%) had an AF history. All 20 patients were assessed in the AF clinic within 24 hours of referral. Upon assessment in the AF clinic, 10/20 (50%) had spontaneously converted to sinus rhythm and 5/20 (25%) were electrically cardioverted at the first AF clinic visit. The remaining 5/20 (25%) of patients were reclassified as AF of uncertain duration; one was admitted to hospital, the other four had delayed electrical cardioversion. All patients received education related to AF. No adverse events or readmissions to the ED were reported and 100% of patients with CHADS 65 $\geq$ 1 had received appropriate anticoagulation. **Conclusion:** A "Short Duration AF Pathway" is a viable alternate approach to immediate cardioversion within the ED. Potential advantages include avoiding unnecessary cardioversion, providing patient education, accessing timely specialty care, and initiating anticoagulation where appropriate.
Keywords: atrial fibrillation, atrial flutter, quality improvement

P060

Cannabinoid hyperemesis syndrome presentation to the emergency department: a two-year multi-centre retrospective study

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Introduction: Cannabinoid hyperemesis syndrome (CHS) is a paradoxical side effect of cannabis use. Patients with CHS often present multiple times to the Emergency Department (ED) with cyclical nausea, vomiting and abdominal pain, and are discharged with various misdiagnoses. CHS studies to date are limited to case series. We examined the epidemiology of CHS cases presenting to two major urban Tertiary Care Centre EDs. **Methods:** Using explicit variables, trained abstractors, and standardized abstraction forms, we abstracted data for all adults (18-55 years) with a presenting complaint of vomiting, and/or a discharge diagnosis of vomiting and/or cyclical vomiting, during a 2-year period. Inter-rater agreement was measured using a kappa statistic. **Results:** We identified 494 cases: mean age 31 years; 36% male; only 19.4% of charts specifically reported cannabis use. Among the regular cannabis users (>3 times per week), 43% had repeat ED visits for similar complaints. Interestingly, of these patients, 92% had bloodwork done in the ED, 92% received IV fluids, 89% received anti-emetics, 27% received opiates, 19% underwent imaging, 8% were admitted to hospital, and 8% were referred to the Gastroentorology service. Inter-rater reliability for data abstraction was kappa = 1. **Conclusion:** This study suggests CHS may be an overlooked diagnosis for nausea and vomiting, a factor which can possibly contribute to unnecessary investigations and treatment in the ED. Additionally, this indicates a lack of screening for CHS on ED history, especially in quantifying cannabis use and eliciting associated symptoms of CHS.

Keywords: nausea and vomiting, cannabinoid hyperemesis syndrome, cannabis

P061

Mobile digital access to a web-enhanced network (mDAWN): mHealth for type-2 diabetes self-management and implications for emergency medicine

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Introduction: Diabetes mellitus affects over 2.7 million Canadians, with 90% being Type-2 diabetes (CDA 2010). Complications of diabetes are major causes for emergency department (ED) visits, adversely affecting patients' health and costing the health system. Improving diabetes self-management can lead to avoidance of ED visits and revisits after discharge. Recent developments in mobile Health (mHealth), such as home health monitoring with sensors, social media, and text messaging, have shown promise in supporting patients in chronic disease self-management. This project tested the feasibility of these tools to support self-management for people with type-2 diabetes. **Methods:** Forty-three people with type-2 diabetes took part in a three month program that provided: health information via text messages, online access to curated resources and a facilitated discussion board, and access to wireless monitoring devices. Participants were outfitted with a wireless blood pressure monitor and weight scale, standard blood glucose monitor, and online access to their physiological data. Data collected included pre and post-self-reported health measures, tracking of physiological changes, website and discussion board use, cost survey, and interviews. **Results:** Participants reported significantly less health distress and an increase in diabetes empowerment. HbA1c levels decreased from an average of 7.41 to 6.77. Average weight and blood glucose also decreased over the study period. Interview and cost survey findings revealed most participants felt mDAWN provided good value; 78% expressed interest in continuing all or parts of the program. Interview findings revealed that participants developed self-management routines, and experienced increased self-awareness of, and ownership over, their health achievements. **Conclusion:** mHealth tools provided participants with their own physiologic information, connection with peers, and evidence informed advice. Participants highly valued this combination and improved their self-management and health outcomes. Equipping patients with similar tools for self-management post ED discharge holds great promise for decreasing revisits and improving health outcomes. This study has stimulated a clinical trial now underway to evaluate the effectiveness of home monitoring to facilitate the transition of patients between acute care and community settings.

Keywords: technology, diabetes, monitoring

P062

Impact of pharmacist-led medication review in the emergency department on downstream health services utilization

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Introduction: Adverse drug events are a leading cause of Emergency Department (ED) visits and unplanned admissions. Up to 50% are misdiagnosed in the ED and on hospital wards leading to treatment delays. Our main objective was to evaluate the effect of pharmacist-led medication review in high-risk ED patients on the number of days in-hospital. Our hypothesis was that early pharmacist-led medication review may reduce the number of days spent in-hospital. **Methods:** We evaluated a quality improvement program that was implemented in three British Columbian EDs. During a 12-month period, nurses identified consecutive patients at high-risk for adverse drug events using a clinical decision rule integrated into triage algorithms. Clinical pharmacist research assistants enrolled consecutive eligible high-risk patients, and systematically allocated them to medication review or control. In the intervention group, pharmacists collected best possible medication histories, reviewed medications for appropriateness and adverse drug events, and communicated review results to patients and physicians. In the control group, nurses collected best-possible medication histories, and physicians referred patients to the ED pharmacist as needed. Ongoing care was determined by physicians who were not blinded to group allocation, but were unaware of the evaluation. We assessed outcomes using administrative health databases. The primary outcome was the number of days spent in-hospital over 30 days. We used inverse propensity score weighted regression modeling to assess the relationship between medication review and health outcomes. The sample size was limited by the duration of the quality improvement program. **Results:** Among 10,807 patients 6,416 received medication review in the ED and 4,391 usual care. The groups were balanced in terms of baseline characteristics. The median number of hospital days was 0.48 days (95% confidence interval [CI] 0.00-0.96) less in the medication review group compared to usual care ($p = 0.058$). The difference was 0.60 days (95% CI 0.06-1.17; $p = 0.03$) less among patients under 80 years old. There was no effect on ED revisits, number of admissions and readmissions, or mortality. **Conclusion:** Medication review was associated with a trend in reduced hospital-bed utilization. While limited by lack of randomization, our evaluation suggests that ED pharmacists may impact subsequent resource utilization.

Keywords: adverse drug event, patient safety, medication review

P063

Is triage score a valid measure of emergency department case mix?

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Introduction: In the Canadian province of Alberta, (pop. 4,227,879), the publicly-funded health care system uses the five level Canadian Triage and Acuity Scale (CTAS), to prioritize emergency department (ED) patients. Health system decision makers and policy makers currently use CTAS as an isolated metric to describe ED patient case-mix and to compare EDs. **Methods:** Using the National Ambulatory Care Reporting System dataset, we reviewed the distribution of patient CTAS scores and the proportion of inpatient admissions by CTAS level for the 16 highest volume Alberta hospital EDs during FY 2013/2014. **Results:** Collectively, the EDs received 1,027,976 patients, with 1%, 18%, 44%, 30% and 7% classified as CTAS 1-5, respectively. The proportions by CTAS level ranged from 0.2% to 2.8% in CTAS 1; 3.3% to 33.3% in CTAS 2; 29.1% to 54.1% in CTAS 3; 16.7% to 49.0% in CTAS 4; and 3.1% to 12.3% in CTAS 5. Admission proportions by CTAS level ranged from 43.9% to 75.2% in CTAS 1; 18.9% to 42.1% in CTAS 2; 5.4% to 24.7% in CTAS 3; 0.8% to 9.3% in CTAS 4; and 0.1% to 9.1% in CTAS 5. **Conclusion:** Inter-hospital differences in CTAS acuity distributions reflect triage variability and real differences in case-mix. Wide variation in admission proportions by CTAS level reflects differing admission thresholds between sites, but also suggest intra-level differences in patient severity, comorbidity and complexity. Triage levels cannot be used as an isolated metric to describe and

compare ED case-mix. Further work is required to accurately characterize ED patient case-mix.
Keywords: triage, case mix

P064

Effect of increased availability of pre-authorized radiological test ordering on CT scan utilization in the emergency department

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Introduction: Computed tomography (CT) scan utilization has increased dramatically over the past 25 years. This has sparked concern for potential overuse leading to unnecessary radiation exposure for patients and increased health care costs, without any improvement in health outcomes. In order to improve workflow through the Emergency Department (ED) at our institution, an existing pre-authorization policy during weekday business hours allows emergency physicians to order CT scans directly without the need for approval from a radiologist. This policy was recently expanded on September 28, 2015 to allow pre-authorized CT scan orders during weekday evening hours. The objective of our study is to evaluate the impact of increased availability of pre-authorized CT scan ordering on CT scan utilization and patient flow through the ED at two tertiary care hospitals in London, Ontario. **Methods:** This is a retrospective review comparing monthly CT scan utilization rates in the pre-implementation period from September 28, 2014 to February 28, 2015, to rates in the post-implementation period from September 28, 2015 to February 28, 2016. Length of stay parameters including time from physician initial assessment to CT scan order, completion, report and patient discharge will also be compared between the groups. **Results:** Results will be presented at CAEP 2016. No significant difference is expected in the monthly number of CT scans ordered per registered ED visits between the pre- and post-implementation groups. We also anticipate a significantly shorter average length of stay for patients receiving a CT scan in the post-implementation group. **Conclusion:** We expect there will be no significant increase in CT scan utilization with increased availability of pre-authorized CT scan ordering in our EDs. We also anticipated decreased patient length of stay leading to improved patient flow through the ED. Findings may offer support for organizations to safely implement or increase availability of pre-authorized CT scan orders to help improve patient flow and decrease costs in the ED.
Keywords: computed tomography, emergency medicine, utilization

P065

Surveying ED transition of care: satisfaction, awareness of risks and barriers to the implementation of a standardized protocol

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Introduction: Patient handoffs have been identified as the primary cause of error affecting patient safety. The lack of standardization - and the often-avoidable errors that occur as a result - profoundly affect patient care and emergency department (ED) administration. Our study set out to evaluate emergency doctors' awareness of these safety concerns, as well as their satisfaction with handoff practices currently used in their respective EDs. We also aimed to identify the potential barriers to the use of a standardized approach to patient transition of care. **Methods:** Guided by a modified Delphi method, a 29-question survey was developed by a panel of experts on patient transition of care. A printed version of the survey was distributed to ED doctors attending a local emergency medicine conference. An electronic version was subsequently distributed to all ED doctors registered as members of our provincial professional organizations. **Results:** We achieved a 68% response rate. Amongst the 309 participants, 51% (95%CI 44-56%) acknowledged that handoffs between emergency doctors are a frequent cause of error related to patient care. Frequent interruptions (77% (95% CI 72-82%)) and heavy workloads (73% (95%CI 68-79%)) were identified as the main factors negatively influencing the quality of handoffs. Despite 61% (95%CI 56-68%) satisfaction with the currently employed methods, 74% (95%CI 68-79%) of the respondents believe that handoffs would benefit from standardization and 83% (95%CI 79-88%) are open to changing their current practices. In addition, 53% (95%CI 48-60%) believe that the tools used for transition of care can be improved. Apprehension regarding the increase of handoff burden (86% (95%CI 81-90%)) was identified as the primary barrier to the implementation of a standardized handoff protocol. **Conclusion:** Doctors are generally satisfied with current handoff practices used in the ED. Nevertheless, their awareness of the possible risks associated with transition of care may be driving their openness to adapting their practice, potentially towards a more standardized approach given the conceivable benefits to patient safety. In light of these results, we aim to develop a comprehensive, standardized handoff protocol, and to evaluate its applicability in the ED with a prospective study.
Keywords: safety, handover, administration

P066

Comfort of emergency medicine physicians in implementing early goal directed therapy for sepsis

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Introduction: The recently published ProMISe, ARISE and ProCESS trials demonstrated that protocol-based resuscitation (EGDT) of ER patients in whom septic shock was diagnosed did not improve outcome when compared to usual care. The objective of this project was to survey McMaster emergency physicians in areas including sepsis definition, clinical recognition in adults, self-rated skills assessment, attitudes towards skills augmentation and compare results to the cohort surveyed 11 years ago, close to the introduction of EGDT. **Methods:** Full time faculty at McMaster's Department of Emergency Medicine and ER residents were surveyed anonymously using an electronic survey. The questions covered demographics and training data, identification of septic patients, sepsis intervention and attitudes towards skills augmentation. **Results:** A total of 18 physicians responded to the electronic survey to date. All respondents were able to correctly input definitions for SIRS, sepsis, severe sepsis and septic shock. The majority of respondents felt the best strategy to identify potentially septic adults involved monitoring abnormal vital signs (67%) with some stating serum lactate assessment (33%). Of the 11 possible interventions options provided to care for septic patients, respondents appeared more comfortable with placement of lines, giving vasopressors and appropriate use of fluids for resuscitation. This was compared to more specialized interventions like initiating IV steroids in vasopressor dependant shock despite adequate fluid loading. 22% of respondents believed that patients without respiratory compromise with clinically severe sepsis should be intubated which was found to be 48% in the previous cohort surveyed 11 years ago. 78% believed patients in septic shock without respiratory comprise should be intubated, reassuringly similar to the previous survey result of 87%. **Conclusion:** Emergency physicians at our Canadian institution are comfortable with the skill set required to care for patients with sepsis. Respondents surveyed to date were all comfortable with important resuscitative measures including accurate identification, placement of lines and appropriate fluid administration and were receptive

to additional training. Our study emphasizes that our physicians have the skill set to identify and provide care for sepsis using their clinical judgment in cases that may not require protocolized based care.
Keywords: early goal directed therapy (EGDT), sepsis, resuscitation

P067
Missed opportunities for prehospital management of anaphylactic reactions
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Introduction: Emergency medical services (EMS) have the opportunity to treat allergic reactions anaphylactic reactions rapidly. However, the rate of recognition and treatment is unknown. **Methods:** This was a retrospective cohort study conducted at two urban emergency departments from 2007 to 2012 including adult patients with allergy and anaphylaxis, both of which were predefined by explicit criteria. The patients of interest were those attended by EMS and transported to hospital. The primary outcome was the proportion of patients who met anaphylaxis criteria in the prehospital setting, but who did not have epinephrine administered. The secondary outcome was the proportion of patients who did not meet anaphylaxis criteria, yet had epinephrine administered. **Results:** Of 2819 overall patients, 491 (17.4%) arrived by EMS. The median age was 38 (IQR 27 to 49) and 60.9% were female. For the 151 (30.8%) patients with anaphylaxis, 55 received ephinephrine, (36.4%, 95% CI 27.4 to 47.4%). For the 340 (69.2%) patients without anaphylaxis, 28 received ephinephrine (8.2%, 95% CI 5.5 to 11.9%). **Conclusion:** For patients with anaphylaxis and allergic reactions who are managed by EMS, there may be a mismatch between illness severity and treatment.
Keywords: anaphylaxis, epinephrine

P068
Developing a standardized knowledge dissemination tool for communicating the need for Choosing Wisely© in Alberta's emergency departments
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Introduction: Standardized tools for disseminating knowledge summaries of low value or unnecessary care (e.g., testing, procedures and treatments) are limited, but needed to equip clinicians for discussions with patients about care decisions. The objective of this study is to assess the acceptability of a tool developed by our emergency department (ED) team to communicate the evidence supporting the Choosing Wisely Canada© (CWC) and other similar recommendations. **Methods:** A consensus process was used by team members to develop a tool that highlights three areas: Facts, Gaps, and Acts. The Facts portion highlights the current state of knowledge and illustrates the strength of the evidence supporting guideline recommendations. The Gaps section identifies variation in current clinical practice. The Acts section includes larger CWC goals, as well as specific next steps for a demonstration project. Each section contains one key message for clinicians, ensuring the tool is easy to use. **Results:** A test case has been developed for avoiding chest radiographs in patients with an exacerbation of documented asthma. The Facts section reviewed current guidelines for asthma care. The Gaps section collated evidence from a systematic review and primary research. The Acts section recapitulates the CWC recommendations. In order to assess acceptability feedback cycle will be completed using surveys of 50 patients and 50 clinicians. **Conclusion:** While generating the Facts, Gaps, and Acts tool for a CWC recommendation represents a translational activity, evidence of effectiveness is needed prior to widespread implementation. We report the rational and development of a novel tool to engage clinicians and patients in conversations about unnecessary care in the ED.
Keywords: knowledge dissemination, Choosing Wisely

P069
Gestalt assessment of online educational resources is unreliable and inconsistent
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Introduction: The use of free open access medicine, particularly open educational resources (OERs), by medical educators and learners continues to increase. As OERs, especially blogs and podcasts, rise in popularity, their ease of dissemination raises concerns about their quality. While critical appraisal of primary research and journal articles is formally taught, no training exists for the assessment of OERs. Thus, the ability of educators and learners to effectively assess the quality of OERs using gestalt alone has been questioned. Our goal is to determine whether gestalt is sufficient for emergency medicine learners (EM) and physicians to consistently rate and reliably recommend OERs to their colleagues. We hypothesized that EM physicians and learners would differ substantively in their assessment of the same resources. **Methods:** Participants included 31 EM learners and 23 EM attending physicians from Canada and the U.S. A modified Dillman technique was used to administer 4 survey blocks of 10 blog posts per subject between April and August, 2015. Participants were asked whether they would recommend each OER to 1) a learner or 2) an attending physician. The ratings reliability was assessed using single measures intraclass correlations and their correlations amongst the groups were assessed using Spearman's *rho*. Family-wise adjustments were made for multiple comparisons using the Bonferroni technique. **Results:** Learners demonstrated poor reliability when recommending resources for other learners (ICC = 0.21, 95% CI 0.13-0.39) and attending physicians (ICC = 0.16, 95% CI = 0.09-0.30). Similarly, attendings had poor reliability when recommending resources for learners (ICC = 0.27, 95% CI 0.18-0.41) and other attendings (ICC = 0.22, 95% CI 0.14-0.35). Learners and attendings demonstrated moderate consistency between them when recommending resources for learners ($r_s = 0.494$, $p < .01$) and attendings ($r_s = 0.491$, $p < .01$). **Conclusion:** Using a gestalt-based rating system is neither reliable nor consistent when recommending OERs to learners and attending physicians. Learners' gestalt ratings for recommending resources for other learners and attendings were especially unreliable. Our findings suggests the need for structured rating systems to rate OERs.
Keywords: critical appraisal, e-learning, free open access medicine (FOAM)

P070
Improving handovers in the emergency department: implementation of a standardized team approach
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Introduction: Handovers in the ED are a high risk area for breakdown in team communication, discontinuity of patients' clinical course, and potential medical errors. This is especially true for morning handovers at our center, when one single overnight MD working with limited resources hands over the entire ED to an oncoming day team of MDs and allied health professionals. We describe a quality improvement (QI)

project to implement an inter-professional team approach during handovers. **Methods:** This prospective QI project took place at an academic tertiary care centre with >160,000 ED visits/yr. An expert working group identified key components of the ideal morning handover, and developed an intervention consisting of standardizing the "location", "participants", and "time" components of our handover processes. A research assistant directly observed all 8am handovers for 2 weeks pre- and 2 weeks post-intervention. Outcomes include participant attendance; # of beside RN issues proactively brought forward; frequency of new allied health consults and/or involvement triggered; # of physician interruptions; and time metrics. We report descriptive statistics. **Results:** During the study period a total of 308 individual patient handovers were observed [Pre:162, Post:146]. Average duration of total handover each morning decreased from 24.9min to 16.3min ($p = 0.051$). Frequency of attendance at handovers increased for various allied health professionals, including care facilitators [Pre:35.7%; Post:91.7%, $p = 0.005$], social workers [Pre:7.1%; Post:66.7%, $p = 0.003$], geriatrics EM (GEM) RNs [Pre:64.3%; Post:83.3%, $p = 0.391$], pharmacists [Pre:0.0%; Post:58.3%, $p = 0.001$], and physiotherapists [Pre:0.0%; Post:58.3%, $p = 0.001$]. Number of specific beside RN issues proactively brought forward increased [Pre:0; Post:4, $p = 0.049$], while the number of physician interruptions during handover decreased [Pre:20; Post:0, $p < 0.0001$]. Frequency of new allied health consults and/or involvement triggered as a result of handover participation increased from 6.8% to 13.7% ($p = 0.057$). **Conclusion:** Implementation of a standardized team approach to morning handovers in the ED led to significant improvements in inter-professional contributions to patient care plans and overall efficiency. Future planned phases will build on this QI initiative by standardizing specific content of ED handovers.

Keywords: handover, patient safety, quality improvement

P071

Emergency physician attitudes and perceived barriers to take-home naloxone programs in Canadian emergency departments

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Introduction: Unintentional overdose is the leading cause of injurious death among Americans aged 25-64 years. A similar epidemic is underway in Canada. Community-based opioid overdose education and naloxone distribution (OOEND) programs distribute take-home naloxone kits to people at risk of overdose in several cities across Canada. Due to the high rate of drug-related visits, recurrent opioid prescribing, and routine encounters with opioid overdose, Emergency Departments (ED) may represent an under-utilized setting to deliver naloxone to people at risk of opioid overdose or likely to witness overdose. The goal of this study was to identify Canadian emergency physician attitudes and perceived barriers to the implementation of take-home naloxone programs. **Methods:** This was an anonymous web-based survey of physician and trainee members of the Canadian Association of Emergency Physicians. Survey questions were developed by the research team and piloted for face validity and clarity. Two reminder emails were sent to non-responders at 2-week intervals, per the modified Dillman method. Respondent demographics were collected and Likert scales used to assess attitudes and barriers to the prescription of naloxone from the ED. **Results:** A total of 347/1658 CAEP members responded (20.9%). Of the respondents, 62.1% were male and residents made up 15.6%. The majority (48.2%) worked in Ontario and 55.7% worked in an urban tertiary centre. Overall attitudes to OOEND were strongly positive: 86.6% of respondents identified a willingness to prescribe naloxone from the ED. Perceived barriers included allied health support for patient education (56.4%), access to follow-up (40.3%), and inadequate time in the clinical encounter (37.7%). In addition to people at risk of overdose, 78% of respondents identified that friends and family members may benefit from OOEND programs. **Conclusion:** Canadian emergency physicians are willing to prescribe take-home naloxone to at-risk patients, but better systems and tools are required to facilitate opioid overdose education and naloxone distribution implementation. This data will inform the development of these programs, with emphasis on allied health support, training and education.

Keywords: addiction medicine, opioids, naloxone

P072

Using the Bergman-Paris Question to detect ED seniors' cognitive impairment and functional status

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Introduction: Mild Cognitive Impairment (MCI) remains frequently undiagnosed and Emergency Department (ED) guidelines suggest screening for CI. The Bergman-Paris Question (BPQ) which is currently used in memory clinics, is a one-question screening test administered to the patient's relative; a negative answer suggests presence of CI. We sought to validate if the BPQ would be associated with MCI and functional status in ED elders. **Methods:** A planned sub-study of the prospective MIDI-INDEED study on ED-induced delirium, which included patients from 4 Canadian EDs was realized. Inclusion criteria were: patients ≥65 y.o., with and ED stay ≥8 hours, admitted to the hospital, non-delirious at the end of the first 8 hours and independent or semi-independent. Eligible patients were assessed in ED and at 60 days after ED visit using validated screening tests: the Telephone Interview for Cognitive Status-modified (TICS-m) for CI and the Older Americans Resources and Services scale (OARS) for functional status. The BPQ was asked at any time depending on the availability of a relative. Patients with a TICS-m score <31 are considered to have MCI. Data from patients with incident delirium, and those with documented dementia was individually analyzed. Univariate and multivariate analyses were used to ascertain outcomes. **Results:** 167 patients had a BPQ response, 126 (75.5%) were negative, and 41 positive (24.5%). For MCI, 40 (32.8%) patients of the negative group have a TICS-m below 31 comparatively to 6 (14.3%) for the positive group ($p = 0.2$). The BPQ was significantly associated with functional status. The mean OARS scores were 25.1 (3.9) in the negative group and 27.1 (1.3) in the positive group. This difference was maintained at 60 days. The number of delirium in the negative group was 24 (18%) vs 2 (5%) in the positive group ($p = 0.04$). **Conclusion:** BPQ could provide detection of MCI but further validation in a larger population is needed. BPQ was interestingly associated with ED-induced delirium and dementia. Detection of functional status and frailty shows good results. More research is needed to evaluate the usefulness of the BPQ "single" question for geriatric screening by ED professionals.

Keywords: mild cognitive impairment, delirium, emergency department

P073

Feasibility of emergency department targeted ultrasound for rib fracture diagnosis in minor thoracic injury

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Introduction: Rib fractures represent a frequent condition associated with Minor Thoracic Injury (MTI). Since the last decade, ultrasound have become an important part of emergency physician's (EP) daily practice, and its applications have become numerous. The main objective of this study was to evaluate the feasibility of Emergency Department Targeted Ultrasound (EDTU) for rib fracture diagnosis in patients with MTI. Secondary objectives were to 1) evaluate patients' pain during the EDTU procedure, 2) assess clinicians' degree of certitude over rib fracture diagnosis made by EDTU, 3) identify the limitations of the use of EDTU technique, and 4) compare the diagnosis obtained with EDTU to radiography results. **Methods:** Adult patients who presented with clinical suspicion of rib fractures after MTI were included. All patients underwent EDTU performed by emergency physicians (EP) prior to a rib view X-ray. Visual Analogue Scale (VAS) ranging from 0 to 100 was used to ascertain feasibility, patients' pain and clinicians' degree of certitude. Feasibility was defined as a score of more than 50 on the VAS. We also documented the radiologists' interpretation of rib view X-ray. Radiologists were blinded to the EDTU results. **Results:** Ninety-six patients were included. A majority (65%) of EP concluded that the EDTU technique to diagnose rib fracture was feasible (VAS score > 50). Median score for feasibility was 63. Median score was 31 (Interquartile range (IQR) 5-57) for patients' pain related to the EDTU examination and 72 (IQR 32-92) for the degree of certitude over the diagnosis made by EDTU. The main limiting factor of the EDTU technique was pain during patient examination (15%). **Conclusion:** EDTU examination appears to be a feasible technique for rib fractures diagnosis in the ED.

Keywords: ultrasound, Rib fracture, minor thoracic injury

P074

Impact of wearing a helmet on the risk of hospitalization after a sport injury

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Introduction: Six Canadian provinces recently made bicycle helmet mandatory and subsequent data concerning hospitalization rates after head injuries in cyclists were controversial. Furthermore, there remains an important proportion of participants who don't wear a helmet in sporting activity. We thus wanted to estimate the impact of helmet use in sport injuries on the risk of hospitalization. **Methods:** Study participants were patients of all age presenting at the emergency department of the Hôpital de l'Enfant-Jésus du CHU de Québec for a trauma that occurred in a sport in which it's possible to wear a helmet. Data were collected from information provided by the patient and from the Canadian Hospitals Injury Reporting and Prevention Program' (CHIRPP) database. Descriptive and multivariate analyses have been carried out using these data. We performed binomial logistic regression analyzes to estimate the risk adjusted for potentially confounding variables: age, sex and number of injuries. **Results:** Most patients included in the study (n = 169) were males (69.8%) aged between 10 and 30 years (50.3%). Sports most frequently involved in trauma were cycling (31.4%), downhill skiing (18.3%), snowboarding (14.8%), hockey (11.8%), and skateboarding (5.9%). Overall, 70.4% of patients were wearing a helmet at the time of injury. Helmet use in sports was associated with a reduction of 52% of the risk of hospitalization (RR: 0.48 [CI: 95%: 0.25-0.93]) after a trauma. In addition, patients not wearing a helmet had higher proportions of intracranial hemorrhage (10% vs. 1.7%) and skull fracture (8% vs 2.5%). **Conclusion:** Results suggest that helmet use decreases the risk of hospitalization for trauma sustained in sports in which it's possible to wear a helmet.

Keywords: helmets, sport injury, hospitalization rate

P075

Impact of pit-crew CPR following out-of-hospital cardiac arrest in Saskatoon

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Introduction: Between 1980 and 2008, survival rates following an out-of-hospital cardiac arrest (OHCA) have remained unchanged, averaging 7.6%. Despite the use of new and emerging technologies, new medications, and automated external defibrillators, survival remains low. Recently, a new focus in cardiopulmonary resuscitation (CPR) has shown dramatic improvements in survival post OHCA. This new model, called pit-crew CPR, focuses on minimizing interruptions in chest compressions and has each team member playing a specific role in the resuscitation, akin to the pit-crew of a car race. Certain districts in the United States and Canada have adopted the pit-crew, or a similar, high quality, maximum time-on-chest CPR model, with much success. We aim to determine whether the pit-crew model of CPR improves survival following OHCA in Saskatoon, SK. **Methods:** In Saskatoon, EMS and Fire crews respond to OHCAs and have been exclusively using the pit-crew model of CPR since Jan 1st, 2015. This study is a before and after retrospective chart analysis, comparing two groups - pre and post implementation of the pit-crew CPR model. The primary outcome is survival to hospital discharge post OHCA. Secondary outcomes include survival to admission and any return of spontaneous circulation (as per the Utstein definition). The inclusion criteria are patients >18 years old with a witnessed OHCA of presumed cardiac origin who receive CPR by EMS/Fire within the Saskatoon Ambulance service (MD Ambulance) catchment area. Patients were excluded if the OHCA was unwitnessed, or if there was a presumed non-cardiac cause for the arrest, e.g. trauma. **Results:** In the pre-pit-crew model cohort, between Jan 1st, 2011 and Sept 31st, 2014, 455 OHCAs were analyzed. In this cohort 10.5% survived to discharge, 31.9% survived to admission and ROSC was achieved in 39% of cases. The percentage of patients with initial rhythms of VF/VT, asystole or PEA were 28.5% (26%), 41.5% (1%) and 23.6% (10%) respectively, with survival to discharge shown in parentheses. The post-pit-crew cohort is still in the data collection phase. **Conclusion:** Our pre-pit crew cohort data has been collected and analyzed. With ongoing data acquisition for the post-pit crew cohort, we hope to have the full data set complete by the end of 2018. It will be at that time when we are able to determine whether the pit-crew model of CPR improves survival to discharge following OHCA in Saskatoon.

Keywords: resuscitation, prehospital, cardiopulmonary resuscitation (CPR)

P076

Delirium prevention in the emergency department using regional anesthesia with ultrasound guidance in the elderly population with hip fracture: a pilot study

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Introduction: The incidence of delirium following hip fracture is near 60%. The use of regional anesthesia (RA) with ultrasound (U/S) guidance has suggested a decrease in delirium incidence. In this pilot study, we propose to include the use of femoral block with U/S guidance in the management of the elderly population with hip fracture in the emergency department (ED) to lower the risk of delirium. **Methods:** This paired control case study was conducted from December 2013 to April 2015, and includes patients seen by emergency doctors from the ED of Hospital Enfant Jesus in Quebec City. Patients of the intervention and control groups were paired by age. Inclusion Criteria: Patients with (1) a hip fracture; (2) admitted to the hospital after their ED management; (3) and surgically repaired. Exclusion Criteria: Patients (1) with delirium upon arrival or a known mental/cognitive status (dementia, unconsciousness or severely ill status) (2) less than 60 years old (3) not able to speak English or French. Intervention group: Patients with hip fracture who received femoral blocks by the five emergency doctors who were trained and performed with U/S guidance. Control group: Patients with hip fracture who received standard pain control care by emergency doctors and who did not receive a femoral block. Analysis: Incidence of delirium and blocks performed by EM doctors were tallied. A comparison of absolute pain reduction at 30 minutes was also done. Odd ratios were derived and adjusted for age, sex, total opiates dose, delay before surgery and morbidity scores. **Results:** A total of 29 femoral blocks were performed through the analysis period. Groups were similar for age, sex and APACHE II and CHARLSON scores. A 30 minutes absolute pain reduction of 3/10 was noted. Two thirds of the blocks were performed by two ED doctors. Need for rescue medication was needed for 7% of patients for pain control at 30 minutes. Adjusted odd ratios for age, sex, morbidity scores, total opiate doses and delay before surgery revealed no decrease in delirium. **Conclusion:** Ten out of 26 patients hospitalized for hip fracture who received a femoral block under U/S guidance from the ED doctors were diagnosed with delirium. A Canadian prospective study «EDURAPID» is underway to demonstrate more the impact of R/A under U/S guidance on the incidence de delirium in this population.

Keywords: delirium, regional anesthesia, hip fracture

P077

Subcutaneous fentanyl administration for pain management in prehospital setting

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Background: Intravenous (IV) and Intranasal (IN) route for analgesic administration cannot always be used to provide adequate pain management in pre-hospital setting. **Objective:** In a rural and suburban pre-hospital setting, studying the feasibility, safety and effectiveness of the subcutaneous (SC) route for fentanyl administration by Basic Life Service-Emergency Medical Technician (BLS-EMT) for pain management, with the support of an online medical control (OLMC) center. **Methods:** Retrospective study of patients who received subcutaneous fentanyl and were transported by BLS-EMT to an emergency department (ED). Safety and feasibility were characterized by collecting vital signs, Ramsey sedation scores and adverse events following fentanyl administration, and effectiveness was evaluated by changes in pain scores. Parametric and non-parametric tests were used for statistical analyses comparing age groups (<70 & ≥70 years old) regarding transport time. **Results:** Pain scores ≥7 were found in 288 patients (14-93 years old) who were eligible for analgesia. 249 (86.5%) of the 284 (98.6%) who received subcutaneous fentanyl were included for analysis. At baseline, no difference ($p > 0.05$) in pain scores *p*re-fentanyl between groups even if patients < 70 years old received a significant higher dose of fentanyl than those ≥70 years old (1.4 ± 0.3 $^{v}/_{s}$ 0.8 ± 0.2mcg/kg, $p < 0.05$). Post-administration pain score decreased significantly while proportion of patients achieving a pain relief increased significantly ($p < 0.05$) regarding transport time (15, 30 or 45min) to ED. Adverse events were present in 1.6% of the patients [hypotension (n = 2; 0.8%), nausea (n = 1; 0.4%), and Ramsey score > 3 (n = 1; 0.4%)]. **Conclusion:** Under the supervision of an OLMC center, subcutaneous fentanyl administration by BLS-EMT for pain management seems to be a feasible approach, with a safe and effective route without major adverse event in pre-hospital setting. Pain relief increased with longer transport time. Further studies are needed to determine the benefits of SC route when compared to other administration routes in EMS.

Keywords: prehospital subcutaneous administration, fentanyl, pain management

P078

Handover education in Canadian adult and pediatric emergency medicine residencies: a national survey and needs assessment

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Introduction: Emergency department handover is a high-risk period for patient safety. A recent study showed a decreased rate of preventable adverse events and errors after implementation of a resident hand-off bundle on pediatric inpatient wards. In a 2013 survey by the Canadian Associations of Internes and Residents, only 11% of residents in any discipline stated they received a formal teaching session on handover. Recently, the CanMEDS 2015 Physician Competency Framework has added safe and skillful transfer of patient care as a new proficiency within the collaborator role. We hypothesize that significant variation exists in the current delivery and evaluation of handover education in Canadian EM residencies. **Methods:** We conducted a descriptive, cross-sectional survey of Canadian residents enrolled in the three main training streams of Emergency Medicine (FRCP CCFP-EM, PEM). The primary outcome was to determine which educational modalities are used to teach and assess handover proficiency. Secondarily, we described current sign-over practices and perceived competency at patient handover. **Results:** 130 residents completed the survey (73% FRCP, 19% CCFP-EM, 8% PEM). 6% of residents were aware of handover proficiency objectives within their curriculum, while 15% acknowledged formal evaluation in this area. 98% of respondents were taught handover by observation of staff or residents on shift, while 55% had direct teaching on the job. Less than 10% of respondents received formal sessions in didactic lecture, small group or simulation formats. Evaluation of handover skills occurred primarily by on shift observation (100% of respondents), while 3% of residents had received assessment through simulation. Local centre handover practices were variable; less than half of residents used mnemonic tools, written or electronic adjuncts. **Conclusion:** Canadian EM residents receive variable and sparse formal training and assessment on emergency department handover. The majority of training occurs by on shift observation and few trainees receive instruction on objective tools or explicit patient care standards. There exists potential for further development of standardized

objectives, utilization of other educational modalities and formal assessments to better prepare residents to conduct safer patient handoffs.
Keywords: handover, education, residency

P079

Comparison of vital sign documentation for pre-hospital "lift-assist" calls and non "lift-assist" calls

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Introduction: When an individual requires assistance with mobilization, emergency medical services (EMS) may be called. If treatment is not administered and the patient is not transported to hospital, it is referred to as a "Lift Assist" (LA) call. We have previously shown that LA are associated with morbidity and mortality. Subtle pathology may exist in those who require LAs and they may benefit from being transported to the Emergency Department for medical evaluation. Given that the majority of LA calls result in no-transport, there may be a bias towards not upholding the same standards of care as patients who are transported to hospital. Objective: To determine if there is a difference in Ambulance Call Record (ACR) documentation of vitals signs between LA calls and non-LA calls. **Methods:** All LA calls from a single EMS agency were collected over a one-year period (Jan - Dec 2013). A control group of randomly selected calls of low acuity (Canadian Triage Acuity Scale 3,4,5) from the same time period was collected for comparison. ACRs from these calls were reviewed for missing vital sign documentation. **Results:** Of 42, 055 EMS calls, 808 (1.9%) were LA calls. A comparison of 784 randomly-selected non-LA control calls were reviewed. There were significantly more missing vitals (12.08% vs 6.64% $p < 0.001$) and refused vitals (1.87% vs 0.51% $p = 0.013$). **Conclusion:** There is a significant discrepancy in the complete documentation of vital signs in LA calls vs non-LA calls. There were also significantly more patient refusals for obtaining vitals compared to transported patients. Abnormal vital signs may be a clue to a subtle disease process that has resulted in a LA call, thus care should be taken to ensure that these patients are treated with the same standards of care and documentation as those patients calling EMS for overt medical reasons.
Keywords: emergency medical services (EMS)

P080

Factors predicting morbidity and mortality associated with pre-hospital "lift assist" calls

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Introduction: When an individual requires assistance with mobilization, emergency medical services (EMS) may be called. If treatment is not administered and the patient is not transported to hospital, it is referred to as a "Lift Assist" (LA) call. We have previously shown that LA are associated with morbidity and mortality. What places patients at an increased risk for morbidity and mortality is not yet known. **Objective**: To determine factors that are associated with increased risk of 14 day morbidity, determined by an ED visit or hospital admission, and mortality in LA calls. **Methods:** All LA calls from a single EMS agency were collected over a one-year period (Jan - Dec 2013). These calls were linked with hospital records to determine if LA patients had a subsequent visit to the emergency department (ED), admission, or death within 14 days. Logistic regression analyses were run to predict ED visit or hospital admission within 14 days of the LA call from patients' age, gender, co-morbidities and vital signs at the initial LA call. **Results:** Of 42,055 EMS calls, 808 (1.9%) were LA calls. There were 169 (20.9%) ED visits, 93 (11.5%) hospital admissions and 9 (1.1%) deaths within 14 days of a LA. Patient age > 61 ($p < 0.001$) and history of cardiac disease ($p = 0.006$) significantly predicted ED visit, while patient age > 61 ($p = 0.001$) and an Ambulance Call Record (ACR) missing at least 1 vital sign ($p = 0.017$) significantly predicted hospital admission. There was a 10% increase in risk of ED visit and hospital admission for every 10 year increase of age after the age of 61. Of the 96 patients with at least 1 missing vital sign, 14 (14.5%) were coded as patient refusals. The sample size was too small to determine predictors for mortality. **Conclusion:** Patients at risk for morbidity are older than 61 years of age and have co-existing cardiac disease. Patients who are greater than 61 years of age and had at least one missing vital sign on the ACR were more at risk for hospital admission.
Keywords: emergency medical services (EMS), falls, geriatrics

P081

Adaptation of DECISION+, a training program in shared decision making on the use of antibiotics for acute respiratory infections in primary care, to the context of emergency department: a mixed methods study

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Introduction: Antibiotic overuse for acute respiratory infections (ARIs) is a significant problem in Emergency Departments (EDs). DECISION+, a training program on shared decision making (SDM) and a decision aid for antibiotic use in ARIs, reduces patients' use of antibiotics for ARIs in primary care, but has never been studied in the ED setting. The objectives of this study are to assess the intention of ED physicians to adopt SDM about antibiotic use in ARIs and to identify barriers and facilitators about adopting SDM and a decision aid for antibiotic use in ARIs. **Methods:** An adapted version of DECISION+ (1-hour seminar) was offered to physicians of two academic EDs (Quebec, Canada) in fall 2015. A validated questionnaire was administered to participants before and after the seminar. This questionnaire contains three items measuring the intention to adopt SDM using a 7-point Likert scale [ranging from 1 (very unlikely) to 7 (very likely)]. We performed descriptive analyses for demographic characteristics and a paired Wilcoxon signed-rank test to compare pre- and post-training intention to adopt SDM ($\alpha = .05$). A debriefing session with the participants identified potential barriers and facilitators about implementing SDM and using a decision aid regarding antibiotic use for ARIs. Two researchers analysed the recorded audio material. **Results:** 41% (23/56) of eligible physicians received the intervention. 74 % of participants had already heard of SDM and 40% felt they already used SDM in their practice. The median intention to adopt SDM was 6 (IQR 5-6) before and 6 (IQR 5-6) after the seminar ($P = .23$). One participant did not answer the questionnaire after the seminar and his results were excluded from the comparative analysis. We identified 20 specific barriers to adopting SDM for deciding about antibiotics use for ARIs in the ED (e.g., lack of time) and 13 facilitators (e.g., public health campaign). **Conclusion:** ED physicians' baseline intention to adopt SDM with patients for antibiotic use in ARIs is high. The adapted tutorial of DECISION+ did not change this intention. This could be explained by the social desirability of SDM. Further studies must be conducted to adapt DECISION+ to the ED setting and also to assess the impact of DECISION+ on the actual prescription and use of antibiotics for ARIs.

Keywords: shared decision making, acute respiratory infections, patient education

P082

Correlation between serum and blood gas: a review on the accuracy of electrolyte readings obtained blood gases

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Introduction: In the Emergency Department (ED), increasing time pressures and acuity require physicians to have access to quick and reliable data to guide patient care decisions. Blood gases (BGs) allow quick access to key information, and are used frequently in the ED. Our objective was to review the literature on reliability and accuracy of electrolyte measurements obtained from BGs in high acuity settings. **Methods:** A comprehensive literature review was conducted in September of 2015. The search strategy, done in conjunction with a medical librarian, identified studies that assessed the accuracy of BGs when compared to traditional laboratory serum measurements. Prior to the review we determined sodium and potassium would be the area of focus. Eligibility parameters for the studies included samples from acute care areas - the ED and ICU - and a comparison of BG and serum values taken simultaneously from the patient. **Results:** Our review included 12 studies, 9 in adult and 3 in pediatrics. There were approximately 1,135 patients included, consisting of 851 adult and 284 pediatric cases. The results were mixed; 9 studies agreed that sodium and potassium readings from BGs were accurate enough to guide acute care decisions, 5 did not. Furthermore, important questions were raised regarding the varying accuracy of BGs depending on what physiological level the electrolytes were at during the time of collection, i.e. at critical vs non-critical levels. **Conclusion**: This is the first literature review to examine the existing evidence on the accuracy of BGs in acute care environments. Given the variability in the results, a larger study needs to be done to determine the validity and reliability of blood gases for electrolytes in acute care settings. Only by ensuring the accuracy of data collected via point-of-care BGs can the most informed decisions be made surrounding patient care in acute care settings.

Keywords: blood gas, electrolytes

P083

Why do older adults in assisted living facilities use the emergency department: are all these visits necessary?

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Introduction: Special Care Home (SCH) residents require supervision for activities of daily living but not regular nursing care. Emergency Department (ED) use by seniors in SCHs is poorly studied. A recent study in Nova Scotia found seniors represented over 20% of ED visits. We studied SCH resident ED visits in a community with a population of 30,000 aged over 65 years and with 785 SCH beds, to define reasons for ED visits to a tertiary ED, and if these could be avoided. **Methods:** We performed a retrospective chart review of SCH residents' visits to an ED (SCH-ED) which has 56,000 total ED (TED) visits over one year. Reasons for visit, admission data, and avoidability were collected. A geriatrician and ED physician independently reviewed visits. Initial disagreement on avoidability (27%) was adjudicated through case discussion. **Results:** Demographic data revealed 344 ED visits by 111 SCH residents over one year; 37% of visits resulted in admission. 13.9% of residents visited the ED on at least one occasion (average 3.1 visits); mean age 78.4 years; female 66.7%; ambulance arrival 91.0%. The three most common chief complaints were *shortness of breath, weakness and abdominal pain*. Most SCH-ED visits were Canadian Triage and Acuity Scale (CTAS) Level 3 (63.4%, TED 53.3%). Of CTAS Level 3 visits, 35.3% were admitted (TED 12.9%). SCH-ED visits were avoidable in 40.6% of cases. Gastrointestinal (18%), pain (16.5%), falls, functional decline or injury (14%) and respiratory (12%) were the most common avoidable diagnostic groups, accounting for 57% of total SCH visits. **Conclusion:** ED visits by SCH residents demonstrated increased acuity and admission rates with a high number of repeat visits. Of all SCH-ED visits, 40% were potentially avoidable. Further study may determine if improved community services reduces ED visits or hospital admission. Gastrointestinal, respiratory, falls and pain diagnoses may be important areas of focus.

Keywords: assisted living, seniors, emergency visit

P084

Waiting makes me sick: is it time for formal triage in primary care?

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Introduction: Patient morbidity and mortality are influenced by delay in access to care and lack of continuity of care. Patients frequently present to the emergency department (ED) for care despite being registered with a primary care (PC) provider. Advanced access is an open scheduling system promoted by the College of Family Physicians of Canada that triages primary care (PC) patients to be seen within 24 hours, reducing care delay. We wished to determine the prevalence of formal triage systems in PC appointment allocation. **Methods:** We performed linked cross sectional surveys to quantify the number of ambulatory patients presenting to a tertiary urban ED (with an annual census of 56,000 visits) who felt unable to access primary care. PC practices were also surveyed to assess use of formal triage methods and measure access using the metric of time to third next available appointment. Descriptive statistics were calculated. **Results:** In the patient survey, 381 of 580 patients consented to participate. Of those, 324 patients reported reasons for their ED visit. Perception that wait time for PC was "too long" was reported in 73/324 (23%); 86% reported wait times of greater than 48 hours. The PC practice response rate was 63.8% (46/ 72). The mean time to third next available appointment was 7.7 (95% CI 4.9-10.5) days (median 5 days, range 0-50 days). No PC practice reported utilizing a formal triage system when booking appointments. **Conclusion:** No primary care practices in the surveyed region used a formal triage system to allocate appointments, despite a range of wait times that extended up to 50 days. The safety of primary care appointment allocation may be improved with introduction of a formal triage system, especially if overall wait times cannot be reduced.

Keywords: triage, primary care, advanced access

P085

A low-cost solution to high-risk problem: enhancing communication of emergency physician x-ray interpretations to reading radiologist

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Introduction: There was a recognized lack of available system for Emergency Physicians (EPs) to communicate their x-ray interpretations to the reading Radiologist; this resulted in unnecessary flagging of cases with significant findings already seen by the EP or the possibility of

incorrectly assuming a finding was seen by the EP. Our aim was to develop an IT-based system that permitted Radiologists to view EPs documented x-ray interpretations real-time. Based on engagement with both groups, it was essential that the system be user friendly and not add significantly to an already busy workload. **Methods:** An online reporting system was introduced in 2011, but with complaints that interpretations were not readily accessible, nor automatic. A revised system was launched in 2014 with 2 improvements: i) EP entered interpretation onto "sticky note" in PACs directly; and ii) EP interpretation "popped up" when a film was opened by Radiologist. **Results:** Both systems allowed data collection of the percentage of events EPs entered an interpretation. Prior to 2011, **0%** of films had EP interpretations available to Radiologist, **33% with** initial, and 53% with PACS. The revised system has enabled EPs to enter their x-ray interpretation which has resulted in improvement both ***subjectively***, based on regular feedback from both EPs and Radiologists, and ***objectively.*** **Conclusion:** From this and other quality improvement initiatives, we have learned the importance of engaging frontline practitioners in process changes, specifically the impact on workflow. Also, utilizing existing IT systems and resources can result in positive change with minimal costs.

Keywords: communication, x-ray, quality

P086

Accuracy of the Ottawa Ankle Rules when applied by allied health providers in a pediatric emergency department

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Introduction: The Ottawa Ankle Rules (OAR) are a clinical decision tool used to minimize unnecessary radiographs in ankle and foot injuries. The OAR has been shown to be a reliable rule to exclude fractures in children over 5 years of age. However, there is limited data to support its use by other health care workers in children. Our objective was to determine the sensitivity and specificity of the OAR, to detect clinically significant fractures, when applied by allied health providers (AHPs). **Methods:** Children aged 5 to 17 years presenting with an acute ankle or foot injury were enrolled. Patients assessed by a physician prior to an AHP, presenting for reassessment or >24 hours after the injury, having open, penetrating or neurovascular injury, or multiple injuries were excluded. Patients with metabolic bone disease, a previous x-ray, or the inability to communicate or ambulate before the injury were also excluded. Baseline data on x-ray use was collected in a convenience sample of 100 patients. AHPs then completed an OAR learning module. Then in phase 2, AHPs applied the OAR to a convenience sample of 186 patients. Both AHPs and physicians performed inter-observer assessments. **Results:** When AHP's applied the ankle portion of the OAR, the sensitivity was 88% (95% CI 46.7-99.3) and the specificity was 32.5% (95% CI 24.5-41.6) for clinically significant fractures. When AHP's applied the foot portion of the OAR, the sensitivity was 87.5% (95% CI 46.7-99.3) and the specificity was 15.6% (95% CI 7.0-30.1) for clinically significant fractures. In total, 2 clinically significant fractures (1 foot fracture and 1 ankle fracture) were missed by AHP's. Inter-observer agreement was $\kappa = 0.24$ for the ankle rule and $\kappa = 0.32$ for the foot rule. The missed ankle fracture had a positive OAR when performed by a physician as an inter-observer assessment. The missed foot fracture was a distal metatarsal fracture that was outside of the "foot zone" as defined by the OAR. **Conclusion:** The sensitivity of the OAR when applied by AHP's was very good. Both clinically significant fractures that were missed by AHP's would likely have been picked up by a physician assessment. More training and practice using the OAR would likely improve AHP's inter-observer reliability. Our data suggest the OAR may be a useful tool for AHP's to apply as a screening tool prior to physician assessment.

Keywords: Ottawa Ankle Rule, radiography, allied health providers

P087

Overview of reviews: relevant treatment modalities for management of low back pain in the emergency department

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Introduction: Low Back Pain (LBP) remains a condition with relatively high incidence and prevalence. It affects 70-85% of people at some point in their lives and causes significant disability. LBP management may be best suited to a primary care setting, yet it is one of the most common reasons for presentation to Emergency Departments (ED). Nationally representative data from the United States found that LBP related disorders are a frequent cause of ED visits, accounting for 2.7 million visits to US EDs annually. There are numerous treatment modalities for LBP, however the task is identifying those that have relevance in an ED setting. Although there is extensive research available on management of LBP in primary care settings, treatment outcomes differ from that in the ED setting. This makes management of LBP a challenge for ED physicians. Few studies and no systematic reviews focus on treatment of LBP in the ED setting. **Methods:** The objective of our study is to compare effectiveness of treatment modalities relevant for management of LBP in the ED setting. We conducted an Overview of Systematic Reviews following robust methods advocated by Cochrane. We included systematic reviews of randomized controlled trials (RCTs). A medical librarian assisted in completing of an extensive search of the Cochrane Library, PubMed, and EMBASE. We used transparent criteria to select relevant reviews and assess interventions for ED relevance. We collected key data points from the included reviews including pain and functional limitation outcomes. Evidence will be synthesized for important outcome measures following the approach of Jones et al (2012). **Results:** We screened 4740 citations and identified 346 likely relevant systematic reviews. Comparative effectiveness review synthesis will be completed before the conference. We will report effectiveness of each of the included interventions and as well as make head to head comparisons of said relevant interventions. **Conclusion:** Currently most LBP patients presenting to the ED are inundated with a variety of potential treatment modalities, all alleging efficacy in LBP management. Physicians may use the evidence from this synthesis, and related knowledge translation tools, to guide decisions in effectively treating patients presenting to the ED with LBP.

Keywords: low back pain, emergency department, treatment effectiveness

P088

British Columbia emergency practitioner workforce and training survey

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Introduction: Understanding physician human resources in British Columbia's (BC) emergency settings is essential to plan for training, recruitment and professional development programs. In 2014 we conducted an online and phone survey to the site leads for the 95 Emergency Departments (ED) attached to hospitals in BC. **Methods:** A

one-page survey was developed by the authors (JC and JM). Each hospital listed on the BC Ministry of Health's website was contacted to confirm that they had a functioning ED attached to the hospital and to determine who their site lead was. Each ED site lead was then emailed the questionnaire and up to three more follow-up emails and direct phone requests were performed as needed. **Results:** 92 of the 95 EDs completed the survey and we discovered that just over 1000 physicians deliver emergency care in BC with approximately half doing so in combination with family practice. There was an estimated shortfall of 199 physicians providing emergency care in 2014 and an anticipated shortfall of 287 by 2017 and 399 by 2019. Slightly more than half had formal certification, with 28% through the Royal College of Canada and 70% with the College of Family Physicians of Canada. **Conclusion:** More than 1000 physicians care for patients in EDs across BC but there is a significant and growing need for more physicians. There is tremendous variation across health authorities in emergency medicine certification, but approximately half of those who deliver emergency care have formal certification. Despite limitations of a survey method, this provides the most accurate and current estimate of emergency practitioner resources and training in BC and will be important in guiding discussions to address the identified gaps.

Keywords: physician human resources, training, certification

P089

Frequency of substance abuse in Albertan emergency departments: a retrospective NACRS analysis

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Introduction: Substance abuse is strongly correlated with frequent ED use, which is a known risk factor for mortality. This study aimed to examine epidemiologic trends in ED visit frequency, and visit and patient characteristics among all patients presenting to Albertan EDs with visits related to substance abuse over a five-year period. **Methods:** This is a retrospective analysis of National Ambulatory Care Reporting System (NACRS) administrative ED data for Alberta. All ED visits related to substance abuse made by adults from fiscal year 2010/11 to 2014/15 were included. Using a validated definition enhanced by expert consultation, ED visits were classified as visits related to substance abuse if a set of ICD-10 codes determined *a priori* were present within the primary or secondary diagnostic fields. Data are reported as means (with SD), medians (with IQR) and proportions. Visit and admission frequencies were compared using Chi square and Chi square trend tests. All analysis was performed using SAS 9.4. **Results:** Over the study period, 177,287 visits related to substance abuse were made to Alberta EDs. These visits were made by 77,291 unique patients, and annual patient numbers increased consistently from 17,660 in 2010/11 to 24,737 in 2014/15; 62% of patients were male and median age was 38 years (IQR 24, 49). Visits increased from 27,839 in 2010/11 to 42,965 in 2014/15 ($p < 0.001$). 50% arrived by ambulance, and were mostly triaged as CTAS 3 to 5 (32% CTAS 1 or 2, 43% CTAS 3, and 23% CTAS 4 or 5). While most of the patients were discharged, 15.6% of visits resulted in admission; statistical but not clinically meaningful differences were detected in proportions of admitted visits across the study years. Compared to the overall population of patients with substance abuse presentations, frequent presenters (with a visit number greater than the 95th percentile) appeared to be older (median age 40 years [IQR 31, 49]) and had a higher proportion of males (69%). **Conclusion:** ED presentations for substance abuse increased from 2010 to 2015 in Alberta, and frequent presenters appear to have a different demographic profile. Future study is needed to determine whether patients who present frequently with substance abuse are at increased risk for mortality as this may justify targeted intervention.

Keywords: drug and alcohol use, substance-related disorders, frequent users

P090

Comparing patients who leave the emergency department prematurely, before versus after medical evaluation: a NHAMCS analysis

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Introduction: Many patients leave the Emergency Department (ED) before beginning or completing medical evaluation. Some of these patients may be at higher medical risk depending on their timing of leaving the ED. The objective of this study was to compare patient, hospital, and visit characteristics of patients leaving prior to completing medical care in the ED either before or after evaluation by a medical provider. **Methods:** This is a retrospective cross-sectional analysis of ED visits using the 2009-2011 National Hospital Ambulatory Medical Care Survey. The target population was identified by coded dispositions corresponding to leaving prior to completing medical care, and two groups were defined based on whether or not they had been evaluated by a medical professional. Data are reported as means (with standard errors) and proportions, and bivariate and multivariate logistic regressions were performed. All analysis was performed using SAS 9.4 and SUDAAN 11.0.1 to account for the complex sample design. **Results:** 100,962 ED visits were documented from 2009-2011, representing a weighted count of 402,211,907 total ED visits. 2,646 (3%) resulted in a disposition of left without completing medical care. Of these visits, 1,792 (68%) left prior to being seen by a medical provider versus 854 (32%) who left after medical provider evaluation. Patients who left after being assessed by a medical provider were older, had higher acuity visits, were more likely to have visited an ED without nursing triage, more likely to have arrived by ambulance, and more likely to have private insurance than other payment arrangements (e.g. worker's compensation or charity). **Conclusion:** When comparing all patients who left the ED prior to completion of care, those who left after versus before medical provider evaluation differed in their patient, hospital, and visit characteristics and may represent a high risk patient group.

Keywords: patient safety, left against medical advice, left without being seen

P091

Anaphylaxis: epidemiology and treatment in a Canadian emergency department

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Introduction: As part of the multicenter C-CARE (Cross-Canada Anaphylaxis Registry) project, this study aimed to describe the characteristics of anaphylactic reactions and assess if emergency physicians follow treatment guidelines. **Methods:** A cohort study was conducted in the emergency department of Sacré-Cœur Hospital, a university-affiliated, urban tertiary care hospital. For each anaphylaxis case recruited by the treating physician, a standardised questionnaire was completed. The information for missed cases was collected retrospectively through chart

review. **Results:** Between May 2012 and May 2015, 280 cases (205 prospective and 75 retrospective) of anaphylaxis were identified from a total of 182,408 ED visits. The median age was 36.21 years (IQR 27.8), 61.8% were female, and 12.5% of all patients were children (<18 years old). The majority of reactions were triggered by food [54.3% (95% CI:48.5-60.1%)], followed by medications [18.2% (95%CI:13.7-22.7%)] and venom [5.7% (95%CI:3.0-8.4%)]. Among all cases, 66.8% (95% CI:61.3-72.3%) received epinephrine; 26.1% (95%CI:21.0-31.2%) received it prior to their arrival and 46.8% (95%CI:41.0-52.6%) in-hospital. As for other in-hospital treatments, 85.4% of patients (95% CI:81.3-89.5%) received corticosteroids, 81.1% (95%CI:76.5-85.7%) received H1 antihistamines, and 41.1% (95%CI:35.3-46.9%) received H2 antihistamines. Out of all patients who had anaphylaxis, 86.4% (95% CI:82.4-90.4%) were prescribed an epinephrine auto-injector in-hospital or had already had one prescribed. **Conclusion:** Our results reveal that food is a major trigger of anaphylaxis and that despite current guidelines, there is under use of epinephrine and preferential use of corticosteroids and antihistamines.

Keywords: anaphylaxis, treatment

P092

Clinical performance feedback to paramedics: what they receive and what they need

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Introduction: Clinical performance feedback is not always well utilized in healthcare, despite its potential in continual professional development to improve provider performance in healthcare settings. In order to more effectively incorporate performance feedback, we must evaluate the strengths and flaws of current feedback systems and determine best practices. With this goal, we sought to explore the perspectives of paramedics on the feedback they want and what they currently receive. **Methods:** We used a qualitative methodology with semi-structured interviews. A convenience sampling of practicing paramedics in the Niagara region was interviewed. We used an interpretive descriptive technique with continuous recruitment of participants until thematic saturation was achieved. Themes were identified and a coding system was developed by two investigators separately to code themes and sub-themes. These two systems were merged by consensus. We conducted a member check by contacting participants to determine if they agreed with our analysis. **Results:** 12 paramedics were interviewed. In our analysis we found several themes: positive perception/aspects of feedback and current feedback systems, current barriers, shortcomings of current systems, desire to know patient outcomes, and mental health as it relates to feedback. Positive perception of feedback has included asking for feedback, specific requests for feedback and strengths of current systems. Perceived barriers to feedback included issues around: confidentiality, practical limitations and social barriers. The limitations of current feedback systems noted the lack of feedback, and the questionable value of the feedback received. The desire to know patients' clinical course/outcomes was also a recurrent theme, with paramedics spontaneously expressing desire for feedback specific to cases, greater insight into the ultimate diagnosis and knowledge of outcomes. The mental health of paramedics was frequently discussed as well, including positive impact on job satisfaction and confidence and potential for negative impact. **Conclusion:** We have explored and generated a description of the perspectives of paramedics on feedback in general and the clinical performance feedback they currently receive. The information gained will lay the groundwork for improved feedback systems to provide paramedics with the feedback they want to continually improve as healthcare providers.

Keywords: feedback, paramedic, quality improvement

P093

The effect of Alberta's new impaired driving legislation on motor vehicle-related trauma

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Introduction: Motor vehicle collisions (MVCs) resulting in injuries and death disproportionately involve impaired drivers. Those under the influence of alcohol also have a much higher rate of presentation and admission to hospital for traumatic injuries. In an attempt to decrease impaired driving and consequently alcohol related MVCs and injuries, the government of Alberta recently introduced more strict legislation in the summer of 2012 for drivers found to be under the influence of alcohol. However, it has yet to be seen what impact the enforcement of this new legislation has had on traumatic injuries secondary to MVCs and alcohol impairment. The objective of this study was to assess the relationship between the implementation of Alberta's new impaired driving legislation and the number of alcohol-related motor vehicle traumatic injuries presenting to the emergency department of a Level I Trauma Centre. **Methods:** A retrospective single centre cross-sectional chart review examining all adult patients presenting to the ED of a major trauma centre who: a) require trauma team activation or consultation and b) have a MVC related injury. Of those charts meeting these criteria, the proportion of patients with positive ethanol screens will be compared between the year before and after the new legislation being implemented. Patients will be identified using electronic medical record logs. **Results:** 938 total MVC related trauma patients were identified during the study period (468 prior to legislation enactment [2010-2012], 470 after [2012-2014]). 33.3% of these MVC trauma patients had positive ethanol screens prior to the legislation enactment and 32.4% after (a non significant decrease). Interestingly, with a secondary analysis on a year by year basis, the trends appear to be more noteworthy. When comparing between 2010 and 2013 there was a statistically significant drop in the number of cases over legal limit by 7.74%. Subgroup analysis also demonstrated a large, statistically significant drop in 16-24 yr old cases between 2010 and 2013, from 29 to 11% (a 62% drop). **Conclusion:** While an impact was not seen immediately following the enactment of Alberta's new impaired driving legislation, a year by year analysis demonstrates a statistically significant decrease in MVC related trauma involving alcohol in the years following the new law. Of note, a substantial 62% drop was seen in the 16-24 year old age category.

Keywords: motor vehicle, trauma, alcohol

P094

The frequency of stroke risk assessment tools used to assess patients presenting to the emergency department with atrial fibrillation and flutter

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Introduction: Acute atrial fibrillation or flutter (AFF) is the most common dysrhythmia managed in the emergency department (ED). A key component of managing AFF in the ED is the prevention of stroke. Predictive indices (e.g., $CHADS_2$, HAS-BLED) should be used to assess each patient's risk of stroke and bleeding to determine the appropriate anticoagulation therapy. The frequency of use of these predictive indices in the emergency department to determine appropriate

anticoagulation therapy remains unclear. This systematic review is designed to examine the use of risk scores in the ED to determine the management of patients presenting to the ED for atrial fibrillation and flutter. **Methods:** An extensive search of eight electronic databases and grey literature was conducted. Quasi-experimental studies were eligible for inclusion. Studies had to report on the ED management of adult patients presenting with AFF to be included. Two independent reviewers judged the relevance, inclusion, and risk of bias of the studies. Individual and pooled statistics were calculated as odds ratios (OR) with 95% CI using a random effects model and heterogeneity (I^2) was reported. **Results:** From 1,648 citations, 37 studies were included in this review. Heterogeneity was very high, precluding pooling. Only one of the included studies documented the use of $CHADS_2$ scores by attending physicians; while no studies documented the use of HAS-BLED. There was variability in the ED management strategies of AFF. The utilization of rhythm control in the treatment of AFF ranged considerable (OR: 0.04-9.84) in comparison to rate control. Of the 17 studies reporting cardioversion approaches, chemical (9 {53%}) cardioversion was the most common management strategy of AFF. **Conclusion:** Our results suggests that either few physicians are documenting stroke risk scores in adult patients with AFF, or that research studies assessing ED management of AFF are not reporting scores documented by the attending physicians. Future research needs to examine the use of stroke risk scores to determine the optimal and appropriate care for patients.

Keywords: atrial fibrillation, stroke, emergency department

P095

Who, what, where: a critical assessment of helicopter emergency medical services transport and transfer times on patient outcomes at two level 1 trauma centres

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Introduction: Helicopter emergency medical services (HEMS) have become an engrained component of trauma systems to expedite transportation to a trauma centre. Ornge is a provincially run, paramedic-staffed HEMS that is responsible for all air ambulance service within Ontario, Canada. They provide transportation for trauma patients through one of three ways: scene call, modified scene call or interfacility transfer. In this study we report the characteristics of patients transported by each of these methods to two level 1 trauma centres and assess for any impact on morbidity or mortality. **Methods:** A local trauma registry was used to identify all patients transported to our two trauma centres by HEMS over a 36-month period. Data surrounding patient demographic, arrival characteristics, transport times and in-hospital course were abstracted from the registry. Statistical analysis will be used to compare methods of transport and characterize any association between mode of transport and mortality. **Results:** From January 1st, 2012 to December 31st, 2014 HEMS transferred a total of 911 patients to our trauma centers with an overall mortality rate of 11%. Of these patients 139 were scene calls with a mortality rate of 8%, 333 were modified scene calls with a mortality rate of 14% and 439 were interfacility transfers with a mortality rate of 10%. **Conclusion:** Identifying any association between the type of HEMS transport and morbidity and mortality, we may be able to predict those that need more urgent transfer to a trauma centre and find ways to decrease our overall pre-trauma center time.

Keywords: trauma, helicopter emergency medical services (HEMS)

P096

Hospitalselfie: a review of implications and recommendations on patients making video recordings in hospital

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Introduction: Smartphones are everywhere. Recent technological advances allow for instantaneous high quality video and audio recordings with the touch of a button. In Canada, physician smartphone use is highly regulated by provincial legislature and multiple policies have been published from provincial physician colleges and the Canadian Medical Protective Association (CMPA). Patients on the other hand have no such laws to observe. We set out to look at what legislation and policies exist to provide guidance to physicians in two potential scenarios: when a patient requests to record a patient-physician interaction and if a patient surreptitiously records a patient-physician interaction without consent of the physician. **Methods:** A literature review searching for articles on patient video recordings and patient smartphone use was completed on both Medline and PubMed. Further review of each provincial privacy act and communication with each provincial privacy office was performed. Consultation with each provincial physician college and the CMPA was also done to identify any policies or recommendations to guide physicians. **Results:** Patients making video recordings do not fall under any provincial privacy law and there are no existing policies from any provincial physician college or the CMPA to provide guidance. Therefore, physicians must rely on their own institution's policy regarding patient video recording in the health care setting. Be familiar with your institution's policy. If your institution does not have a policy, create one with the input of appropriate stakeholders. Patients may surreptitiously video record medical interactions without physician consent. Although this may not be permitted under an individual institution's policy, it is not illegal under the Criminal Code. Thus, it is important to behave in a professional manner at all times and assume you may be recorded at any time. **Conclusion:** The majority of patients' recordings will be done without litigious intentions, but rather with the goal of understanding more about their own health and medical care. Unfortunately there are those who will undermine the physician-patient relationship. Physicians cannot allow this to cause distrust in future relationships, nor should it force physicians to practice more defensive medicine. Physicians must continue to practice the art of medicine and accept that "performance" is a part of the job.

Keywords: smartphone, video recordings, privacy

P097

Evaluation of an oral morphine protocol for treatment of acute pain crisis in sickle cell patients in the outpatient setting

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Introduction: Sickle cell vaso-occlusive crisis (VOC) is one of the most frequent causes of emergency visit and admission in children with this condition. With this study, we aim to evaluate whether the implementation of an oral morphine protocol has led to improved care of sickle cell disease (SCD), translated by a reduced hospitalization rate, an increased oral administration rate and faster opiate administration time, comparing cohorts of patients presenting to the emergency department (ED) and hematology outpatient clinic (HOC) with VOC pre and post implementation. **Methods:** Retrospective chart review of patients with SCD followed at CHU Ste-Justine, who presented to the ED and HOC with VOC, in the year pre and post implementation of the protocol.

Patients with a VOC diagnosis during the study periods were selected in each department's database. The primary outcome was to evaluate the hospitalization rate. The rate of oral administration, as well as the opiate administration time from inscription in the ED or arrival in the HOC were also calculated. We estimated that 35 patients per arm would be sufficiently powered to detect at least a 30% rate reduction of admissions, with a power of 80% and a significance of 0.05. **Results:** Over the two periods, a total of 105 patients (49 pre and 56 post) were included from the ED and 62 patients (36 pre and 26 post) from the HOC. Both departments showed a reduction in hospitalization rate: a difference of 48% (95% CI 32, 61) in ED and 38% (95% CI 13, 57) in HOC. Both showed an increase in the rate of oral administration: a difference of 36% (95% CI 19, 50) in ED and 33% (95% CI 8, 53) in HOC. There was a non-significant difference of 10 min (95% CI -10, 25) in the opiate administration time in ED, as opposed to HOC where a significant difference of -45 min (95% CI -71, -6) was found, with both presenting median times over the recommended 60 minutes post implementation. Both settings showed an increase in the percentage of patients without IVs; a difference of 17% (95% CI 4, 30) in ED and 55% (95% CI 72, 31) in HOC. **Conclusion:** This study validates the use of our oral morphine protocol for the treatment of VOC, by showing a significant reduction in hospitalization rates. Although delays remain in our opiate administration time, our protocol decreased the number of painful IV procedures.
Keywords: pain, pediatrics, sickle cell disease

P098

Development and evaluation of a mobile simulation lab with acute care telemedicine support

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Introduction / Innovation Concept: Skillful performance is central to the provision of quality healthcare. Well-organized, deliberate practice with instruction and feedback leads to the best learning and patient outcomes. Professionals in rural/remote locations often face significant challenges in maintaining procedural proficiency and delivering acute care medical services. This is especially important with low-frequency high-stakes procedures. Simulation can play an important role in skills maintenance but limited access to simulation labs and resources in rural areas due to time, cost and distance are often prohibitive. Mobile telesimulation has the potential to facilitate high-quality instruction and overcome these barriers. Our goal is to develop a mobile simulation unit (MSU) that uses acute-care telemedicine mentoring techniques to meet the needs of rural physicians. **Methods:** The MSU design process is a prototype development series with qualitative results from each prototype (A and B) informing design and development of the next. This serves as an assessment of the functionality and set-up of the MSU for housing the simulation equipment/mannequin and providing an acceptable learning environment. The final design (C) will be evaluated for educational effectiveness. Medical students will be taught endotracheal intubation on a mannequin in the MSU under one of 2 conditions. The experimental group will receive instruction, demonstration and feedback from an expert in the telesimulation lab at Memorial University. The control group will receive the same instructions and feedback face-to-face from an expert located in the MSU. Participants will complete a retention test 1 week after the intervention. Performance between the 2 groups will be compared and user satisfaction will be assessed. **Curriculum, Tool, or Material:** The MSU will be a portable, inflatable structure equipped with telecommunication equipment to provide efficient interaction between the rural/remote learner and their instructor at a different site. The design and components of the MSU will facilitate easy transport and deployment for telesimulation in rural/remote areas. A combination of fixed and wearable cameras will facilitate instruction, demonstration and feedback to the learner. **Conclusion:** Mobile telesimulation may play an important role in overcoming the barriers of geography, cost and access to expert instruction. Implications of this research are far reaching and extend beyond healthcare education and training.
Keywords: innovations in EM education, simulation, rural medicine

P099

Development and qualitative evaluation of an emergency medicine simulation book to facilitate the use of simulation for our local EM program

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Introduction / Innovation Concept: Simulation-based medical education (SBME) has seen increased application in medical education. Emergency medicine (EM) trainees must develop a diverse skill set to smoothly transition to clinical practice and ensure optimal patient outcomes. The competency-based medical education (CBME) framework helps ensure residents develop the required expertise relevant to each of the CanMEDs roles. Simulation is a valuable supplement to hands-on clinical experience and allows skill development in a low-risk setting. The EM Simulation book serves to facilitate the effective application of simulation in our curriculum. **Methods:** A number of resources were compiled to meet the needs of our simulation program within Memorial University of Newfoundland. Personal knowledge/experience of the author and local contacts provide site relevant content. Prior training helped in review and selection of materials on simulation theory and debriefing. Core EM resources were sourced for information on procedural training. Literature review on simulation was used to compile a list of resources and materials for further reading. The development and revision of the manual continues as an iterative process with sequential edits based on review and feedback. Qualitative evaluation of the design and value of this document is planned to get feedback from key stakeholders including learners, faculty and simulation lab staff. **Curriculum, Tool, or Material:** The final product is a 94-page document provided in print and electronic format to the EM residents and several faculty involved in simulation. It introduces residents to our simulation program, provides relevant background information and orients them to this modality of curriculum delivery. Theory and rationale behind SBME is included. Information on the key role of debriefing is highlighted. Several core EM procedural topics are covered with tips on practice station set up. Additional learning resources are noted, including information on case development for potential teachers. **Conclusion:** The simulation book brings together key information to optimize the simulation-based medical education experience for EM residents at Memorial University.
Keywords: innovations in EM education, simulation, residency education

P100

It's more than just Travel CME: an embedded ethnography of a unique emergency medicine conference

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Introduction: Travel-based continuing medical education (CME) has become a popular format for physicians looking to combine education with travel. However these programs do not usually include shared group activities and when they do, they are often social, sedentary events. Emergency Medicine Update (EMU) Europe is a unique

biennial accredited CME program which combines high quality Emergency Medicine focused education with organized group physical and social activities in European locales. **Methods:** We undertook a participant observation-based ethnographic study of the EMU Europe program in Provence, France in 2015. Participant interviews and in-depth observation methods were used to understand (1) the impact of shared group activities on learning and (2) the ethos that is created during this type of program. **Results:** We describe three phenomena from the data that we feel are highly influential in the success of the program and impact on learning. The first is "social engagement and a sense of community". Involvement in group physical and social activities supports more interactive learning and people affiliate with this as a group that they enjoy and feel good learning with. The second is "a stimulating escape". This is the opportunity for high quality education and stimulating travel to be provided in an efficient package. The third is "the 'flat' faculty-learner relationships". This is created through accessibility and innovative teaching and is a key component of the quality of the education. **Conclusion:** While each trip in and of itself might be unique, there appears to be some common elements - building a sense of community, providing a stimulating escape and choosing faculty with specific teaching styles - that contribute to the educational success of this model. We will discuss how this relates to medical education theory and how it is generalizable to other groups considering this type of program. To our knowledge this is the first empirical research in this area and improves our understanding of how to leverage this approach for more effective continuing medical education.

Keywords: continuing medical education (CME), ethnography, travel

P101

Needs assessment study for the inter-professional procedural sedation course: methods of adult procedural sedation (MAPS)

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Introduction: Procedural sedation and analgesia (PSA) is a common practice for non-anaesthesiologists. While complication rates for PSA are low, many of them are preventable. Professional regulatory body requirements state that practitioners should have adequate knowledge and skills to safely administer PSA. However, no certification process currently exists to develop and maintain these competencies. A standardized PSA training course would help close the gap between the best evidence for safe administration of PSA and its implementation in everyday practice. Therefore, we conducted a needs assessment to guide the development of such a PSA training course. **Methods:** Using modified Dillman methodology, an electronic survey was sent to a convenience sample of 50 potential learners and two groups of stakeholders: 20 hospital administrators and 35 experts in PSA. Questions assessed practice demographics, experience as well as support and interest in the development and attendance of a PSA training course. Prior to distribution, the questionnaire was peer reviewed and pilot-tested for feasibility and comprehension. Responses were stratified based on clinical role. **Results:** 35 potential learners completed the needs assessment (70% response rate): 15 emergency physicians, 19 registered nurses and 1 nurse practitioner. 48% have been in practice for over 10 years and over 90% participate in PSA at least weekly. 38% received informal training in PSA while 16% obtained no training at all. 86% strongly supported the development of a PSA certification course and were in favour of an inter-professional format. 13 experts responded to the questionnaire within the departments of anesthesia, emergency medicine (EM) and respiratory therapy (37% response rate). 80% supported the need for a PSA training course. 6 hospital administrators responded to the questionnaire within the departments of anesthesia, EM, gastroenterology and respirology (30% response rate). All agreed that standardization of PSA is an important part of patient safety and 80% stated certification in PSA should be a prerequisite for granting privileges to health care professionals to participate in PSA. 60% believed the course should be developed and supported by hospital funds. **Conclusion:** There is strong support from potential learners and stakeholders for the development of a formal PSA training course.

Keywords: procedural sedation and analgesia, emergency medicine, needs assessment

P102

TeamSTEPPS: promoting a culture of safety

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Introduction / Innovation Concept: Adverse events due to medical error are a significant source of preventable morbidity and mortality in Canada's emergency departments. Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) was introduced in 2006 as a strategy to minimize these errors. Although these strategies have been available and widely implemented in hospitals over the last decade, the optimal method of teaching these tools and strategies has not been elucidated. **Methods:** We endeavoured to introduce a twelve month longitudinal TeamSTEPPS program to physicians, nurses, and allied health care professionals in a busy tertiary care hospital via a multi-pronged approach consisting of group huddles, props in the department, and several social media strategies. Dedicated observers in the emergency department recorded the use of the strategies by staff members to identify improved and sustained use of TeamSTEPPS behaviours after they were introduced. **Curriculum, Tool, or Material:** The program that consists of five modules to improve patient safety outcomes: Team structure; Leadership; Situation Monitoring; Mutual support; and Communication. Each module consisted of educational tools including posters in the department explaining the concepts, twice weekly department huddles to discuss the importance of the monthly topic and promote team sharing with real life examples, as well as stimulating and generating discussions around the monthly theme on social media (Facebook, Twitter, and an on-line blog). For several modules, extra prompts, such as I PASS the BATON handover cards were also provided to act as reminder visual cues. The first two modules were rolled out with on-line music videos rewritten to promote the significance of the modules. A team performance observation tool was adopted from the TeamSTEPPS program, and behaviors were evaluated and recorded under the five domains. **Conclusion:** Although unable to detect a meaningful difference in our pre and post-implementation observations, we present a novel approach to educating a multi-disciplinary team about TeamSTEPPS in a busy emergency department, along with the challenges encountered in this unique area of research, and recommendations for further study to interested parties. The TeamSTEPPS program likely could offer as much to the emergency department as similar programs have to the aviation industry yet it requires extensive investigation within this health care venue.

Keywords: innovations in EM education, patient safety, communication

P103

Emergency medicine as a career choice: what influences medical students throughout their schooling?

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Introduction: Practicing emergency medicine (EM) involves rapid decision-making in an acute setting, broad knowledge and a strong ability to multi-task. Some medical students find these characteristics attractive, while others find them a deterrent. Previous studies have indicated the range of characteristics that interest undergraduate students. No studies have followed students to assess how attitudes towards EM careers evolve over their schooling. **Methods:** An open-ended survey of medical students' career interests was distributed at five data-collection points over the four years of undergraduate training from 1999-2006 at Memorial University. Guided by principles of grounded theory the qualitative data was coded to identify key themes and sentinel quotes. Semi-structured interviews with academic emergency physicians at Dalhousie University were then conducted to assess the relevance of these findings to postgraduate training (in progress). These transcripts were analyzed in the same manner as the longitudinal surveys. **Results:** 1281 surveys were completed by 540 students, with 758 comments about EM. The biggest drawbacks of EM included lack of patient follow-up and lack of experience in EM; the biggest benefits included variety of cases and patients, congruence with previous life experiences, and elective experiences. One major theme was the Certificant of the College of Family Physicians (CCFP) EM training, as it meant a shorter residency that was more transferrable to rural settings. Lifestyle was a prominent theme, seen as positive by some and negative by others. Emergency physicians commented on students' naivety, especially relating to media and the nature of the work early in their training. **Conclusion:** Medical students' opinions of EM tend to shift throughout their schooling, in particular, the perception of the work. Medical students' perceptions differ significantly from that of experienced emergency physicians, highlighting the need for a greater degree of mentoring. Perceptions of lifestyle in EM are highly variable amongst students, acting as both a benefit and a drawback. Medical schools may be able to improve clinical exposure and provide more informed career counselling with respect to emergency medicine. Residency program directors can consider these findings during recruitment and interviewing to determine whether students have a realistic view of the specialty and career trajectory.

Keywords: undergraduate medical education, career choices, qualitative

P104

Literature review of telemedicine for trauma patients in rural areas

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Introduction: Trauma is the leading cause of death among people under 40. With more than 7 million Canadians living over one hour's travel from a level 1 or 2 trauma center, access to quality trauma care in Canada is a major concern. We recently reported that more than 40% of rural EDs across Canada were more than 300 km from levels 1 and 2 trauma centers. Direct transportation to trauma centers is therefore unusual and most trauma cases are initially managed in rural EDs. Assistance from trauma centers via telemedicine could thus be valuable in optimizing initial stabilization and inter-facility transfers. **Objective:** Is telemedicine a potentially effective intervention for improving rural trauma care? **Methods:** We conducted a literature review to examine the potential impact (number of transfers, transfer times, length of hospital stays and mortality) of telemedicine on rural trauma care. Two reviewers independently searched PubMed, Embase and Cochrane databases with key words / concept combinations: telemedicine, trauma and rural. Articles included in the final review had to address the question with specific methodologies. After duplicate removal, 312 articles were found relevant. After independent review of titles and abstracts, only 25 articles pertained to the specific question. Only three studies met inclusion criteria. **Results:** These studies reported 187 successful teleconsultations in the context of rural trauma care, 29 of which involved significant interventions (8 interventions potentially lifesaving). Some unnecessary inter-facility transfers were avoided. However, transfer times to trauma centers and length of hospital stays appeared slightly longer with telemedicine. **Conclusion:** The literature on the efficacy of telemedicine in trauma care is scarce, with only three studies addressing the question. Conclusions generally favor telemedicine, but additional research must should determine its impact and better understand the barriers/facilitators to the implementation of telemedicine for rural trauma care.

Keywords: rural emergency departments, telemedicine, literature review

P105

Patient outcome feedback in emergency medicine

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Introduction: Emergency medicine (EM) is characterized by one time patient encounters where the end diagnosis is often unknown. Seeking patient outcome feedback, (POF) which is defined as following a patient's clinical course once they leave your care, is crucial as it can highlight a discord between an intended verses actual result, thus spurring clinical change. This study seeks to determine whether EM staff and residents currently seek POF, the types of patients followed and the barriers faced. **Methods:** An online survey was administered to all EM staff and residents (CCFP-EM and FRCP) working at a tertiary academic hospital to determine their current practices and attitudes towards POF. **Results:** A total of 72 responses were received, of which 41 were residents and 31 were staff, for an overall response rate of 95%. If feedback was sought, the most commonly used tools were looking up imaging results (52%) and talking to EM colleagues (42%). The patients most frequently followed were those with a poor outcome during their ED admission, sick patients with unclear final diagnosis or unplanned returns within 48 hours (55%, 58%, 34% respectively). However, up to 30% of respondents never or rarely sought out POF even in these situations (16%, 19% and 30% respectively). Patients least commonly followed were those where the diagnosis was more certain. Respondents identified many barriers, primarily being time (83%), not being notified about bouncebacks (79%) and remembering which patients to follow (70%). Barriers were amplified for residents as they had a harder time accessing or automatically receiving POF. The most useful tools not currently available, would be being able to easily create electronic tracking lists, being automatically sent discrepant imaging reports and automatic notification of patients who return to the ED within 48hrs. Also, automatic follow up information on patients who experienced a negative outcome or on sick patients with unclear diagnosis is desired. **Conclusion:** POF is a useful and crucial practice for clinical care, but is currently not often performed. The most commonly used tools are those that are easiest to access, and POF was mainly performed on patients with either negative results or unclear diagnoses. Thus, identifying the types of patients deemed most relevant for receiving POF and addressing the major barriers faced by clinicians can help improve the frequency with which POF is sought, potentially improving patient care.

Keywords: outcome feedback, treatment outcome, patient care

P106

Healthcare utilization among homeless and/or substance using adults presenting to the ED

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Introduction: Substance use and unstable housing are associated with heavy use of the Emergency Department (ED). This study examined the impact of substance use and unstable housing on the probability of future ED use. **Methods:** Case-control study of patients presenting to an urban ED. Patients were eligible if they were unstably housed for the past 30 days, and/or if their chief complaint was related to substance use. Following written informed consent, patients completed a baseline survey and health care use was tracked via electronic medical records for the next six months. Controls were enrolled in a 1:4 ratio. More than 2 ED visits during the follow-up was pre-specified as a measure of excess ED use. Descriptive analyses included proportions and medians with interquartile ranges (IQR). Binomial logistic regression models were used to estimate the impact of housing status, high-risk alcohol use (AUDIT) and drug use (DUDIT), and combinations of these factors on subsequent acute care system contacts (ED visits + admissions). We controlled for age, gender, comorbidities at baseline, and baseline presenting acuity. **Results:** 41 controls, 46 substance using, 91 unstably housed, and 31 both unstably housed and substance using patients were enrolled ($n = 209$). Median ED visits during follow up were 0 (IQR: 0-1.0) for controls, 1.0 (IQR: 0-3.3) for substance using, 1.0 (IQR: 0-4.0) for unstably housed and 4 (IQR: 2-12.3) for unstably housed and substance using patients. The median acute care system contacts over the same period was 1.0 (IQR 0-2.0) for controls, 1.0 (IQR: 0-4.0) for substance using, 1.0 (IQR: 0-5.0) for unstably housed and 4.5 (IQR: 2.8-14.3) for unstably housed and substance using patients. Being unstably housed was the factor most strongly associated with having > 2 ED visits ($b = 3.288$, $p < 0.005$) followed by high-risk alcohol and drug use ($b = 2.149$, $p < 0.08$); high risk alcohol use alone was not significantly associated with ED visits ($b = 1.939$, $p < 0.1$). The number of comorbidities present at baseline was a small but statistically significant additional risk factor ($b = 0.478$, $p < 0.05$). The model correctly predicted 70.1% of patients' ED utilization status. **Conclusion:** Unstable housing is a substantial risk factor for ED use; high-risk alcohol and drug use, and comorbidities at baseline increased this risk. The intensity of excess ED use was greatest in patients who were unstably housed and substance using.

Keywords: substance use, homelessness, utilization

P107

Does the use of bedside ultrasound to identify intrauterine pregnancy in the emergency department shorten the length of stay of patients presenting with 1st trimester vaginal bleeding or pelvic pain?

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Introduction: The use of point of care ultrasound (POCUS) has increased rapidly in the emergency department (ED) over the last 10 years. This study seeks to determine whether the use of POCUS to identify intrauterine pregnancy in the ED shortens the length of stay of patients presenting with first trimester pregnancy-related complaints at The Scarborough Hospital (TSH). **Methods:** A prospective chart review of women seen at TSH ED for first trimester pregnancy-related complaints was conducted from March 1, 2014 to December 30, 2014. ED physicians were asked to record the names of patients assessed using POCUS in the ED along with their findings during the study period (experimental group). Health Records data was used to find all patients seen in the emergency department during the study period with the chief triage complaint of "Pregnancy Issues < 20 weeks" (control group). **Results:** A total of 378 patients were identified in the control group and 61 patients were recorded in the experimental group. The outliers were removed from both groups. The POCUS identified an intra-uterine pregnancy (POS IUP) in 47.5% and no definite intrauterine pregnancy (NDIUP) in 52.5%.In the control group, 82.0% proceeded to obtain a formal ultrasound (FUS) after the POCUS. Patients found to have a POS IUP on the POCUS spent 141.48 ± 100.95 minutes in hospital, while patients found to have NDIUP spent 197.10 ± 132.48 minutes in hospital ($p = 0.07$). The POS IUP group spent statistically significantly less time in hospital when compared to the control group ($p = 0.001$). In the POCUS group, patients seen between 1700 and 0800 (i.e. when FUS is not available) spent significantly less time ($p = 0.02$) in hospital (113.13 ± 118.07 minutes, $n = 24$) when compared to patients seen between 0800 and 1700 (208.28 ± 106.35 minutes, $n = 36$). **Conclusion:** For first-trimester pregnancy-related complaints, POCUS has been shown to be effective in reducing the time that patients spend in hospital at TSH. This difference was especially apparent when POCUS was used at times when FUS was not available. Despite the apparent reluctance of many ED physicians to discharge patients without a FUS, even after identifying a POS IUP on the POCUS, it was evident that this technology was saving time for both physicians and patients.

Keywords: ultrasound, point-of-care ultrasound (PoCUS)

P109

Identifying patients who may benefit from extracorporeal membrane oxygenation (ECMO) after cardiac arrest in the urban emergency departments of Saskatchewan

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Introduction: Emergency physician-initiated Extracorporeal Membrane Oxygenation (ECMO/ECPR/ECLS) is gaining critical mass as a successful rescue strategy for patients requiring resuscitation. Wang et al. (2014), Bellezzo et al. (2012) and others have demonstrated promising results of survival to discharge with good neurological function in patients who were resistant to existing treatment protocols after out-of-hospital cardiac arrest. As Saskatchewan does not yet utilize ECMO for cardiac arrest, the objective of this study was to examine the number of adult cardiac arrest patients in the urban emergency departments (EDs) of Saskatchewan who may benefit from the use of ECMO. **Methods:** Using a retrospective review, we identified 401 patients who died after presenting with cardiac arrest between January 1st, 2013 and December 31st, 2014. Of the original 401, 136 were female and 264 were male, with a mean age of 60.1 ± 20.2 years. The charts of 22 (5.5%) trauma patients were excluded because the suitability of ECMO in these patients is uncertain. **Results:** For the 379 non-trauma patients, the mean resuscitation length was 41.6 ± 32.8 minutes (median = 42 minutes) and 125 of these patients received prehospital mechanical CPR. We applied Bellezzo et al.'s (2012) inclusion and exclusion criteria to identify prospective candidates for ECMO. In total, 53 patients (14.0%) with a mean age of 57.1 ± 13.4 years old, represent suitable candidates for ECMO. 260 (68.6%) were deemed unsuitable either because they failed the inclusion criteria or met explicit exclusion criteria. The remainder (66 [17.4%]) were

unsuitable because of age. **Conclusion:** With 1 in 7 patients potentially representing suitable candidates for ECMO, this is a technique that warrants consideration for implementation in the EDs of Saskatchewan.
Keywords: resuscitation, extracorporeal membrane oxygenation, cardiac arrest

P110

Relapse in patients managed in the emergency department for acute asthma: a systematic review

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Introduction: Despite the provision of evidence-based care, approximately 15% of patients discharged from the emergency department (ED) after being treated for asthma exacerbations will relapse within two weeks. This study summarizes the evidence regarding relapses and factors associated with increased relapse in patients discharged from EDs after being treated for asthma exacerbations. **Methods:** Comprehensive literature searches were conducted in seven electronic databases; manual and grey literature searches were performed. Studies tracking outcomes for adults after ED management and discharge were included. Methodological quality was assessed using the Newcastle-Ottawa Scale (NOS) and the Risk of Bias (RoB) tools. Studies were summarized using medians and interquartile ranges (IQR) or mean and standard deviation ($\pm$ SD), as appropriate. **Results:** From 793 potentially relevant citations, 178 articles underwent full text review and 10 studies involving 32,923 patients were included. The majority of the studies were of high quality according to NOS and RoB tools. Relapse proportions were $8 \pm 3\%$, $12 \pm 4\%$, and $14 \pm 6\%$ at one, two, and four weeks, respectively. Female sex was the most common statistically significant reported factor associated with an increased risk of relapse within 4 weeks of ED discharge for acute asthma. Other factors significantly associated with relapse were past healthcare utilization and symptom duration. **Conclusion:** After ED management and discharge of acute asthma, a considerable proportion of patients will relapse within the first four weeks. Factors such as female sex, past healthcare utilization, and symptom duration were commonly and significantly associated with relapse occurrence. Identifying patients with these features could provide guidance to clinicians during the ED-discharge decision-making.
Keywords: asthma, relapses, knowledge synthesis

P111

Presentations for hypoglycemia associated with diabetes mellitus to emergency departments in a Canadian province: a database and epidemiological analysis

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Introduction: Diabetes mellitus (DM) is a major chronic disease. Prevalence of diabetes was 9% globally in 2014 and 9.3% in Canada and 7.2% in Alberta in 2015. Complications of the disease are numerous and frequent. Hypoglycemia is one complication of diabetes treatment. The objective of this study was to quantify and characterize presentations by adults to Alberta emergency departments (EDs) for hypoglycemia associated with type 1 (T1DM) or type 2 (T2DM) diabetes. **Methods:** A retrospective cohort study was conducted using data for Alberta for a five-year period (fiscal years 2010/11-2014/15). Data were sourced from an administrative database: National Ambulatory Care Reporting System (NACRS). Records of interest were those with an ICD-10-CA diagnosis of DM-associated hypoglycemia (i.e., E10.63, E11.63, E13.63, or E14.63). A descriptive analysis was conducted. **Results:** Data extraction yielded 7,835 presentations by 5,884 patients. The majority of presentations were by males (56.2%) and median patient age was 62. These episodes constituted 0.08% of presentations to Alberta EDs and they occurred at an event rate of 0.67 episodes per 100 patient-years (95% CI: 0.66-0.69). The annual rate of presentations decreased by 11.8% during the five-year period. Most presentations (63.4%) involved transportation to the ED via ambulance. Relative to LOS for ED presentations for all reasons, average length-of-stay (LOS) was 3.2x longer and 1.4x longer for discharged and admitted patients, respectively. For 27.5% of presentations, an X-ray was obtained. Most hypoglycemic episodes (65.2%) were considered to be of moderate severity while 34.3% were considered to be severe. None were mild because all involved access to an ED. The condition mainly (absolute terms) afflicted people with T2DM and urban areas; however, it disproportionately afflicted people with T1DM and rural areas. **Conclusion:** For a condition that is largely preventable with effective blood glucose management, DM-associated hypoglycemia incurs significant healthcare resource use. People with DM would be better served with more effective and safer euglycemic agents.
Keywords: diabetes, hypoglycemia, epidemiology

P112

Cost of hypoglycemia associated with diabetes mellitus: a systematic review of the literature

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Introduction: Diabetes mellitus (DM) is a major chronic disease. Many patients with DM suffer hypoglycemic episodes that may be mild, moderate or severe, requiring ambulance and emergency department (ED) services. The cost of these DM-associated hypoglycemic episodes in the ED is not well understood. This study identified literature on DM-associated hypoglycemia costs that were incurred in acute care settings, with particular interest in the ED setting. **Methods:** The methods of this systematic review were based on an *a priori* protocol. The literature searches involved 12 databases. Study selection and quality assessment were conducted independently by two reviewers. Costs from included studies were standardized to year 2014 Canadian dollars. Mean with standard deviation (SD) and median costs with interquartile range (IQR) were calculated whenever possible. **Results:** The systematic search yielded 1,164 studies and 62 were included. The largest proportion of studies (45%) originated from USA data. Quality of included studies varied widely. Although none of the studies were purely a cost analysis of DM-associated hypoglycemia in the ED, 15 studies reported some ED costs. Median DM-associated hypoglycemic episode costs were $1,187.15 in the ED and $1,288.92 irrespective of setting. More severe episodes were more costly; costs were 8.5 times higher in the inpatient setting than in the ED. Episode costs were 18-45% higher for patients with Type 2 DM than Type 1. Direct costs comprised 80% of total costs. **Conclusion:** Acute episodes of DM-associated hypoglycemia are costly. These episodes also often require hospitalization; the highest costs are incurred by admitted patients with Type 2 DM. More studies are needed to better understand the costs associated with ED use by patients with DM-associated hypoglycemia.
Keywords: diabetes, hypoglycemia, cost

P113

Presentations for hypoglycemia associated with diabetes mellitus to emergency departments in a Canadian province: a database and cost analysis

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Introduction: Diabetes mellitus (DM) is a common chronic disease. The Canadian Diabetes Association (CDA) estimated that the national direct cost of DM accounts for approximately 3.5% of public healthcare spending. The economic burden has been estimated to be $12.2 billion in 2010 and projected to increase by $4.7 billion (38%) by 2020. For the province of Alberta, the estimated cost was $1.3 billion in 2015 and $1.7 billion for 2025. The cost of lesser complications of DM like hypoglycemia is not as well understood. The objective of this study was to estimate the health system cost of presentations by adults to Alberta emergency departments (ED) for hypoglycemia associated with type 1 (T1DM) or type 2 (T2DM) diabetes. **Methods:** A retrospective cohort study was conducted using administrative data for Alberta for a five-year period (fiscal years 2010/11-2014/15). Data were sourced from an administrative database: National Ambulatory Care Reporting System (NACRS). Records of interest were those for ED patients with an ICD-10-CA diagnosis of DM-associated hypoglycemia. A top-down approach was used to estimate costs, excluding physician and ambulance fees. This involved resource intensity weight (RIW), cost of a standard hospital stay (CSHS), and adjustment for inflation (to average value of Canadian dollar for Alberta for January-September 2015). A descriptive analysis was conducted. **Results:** Data extraction yielded 7,835 presentations by 5,884 patients. The median RIW was 0.0547. RIWs are centered at 1, thus the resource-use/cost of these presentations is well below that of the "average" case. Estimated costs per episode ranged from $108.63 to $4,136.59 with median of $431.11 (IQR: 369.40-639.50). Median episodic subgrouped costs were as follows: sex: $427.72 for males, $439.20 for females; DM type: $411.61 for T1DM, $511.63 for T2DM; date period: $835,862.09/year, $69,655.17/month, $16,030.23/week, and $2,288.78/day. **Conclusion:** Using population-based administrative data, we identified median costs for DM-associated hypoglycemia of approximately $430/case. Given the frequency, this condition incurs significant healthcare resource use and costs; continued efforts to reduce these ED visits seem worthwhile.

Keywords: diabetes, hypoglycemia, cost

P114

Considering perceptions of patients and knowledge users in the design of an emergency-based acute asthma educational trial

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Introduction: Educational interventions driven by the needs of users can help move evidence into practice. This study considered the perceptions of patients and knowledge users in the design of an educational intervention in acute asthma directed from Emergency Departments (EDs). **Methods:** A mixed methods design with two phases was used. In phase I, convenience samples of asthmatics presenting to the University of Alberta Hospital ED and primary care providers (PCPs) from Edmonton were invited to participate in a survey. Perceptions with respect to: a) an ideal local opinion leader (OL) in ambulatory asthma care; and b) content, style and delivery methods of OL educational interventions in acute asthma were collected. In phase II, focus-group discussions were conducted to further explore preferences and expectations for such interventions; self-perceived barriers and facilitators for implementation were assessed. **Results:** Overall, 54 patients completed the survey; 39% preferred receiving guidance from a Respirologist, 44% during their ED visit and 56% through individual discussions. In addition, 55% expressed interest in having PCP follow-up within a week of discharge. A Respirologist was identified as an OL in ambulatory asthma by 59% of the 39 responding PCPs. All expressed interest in receiving notification of their patients' ED presentation, most within a week and including diagnosis and ED/post ED-treatment. Personalized and guideline-based recommendations were considered to be the ideal content by the majority; 39% requested this guidance through an educational pamphlet faxed to their offices. In the focus groups, patients and PCPs recognized the importance of health professional liaisons in the ED to PCP transition of care; patient anxiety and time constraints were identified as potential barriers for ED-educational information uptake and proper post-ED follow-up, respectively. **Conclusion:** Messages arising from patients and PCPs help tailoring study interventions to meet local needs and expectations. Overall, patients and physicians are seeking ways to mitigate problems with transitions in care. This contact with the practice environment also facilitates the identification of potential determinants to implementation and knowledge uptake.

Keywords: respiratory, education, knowledge translation

P115

An analysis of current and forecasted patient visits to Ontario's emergency departments and its effect on hospital admissions

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Introduction: The number of emergency department (ED) visits across Ontario has increased annually over the past two decades leading to overcrowding and longer wait times. ED volume forecasting may provide insight to strategic planners regarding future patient volumes and the effects on health care resources. We investigated the pattern of ED use at the local health integration network (LHIN) level and developed forecasts using historical data. The forecasts were then used to examine the effect on acute care hospital bed requirements and the number of full time equivalent physicians needed. **Methods:** Aggregated data from the Canadian Institute for Health Information for the period 2003 to 2013 was obtained for each of Ontario's LHINs. The total number of ED visits per year was first quantified by LHIN and then simple linear regression was used to forecast patient volumes in 2018 and 2023. The rate of hospital admission by LHIN was also calculated. We then used the forecasted volume, admission rate and the total number of acute care hospital beds by LHIN to predict the total number of beds needed by LHIN. Based on the forecasted patient volumes and the hours of coverage model, the total number of full-time equivalent physicians needed was calculated. **Results:** Over the study period, the number of patients increased from 4 to 37% among LHINs. Admission rates generally decreased from 2003 to 2013. Based on historical trends, all EDs across Ontario are expected to experience increased patient visits in the future but at different rates of growth. Depending on the rate of growth in ED visits, the number of acute care beds needed by LHIN is somewhat variable and affected by the proportion of alternate level of care patients. Given, the forecasted increase in patient volume, the hours of coverage model suggests that approximately 320 additional full-time equivalent ED physicians are needed across the province by 2023. **Conclusion:** Although all forecasts inherently have a degree of error associated with their estimates, strategic planners require some

quantitative prediction of future events to develop initial plans. Through research, these predictions can be focused and refined. The results suggest that many hospitals will experience increased demand for services and will have to do resource allocation planning accordingly to ensure patient demand is met appropriately.
Keywords: patient flow, health human resources, admission

P116

An analysis of pediatric visits to a tertiary care centre in Northern Ontario, Canada

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Introduction: The Thunder Bay Regional Health Sciences Centre (TBRHSC) Emergency Department (ED) has experienced an all patient increase in visits ranging from 1.5 to 6% per year since 2004. As a regional referral centre with no dedicated pediatric ED, TBRHSC is the sole emergency provider. Given the rising visits, we have investigated the pattern of pediatric visits, rates of admission to hospital and for a subset of years the investigations completed. **Methods:** Pediatric visits from 2004 to 2014 were summarized for the TBRHSC ED. The pattern of visits was examined along with the rate of admission to hospital. We also investigated the trend in acuity over the study period. Laboratory and imaging data are purged 1 year after each visit and were not available prior to 2011 but were summarized for the remainder of the years to identify the rates of all investigations completed. **Results:** From 2004 to 2014 there was a total increase in visits of 7.5% with the average annual admission rate ranging from 5 to 6.3%. The month to month variability in visits over the study period was high with a minimum of 1292 in August 2004 and a maximum of 2488 in October 2009. Nearly all patients were either CTAS II, III or IV, with level III having the highest occurrence. The mean investigation rate was approximately 16, 0.8, 24, and 2.3% of patients having laboratory, CT, x-ray and ultra-sound completed, respectively. **Conclusion:** Pediatric patients are an important subset of all patients visiting the ED. They often require special resources and at the TBRHSC use specific treatment spaces. In addition, there is a limited number of pediatric inpatient hospital beds. Managers could use the timing of visits, number of visits and admission rates to examine resource use and the probability of exceeding capacity. This study also provides baseline information on the rates of investigations, especially imaging such as CT which can have long-term radiological consequences.
Keywords: pediatrics, patient flow, diagnostic investigations

P117

Does an age-adjusted D-dimer threshold provide adequate sensitivity in ED patients investigated for pulmonary embolism?

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Introduction: The D-dimer assay is a high sensitivity, low specificity test used to rule out pulmonary embolism (PE) in low risk ED patients. Patients with a positive D-dimer result will likely undergo CT imaging to confirm the diagnosis. Given the time, cost, and radiation exposure associated with CT, and the higher false-positive rate in older patients, an age-adjusted D-dimer threshold may be preferred. Our objective was to evaluate the sensitivity and specificity of an age-adjusted D-dimer and approximate the downstream effect on CT imaging utilization. **Methods:** This was a retrospective cohort study conducted using administrative data from Calgary emergency departments between July 2013 and January 2015. Eligible patients were individuals aged 50 and older who were undergoing PE workup including D-dimer testing. Outcomes were ascertained using CT imaging reports and by searching the regional administrative database for subsequent diagnosis of PE within 30 days of the index visit. These data were used to calculate the sensitivity, specificity, positive predictive value, and negative predictive value of the D-dimer test using the standard threshold (500 ng/mL) and an age-adjusted threshold (10 ng/mL x patient age as an integer). From this, the potential reduction in CT imaging use and missed PE diagnoses were modeled. **Results:** Of 6669 patients aged 50 or older who had D-dimer testing for possible PE, 1504 (22.6%) underwent a CT scan, and 217 (14.4% of CT) received a discharge diagnosis of pulmonary embolism, which was confirmed on chart review. When test results were re-interpreted using an age-adjusted threshold, D-dimer specificity increased from 63.9% to 75.4%, while sensitivity decreased from 96.5% to 89.9%. This translates to 888 new true negatives, representing CT scans potentially avoided (a 59% reduction in CT utilization), but with 18 new missed PE diagnoses. **Conclusion:** The age-adjusted threshold may reduce use of CT imaging among older patients suspected of PE, but at the cost of more missed PE diagnoses.
Keywords: pulmonary embolism, D-dimer, diagnostic imaging

P118

The utility of serum markers for diagnosing septic arthritis in the emergency department: do rigid cut-offs improve diagnostic characteristics?

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Introduction: Septic arthritis represents one of the most severe diagnoses for a presentation of an acutely swollen joint, with a high level of morbidity and mortality associated with delayed management. There is continued interest in the utility of serum markers of inflammation in diagnosing this dangerous condition, however there is a lack of clear consensus for cut-offs that optimize diagnostic performance for these tests. The objective of this study was to perform a systematic search of the literature to identify optimal cut-offs for commonly ordered serum markers and to assess how these cut-offs perform in a cohort of patients with a diagnosis of septic arthritis. **Methods:** We performed a systematic literature search aimed at identifying optimal cut-offs for serum makers (white blood cell count (WBC), erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP)) used for diagnosing septic arthritis. We assessed the use of these markers within a retrospective cohort (n = 87) of patients diagnosed with septic arthritis (based on positive gram stain, culture, or treatment with a prolonged antibiotic course and/or surgical intervention) that presented to one of four emergency departments in Calgary over a two-year period. We then compared published values to local data. **Results:** We identified 10 articles that evaluated diagnostic characteristics for serum markers. Although there was variability for cut-offs reported in the literature, classically WBC >11 x 10^9/L, ESR >30 mm/h, and CRP >100 mg/L were reported to modestly increase the likelihood ratio of diagnosing septic arthritis. In our cohort, a complete blood count was ordered in the emergency department in 97% (n = 84) subjects. ESR and CRP were ordered in 66% (n = 57) and 85% (n = 74) of patients, respectively. When comparing the classic literature based cut-offs to our population group, a WBC <11 x 10^9/L was found in 38% (n = 32), ESR <30 mm/h in 51% (n = 38), and CRP <100 mg/L in 30% (n = 17). Sensitivity was found to be poor (61% for WBC >11 x 10^9/L; 70% for ESR >30 mm/h; 48% for CRP >100 mg/L). **Conclusion:** Data collected from the Calgary Emergency Department supports the published literature suggesting that serum tests are not helpful in the

diagnosis of septic arthritis. Future work should evaluate these diagnostic characteristics in relation to patients with non-infectious monoarticular joint pain.
Keywords: septic arthritis, serum markers, diagnosis

P119

B-mode point-of-care ultrasound without doppler may help include or exclude significant carotid stenosis in stroke and transient ischemic attack patients - a prospective pilot study

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Introduction: Emergency physicians can use B-mode Point-of-Care Ultrasound (POCUS) to identify a patient's carotid vasculature including the common carotid artery (CCA), and carotid bulb (CB) as well as carotid bifurcation into the internal carotid artery (ICA) and external carotid artery (ECA). Radiology performed carotid ultrasound (RPCU) is performed using both B-mode and spectral Doppler ultrasound, a combination termed "duplex" ultrasound where first arteries are evaluated for stenosis using B-mode ultrasound, which is followed by flow measurements using Doppler. Performing flow measurements using Doppler may add a significant amount of time to the ultrasound, which makes it impractical for an emergency physician in a busy emergency department. Some institutional practices include arranging for outpatient RPCU to assess patients with Transient Ischemic Attack (TIA) and have them follow up in an outpatient TIA clinic. This study explored whether B-mode POCUS without Doppler may help identify Stroke or TIA patients in the emergency department with significant carotid stenosis (CS) by measuring the CCA, CB, and ICA lumen. **Methods:** Adult patients with an emergency physician diagnosis of stroke or TIA who were sent for RPCU were included in this study. An emergency medicine resident in their POCUS fellowship training performed a B-mode POCUS of the patient's right and left CCA, CB and ICA with the patient sitting 90 degrees. Three measurements of each of the 3 sections were obtained and the mean calculated. This was then compared to the results from the RPCU as CS $>50\%$ or CS $<50\%$. **Results:** 38 patients were included in the study between February and June 2013. We observed a correlation between absolute differences in comparing the right side of the carotid vasculature to the left side of the carotid vasculature with CS $>50\%$. Also, in one case, the absolute lumen diameter with B-mode POCUS without Doppler predicted near complete CS which was confirmed on the RPCU. **Conclusion:** B-mode POCUS without Doppler may be useful in identifying patients with CS above and below 50% and may help identify patients who need expedited referrals for CS. However, further research is required before this method can be recommended.
Keywords: point-of-care ultrasound (PoCUS), carotid stenosis

P120

Exploring the utility of the Hamilton early warning score at triage: pilot study in a Canadian emergency department

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Introduction: Early warning scores (EWS) use vital signs to identify patients at risk of critical events as defined by unplanned intensive care unit (ICU) admission, cardiopulmonary resuscitation (CPR), or death. Systems that combine an EWS with a ICU outreach team can improve hospital survival and cardiac arrest rates. Although initially developed for use in ward patients, evidence suggests that EWS are useful in emergency department (ED) patients and may aid in the earlier identification of sepsis. The Hamilton Early Warning Score (HEWS) was recently developed as part of quality improvement process in our health system. The current study examined HEWS at ED triage among a cohort of patients who experienced a critical event during their hospitalization. HEWS were also evaluated as a predictor of sepsis. **Methods:** Patient were selected from a database of patients admitted to a medical or surgical ward at two tertiary care hospitals over a six-month period. Cases were patients who experienced a critical event during admission and were admitted via the ED. Controls were randomly selected from the database in a two-to-one ratio using an algorithm to match cases based upon burden of comorbid illness. Receiver operator curves (ROC) and likelihood ratios were used to evaluate HEWS at ED triage as a predictor of likelihood of critical deterioration and sepsis. **Results:** The sample included 845 patients of whom 267 experienced a critical event. The median time to occurrence of critical event from admission was 124 hours. ROC analysis indicated that HEWS at ED triage had poor discriminative ability for predicting likelihood of experiencing a critical event 0.63 [95%CI: 0.58-0.67]. HEWS had fair discriminative ability for predicting likelihood of meeting criteria for sepsis 0.75 [95%CI: 0.71-0.80], and good discriminative ability for predicting likelihood of experiencing a critical event among patients meeting criteria for sepsis 0.80 [95%CI: 0.74-0.86]. **Conclusion:** This retrospective study indicates that HEWS at ED triage has limited utility for identifying patients at risk of experiencing a critical event. This may be because deterioration commonly occurred days after admission. However, HEWS may have utility as tool for aiding earlier identification of critically ill septic patients. Prospective studies are needed to further delineate the utility of the HEWS in the ED.
Keywords: triage, early warning scores, sepsis

P121

Does test-enhanced learning improve success rates of ultrasound-guided peripheral intravenous insertion? A randomized-controlled trial

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Introduction: Optimising teaching techniques when introducing learners to new skills such as ultrasound guided peripheral IV insertion (UGPIV) is essential due to the time and resource intense nature of skills learning. The testing effect has been demonstrated to be effective in improving learner retention, however there is little research evaluating the testing effect on the acquisition of technical skills in medicine. This study aims to determine whether test-enhanced learning improves learner performance of UGPIV. **Methods:** A prospective randomized control trial is ongoing with medical students on rotation at Sunnybrook Health Sciences Centre. Participants are randomized to one of two study groups, the control group (CG) and the test-enhanced learning group (TEG). Each group receives a teaching session lasting 1.5 hours surrounding ultrasound guidance for peripheral IV insertion. The TEG receives a formal evaluation of the skill during the last 15 minutes of that session, whereas the CG has continued practice time. Subjects in both groups are being evaluated two weeks later to compare skill performance using an objective structured assessment of technical skills. **Results:** Data collection is ongoing and is expected to be completed with an recruitment of 40 by March 31st. **Conclusion:** Given the importance and resource intensive nature of technical skill training it is important to have an understanding of the most efficient ways to teach new techniques. The results from this study will help provide evidence on the testing effect as a method of improving competency and retention for ultrasound guided procedures.

Keywords: education, ultrasound, procedure

P122

The use of decision support tools in the implementation of the Prehospital Canadian Triage Acuity Score (Pre-CTAS)

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Introduction: The Prehospital Canadian Triage and Acuity Scale (Pre-CTAS) is based upon, and is consistent with, the CTAS (Canadian Triage and Acuity Scale). Paramedic-assigned Pre-CTAS scores using memory compared to Triage Nurse CTAS scores have previously demonstrated moderate inter-rater reliability. This is the first study to measure the effect of two different point-of-care decision support tools on the inter-rater reliability of paramedic assigned Pre-CTAS and Triage nurse CTAS scores. **Methods:** Paramedics were randomized to Pre-CTAS booklet or CTAS smartphone app during the one-year study period. Pre-CTAS scores assigned on arrival at hospital (AH) were compared with Triage Nurse CTAS scores and analyzed using Cohen's Kappa. Paramedics were then surveyed to assess the perceived utility and satisfaction with the decision support tools. **Results:** For 1663 patient transports, the weighted kappa score for Paramedic AH vs. Triage Nurse CTAS was fair at 0.38 (95% CI 0.35-0.41). For patients whose initial on-scene and AH Pre-CTAS scores did not change (n = 1405, 85%), Paramedic-Triage Nurse agreement was moderate at 0.43 (95% CI 0.39-0.46). The survey revealed that tools, when employed, helped assign scores; however accessing the additional resource was cumbersome or time consuming, and scores were occasionally assigned post clinical encounter. **Conclusion:** Point-of-care external decision support tools did not affect Pre-CTAS and ED CTAS agreement. These tools may add complexity or be perceived to add time to documentation within the delivery of clinical care if not implemented with adequate support. Future research needs to evaluate the impact of clinical decision support embedded within an electronic patient care record consistent with many ED information systems.

Keywords: Pre-CTAS, clinical decision support, paramedic

P123

Missed fractures on radiographs in a pediatric emergency department

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Introduction: About 3-8% of fractures are missed in the adult emergency department (ED). No study has examined this in a pediatric ED. Such data is essential to quality improvement. We sought to determine the proportion of missed fractures on x-rays in a pediatric ED, the location of missed fractures and associated factors, and if missed fractures were clinically significant. **Methods:** We did a retrospective cohort study from Jan 1 to Dec 31, 2013 of 1000 pediatric patients with a fracture on x-ray in our academic pediatric ED. We randomly reviewed radiologist reports to find new fractures. A fracture was missed if identified by the radiologist but not the ED physician. Data was collected on patient, fracture, department and physician characteristics and change in management or complications. Descriptive statistics were used for clinical characteristics. The proportion of missed fractures was computed using the Wilson score method. Factors associated with missed fractures were investigated using chi-squared test. **Results:** Of 1000 x-rays, 19.4% (95% CI 17.0-22.0%) had at least one fracture missed. However, when possible fractures were removed for further analysis, 13.9% (95% CI 11.7-16.5%) were missed. The bones most associated with missed fractures were pelvis (60%,) carpal (50%,) vertebra (42.9%,) and patella (33.3%) ($p < 0.001$.) However, these accounted for only 12.5% of missed fractures whereas ulna (31.3%,) metatarsal (14.1%,) phalynx of the hand (9.4%,) and fibula (7.8%) accounted for the greatest number of missed fractures. The fracture types most associated with a missed fracture were styloid, Salter-Harris IV, Salter-Harris I, compression, avulsion and buckle ($p < 0.001$.) The presence of multiple fractures was associated with missed fractures (35.0% vs 7.2%, $p < 0.001$) as was older age (11.2 vs 9.5 years, $p = 0.001$). Most missed fractures were not clinically significant (71.9%) but some required splinting or limitation of activities. One had decreased function at 2 months. **Conclusion:** Overall, the proportion of missed fractures is higher than in adults, stressing difficulties with reading pediatric x-rays. Most missed fractures were not of clinical significance. Carpal, patella, vertebra and pelvis fractures were particularly challenging but were also rare. Ulna, metatarsal, phalynx of the hand and fibula accounted for the greatest number of missed fractures. More education may help improve physician skills in recognizing these fractures.

Keywords: fracture, medical error, imaging

P124

The Ottawa Chest Pain Rule would increase stretcher capacity if implemented for cardiac chest pain patients

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Introduction: Reducing the number of patients requiring cardiac monitoring would increase system capacity and improve emergency department (ED) patient flow. The Ottawa Chest Pain Rule helps physicians identify chest pain patients who do not require cardiac monitoring and is based on a 'normal or non-specific' ECG and being pain-free on initial physician assessment. Our objective was to measure the impact that the implementation of this decision rule would have on cardiac monitoring bed utilization in adult EDs in Calgary. **Methods:** A convenience sample of patients was prospectively obtained at each of the four Calgary adult emergency sites. All patients presenting with the Canadian Triage Acuity Scale chief complaint of "cardiac pain", or "chest pain with cardiac features" were captured for inclusion in the study. Real time interviews and survey assessments were conducted with the primary nurse and physician involved in each patient's care. **Results:** A total of 61 patients were captured by the study. Physicians identified cardiac as the primary rule-out pathology in 51% of these patients. The average Heart Score of all study patients was 4.2, and 30% of patients were ultimately admitted. Physicians believed that 39% of the 61 patients needed cardiac monitoring, while primary nurses believed that 59% needed monitoring. Of the 61 patients, 59% were triaged to areas providing cardiac monitoring. The application of the Ottawa Rule would have allowed 47% of patients triaged to cardiac monitoring to be taken off cardiac monitoring. This would translate to a total of greater than 74 hours saved or a reduction of 30% of the total cardiac monitored patient time. **Conclusion:** The Ottawa rule appears to be a low-risk emergency department flow intervention that has the potential to help reduce resource utilization in emergency departments. This change may result in increased emergency department capacity and improved overall patient flow. This simple rule based only on ECG findings and absence of chest pain can easily be applied and implemented without increasing physician workload or increasing risk to patients.

Keywords: cardiac monitoring, chest pain, clinical decision rule

P126

Analysis of acute pain management in the emergency department of a large private hospital in Cape Town, South Africa

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Introduction: Pain is a common presenting complaint amongst emergency department (ED) patients. Evidence suggests that pain is often inadequately and inconsistently treated resulting in oligoanalgesia. Patients that do not have their pain timeously recognised and treated end up with an inferior patient experience in the ED. It was speculated that pain management in Panorama Mediclinic ED was not optimal and an in-depth analysis of pain management trends was performed in order to lead to a targeted intervention which would result in better care in the ED. **Methods:** A convenience sample of 100 random folders was collected from May-July 2015. Folders with presenting complaints excluding pain and children under 10 years of age were excluded. The data were collected onto a password protected Excel database and analysed using basic descriptive analysis. **Results:** 44% of patients included were green triage category, 30% yellow, 23% orange and 1% red. 82% of patients presented with verbal pain scores greater than 5/10. The average time to receive analgesia was 60.26 minutes. 33.3% of patients only received analgesia after being in the ED for >60 minutes. Of those patients receiving delayed analgesia, the majority of their pain scores were between 6-8/10. Abdominal and extremity pain together consisted of 51% of the anatomical pain distribution. 29% of the patients sampled received no analgesia during their visit to the EC and the majority of their pain scores were between 3-6/10. Intravenous acetaminophen, intravenous opioids and intramuscular opioids are by far the most common pharmaceutical agents to treat acute pain in this ED. **Conclusion:** This study demonstrated that acute pain is not well managed in the ED of Panorama Mediclinic. Subsequently an acute pain management protocol was implemented in which all patients with pain scores greater than 5/10 are offered early analgesia on initial presentation to the ED by the triage nurse.

Keywords: pain, analgesia, pain management

P127

Use of nt-probnp biomarker amongst cardiologists and emergency physicians to diagnose acute heart failure in the undifferentiated dyspneic emergency patient

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Introduction: Diagnosing the undifferentiated dyspneic emergency department (ED) patient remains a challenge for clinicians; in order to rule in or out acute heart failure (AHF) natriuretic peptide biomarker testing has evolved and is recommended by cardiology international guidelines to be utilized in these presentations. However there is equipoise in the emergency community for its use, largely due to perceived modest test specificity. We sought to analyze this apparent clinical dichotomy as part of a multicenter trial of undifferentiated dyspneic ED patients. **Methods:** Patients with dyspnea presenting between October 2010 and October 2013 to one of four ED sites -2 Canadian, 1 American, 1 New Zealand- were assessed by certified staff emergency physicians (EPs) and their chest Xray reviewed. Those patients with undifferentiated dyspnea with a potential for AHF (ie further investigated or treated for AHF but investigated and/or treated for another cause) were consented and enrolled. Two of the sites (American, New Zealand) had NT-proBNP assay ordered as a standard of care for these patients; the other 2 sites did not. At the end of Emergency care, the EP recorded the primary diagnosis of the dypnea-either "AHF" or "Not AHF." Blinded adjudication was carried out by 2 cardiologists after reviewing sequential records: first, with index ED records but no NT-proBNP result; second, with the NT-proBNP result and lastly, with follow up 60 day records (deemed the gold standard diagnosis). EP accuracy between NT-proBNP and no NT-proBNP sites and NT-proBNP accuracy using standard cutpoints were calculated, as were the number of adjudicated cases influenced by exposure to NT-proBNP. **Results:** 197 patients were enrolled, 107 at NTproBNP sites and 90 at the other 2 sites. EP accuracy was 76% for either site. NT-proBNP used as a binary test with recommended age-stratified cutoffs had 80% accuracy, applied to 70% of patients (30% remained in "gray zone").Cardiology adjudicators reversed 16% of initial diagnoses upon exposure to NT-proBNP result, ultimately diagnosing 41% of patients with AHF. **Conclusion:** This study supports the clinical equipoise amongst emergency physicians compared to cardiologists for the use of NT-proBNP in diagnosing acute heart failure in the undifferentiated dyspneic Emergency patient.

Keywords: acute heart failure, biomarkers

P128

Patterns of injurious falls on snow and ice in public pedestrian areas

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Introduction: Maintenance of public pedestrian walkways to ensure safety can be onerous during Canadian winters. The costs of maintenance should be weighed against the potential for reducing injuries related to falls. Ice and snow covered surfaces can increase the chance of falling by 3.5 times compared to normal concrete surfaces. The objectiveof this study is to examine patterns of injury occurrence in persons injured when falling due to snow or ice in public areas. **Methods:** We identified persons presenting to emergency departments in Kingston, ON for treatment of injuries related to falls on ice or snow for a 5 year period ending in March 2015 using data from the Canadian Hospital Injury Reporting and Prevention Program(CHIRPP). Within CHIRPP, there is a series of variables that describes the injury event, location and circumstances. Hospital medical records were reviewed for additional information on anatomic injuries sustained and subsequent use of hospital based resources.Variables were managed and assessed in Excel. A descriptive analysis examined distributions of variables by subgroups of injury occurrence. **Results:** 674 injury cases of falls on snow and ice were identified. 316 cases (46.9% of cases/ about 60 per year) occurred in public pedestrian areas, the group of primary interest. Of these: 88 cases (27.8%) resulted in fractures; 68 (21.5%) were soft tissue injuries; 46 (14.6%) were head injuries, concussions or intracranial injuries; and 40 (12.7%) were sprains or strains. Of the fractures, 37 (42.0%) involved the upper limb and 33 (37.5%) involved the lower limb. 72 (81.8%) of fractures were managed in the emergency department with orthopedics referral or follow up. The large majority of sprains or strains (85.0%), soft tissue injuries (80.9%) and head injuries (82.6%) were managed in the emergency department without plans for hospital based follow up. **Conclusion:** Falls on snow and ice frequently occur on public pedestrian areas. The resulting injury can be significant, leading to fractures in upper and lower limbs. These fractures require more use of hospital based resources than other injury types. It is hoped that providing municipal decision makers with information on the frequency and severity of these injuries will lead to improved snow and ice removal in public pedestrian areas.

Keywords: falls, fracture

P129

The impact of high performance physician training on resident wellness and clinical performance

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Introduction / Innovation Concept: There are numerous research studies in the medical literature, which demonstrate how the experience of a medical residency can contribute towards burnout. The escalating performance pressures and expectations during residency training have the potential to negatively impact upon physician health and clinical performance. The purpose of this prospective cohort study was to test the effectiveness of the High Performance Physician (HPP) program among General Surgery residents at the University of Manitoba with regard to burnout and clinical performance. **Methods:** This program was delivered over a 9-week period. All 26 residents were asked to complete the Maslach Burnout Inventory - Human Services Survey (MBI-HSS). Each resident then participated as the team leader for a 15-minute trauma resuscitation simulation. Three attending physicians from Surgery & Emergency Medicine assessed resident performance and ability to manage work-based stressors. Following the simulation, each resident received a debrief interview. Once the HPP curriculum had been completed, residents took part in a second high fidelity simulation session and again completed the MBI-HSS. **Curriculum, Tool, or Material:** The HPP program offered through the Department of Emergency Medicine (EM), is a performance enhancement based curriculum. It is designed to equip physicians with mental skills to help optimize focus, arousal control, stress management, communication, and teamwork. Further, to utilize these skills to cope and respond more effectively to the inherent performance pressures that may present within one's area of specialization. **Conclusion:** The Emotional Exhaustion domain of the MBI-HSS demonstrated a statistically significant decrease. The other domain scores were not statistically significant. Simulation domain scores did not demonstrate a statistically significant difference in performance between the pre- and post-HPP curriculum simulation sessions. A summative content analysis of the interview data demonstrated that residents believed internal barriers to situational awareness were the most significant impact on performance. Further study is required to determine if differences are seen in long-term follow-up.

Keywords: innovations in EM education, resident wellness, clinical performance

P130

Incidence and characteristics of ventricle fibrillation in patients with ST-elevation myocardial infarction in a suburban pre-hospital setting

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Introduction: *Background:* Ischemic ventricular fibrillation (VF) is highly related to ST elevation myocardial infarction (STEMI). Pre-hospital STEMI patients have been shown to also develop VF during ambulance transport. However, there is limited literature exploring the characteristics of this specific population of VF. *Objective:* To determine the incidence of pre-hospital VF, and evaluate some demographic and electrocardiogram (ECG) characteristics of STEMI patients having VF while transported by ambulance in a Quebec suburban pre-hospital setting. **Methods:** A retrospective study from 8th August 2006 to 6th December 2015 of 937 STEMI patients transported by ambulance in the Chaudiere-Appalaches region, south of Quebec City. Destination for treatment was either Catherization Laboratory (CL) or the nearest Emergency Department (ED) for reperfusion treatment and was mainly based upon a maximum transport time of 60 minutes, from the first confirmed STEMI-ECG to the CL. Demographics and ECG characteristics were extracted from the patients care records. SPSS-20 was used for descriptive statistics. **Results:** 937 patients (259 women & 678 men) diagnosed with STEMI were included in the study. Patients were regrouped in V1-V4 leads STEMI (336; 35.9%) and in other leads STEMI (651; 64.1%). 52 (5.55%) of all STEMI patients had FV during ambulance transport. There were 10 women (27,4%) and 42 men (72,6%). Of these, 28 had V1-V4 STEMI (28/336; 8.33%) while 24 had other leads STEMI (24/651; 3.69%). Relative risk of FV is higher (225%) with V1-V4 STEMI compared to other leads STEMI. Regarding age groups, patients from 60 to 70 years old represent 38.4% (20/52) of FV for 25.7% (241/937) of STEMI patients while those over 80 years old had 3.85% (2/52) of FV, but were 17% (159/937) of all STEMI patients. Men seem also more at risk for FV (16/20) especially between 60 and 70 years old compare to other age group. **Conclusion:** In this suburban area, VF occurred in 5.55% of STEMI patient's transported by ambulance. STEMI patients over 80 years old had a low rate of FV. Being a man, 60 to 70 years old, with a STEMI located in V1-V4, seems to be associated with a higher risk of VF. More studies are needed to confirm these results and explore other characteristics associated to pre-hospital VF.

Keywords: pre-hospital ventricular fibrillation, electrocardiogram (ECG), myocardial infarction

P131

Emergency department falls risk management screening tool comparison

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Introduction: Emergency Department (ED) fall risk screening has been newly implemented in Alberta based on Accreditation Canada requirements. Two existing inpatient tools failed to include certain ED risk conditions. One tool graded unconsciousness as no risk for falling, and neither considered intoxication or sedation. This led to the development of a new fall risk management screening tool, the FRM (Tool1). This study compared Tool1 with inpatient utilized Schmid Fall Risk Assessment Tool (Tool2) and the validated Hendrich II Fall Risk Model (Tool3). **Methods:** Patients ($\geq$17 years old) in a tertiary care adult ED with any of the following; history of falling in the last 12 months, elderly/frail, incontinence, impaired gait, mobility assist device, confusion/disorientation, procedural sedation, intoxication/sedated, or unconscious were included. Forms were randomized to score patients using different paired screening tools: Tool1 paired with either Tool2 or Tool3. Percent agreement (PA) between the tools based on identification of a patient at either risk/no risk for falling; higher PA indicating more tool homogeneity. **Results:** A total of 928 screening forms were completed within our 8-week study period; 452 and 443 comparing Tool1 to Tool2 and Tool1 to Tool3, respectively. Thirty-two forms included only Tool1 scores, excluding them from comparative analysis. The average patient age (n = 895) was 64.8 ± 21.4 years. Tool1 identified 66.4% of patients at risk, whereas Tool2 and Tool3 identified only 19.2% and 31.4%, respectively. Tool1 and 2 had a PA of 50.2%, whereas Tool1 and Tool3 had a PA of 65.9%. **Conclusion:** The FRM tool had higher agreement with the validated assessment tool, identifying patients at risk for falling but better identified patients presenting with intoxication, need for procedural sedation and unconsciousness. The other tools generally miss these common ED conditions, putting

these patients at risk. Validation and reliability assessments of the FRM tool are warranted.
Keywords: fall risk, risk management, emergency nursing

P132

Developing and piloting a nurse-initiated falls risk screening tool in the emergency department

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Introduction / Innovation Concept: With aging, increasing complexity, and prolonged emergency department (ED) stays, patient falls are an increasing problem. Accreditation Canada recently listed falls risk management (FRM) as a required operational practice (ROP). The University of Alberta ED had no screening tool or education program specific to falls. Gaps in identifying patients with altered consciousness, intoxication, or are undergoing procedural sedation were noted in the Alberta Health Services (AHS) recommended tool. This gap led to the development piloting of an ED specific FRM screening tool. **Methods:** A literature review was completed to assess current fall assessment tools and their applicability to the ED. No ED specific tools were identified leading to the development of the FRM tool. Prior to the FRM tool being piloted, nursing staff were asked to respond to a voluntary survey on their perceived knowledge of falls management followed by a survey testing their actual knowledge. They were then educated on the FRM and protocol through in-services, power point presentations, and fact sheets. A post education knowledge survey was then sent out. Multidisciplinary working groups provided feedback throughout the pilot, resulting in modifications prior to final implementation. **Curriculum, Tool, or Material:** The FRM tool consists of 10 variables with a maximum score of 20. Variables included are: falls in the last 12 months? Mechanical (1), Physiological (2), Multiple (3); age ≥70 or frail (2); mobility assist device (1) confusion or disorientation (5); impaired gait (1); incontinence (1); intoxicated (3); procedural sedation (3); and unconscious (5). All except for the last 3 variables were adapted from inpatient risk tools. Patients were categorized as low (1-2 points), moderate (3-4 points), or high risk (5+ points) and those scoring ≥3 had a safety protocol implemented. The survey regarding perceived knowledge for management of falls led to an average score of 86.6% (n = 46). When tested on their actual knowledge they scored 48.8% (n = 29). Following training on the FRM tool and protocol, the actual knowledge of 18 respondents averaged 83%. **Conclusion:** The FRM screening tool has been implemented and a comparative study looking at ED risk predictability matched to existing falls risk scores. Based on research findings the FRM will be considered for a provincial implementation.
Keywords: fall risk, risk prevention, nurse screening

P133

Characterizing how institutionalized and community-dwelling elderly patients use emergency department services in Regina, Saskatchewan

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Introduction: In light of recent local initiatives aimed at improving emergency department (ED) patient flow, we sought to characterize how patients aged 65 and older who reside in long term care (LTC) facilities utilize the services of the EDs in Regina, Saskatchewan as compared to an age-matched comparison of community dwelling individuals. **Methods:** A retrospective chart review was performed with a convenience sample of the first 50 patients who presented to each ED at both hospitals in Regina starting January 1, 2012 for each population. Two separate patient populations were included: those who reside in the health region run LTC facilities and those who live in the community. We abstracted data from a variety of different clinical, demographic and administrative parameters. **Results:** The charts of 100 patients were reviewed for the LTC population (54 females, mean age 82.6) and 99 patients for the community dwelling population (55 females, mean age 77.3). The CTAS distribution for the LTC patients was found to be CTAS 1: 5%, CTAS 2: 9%, CTAS 3: 43%, CTAS 4: 33% and CTAS 5: 10%. For the community dwelling individuals, the distribution was CTAS 1: 1%, CTAS 2: 21%, CTAS 3: 44%, CTAS 4: 22%, CTAS 5: 10%. This is a significantly different distribution ($p = 0.047$). From the LTC population, we found that 50% of patients were admitted, with 46% being discharged and 4% leaving without being seen. Furthermore, we also noted that 75% of patients were brought to the ED by EMS. From the community dwelling population, we noted that 43% of patients were admitted, with 55% being discharged and 1% leaving without being seen. This population used EMS services 41% of the time. With respect to length of stay, LTC patients had a mean duration of 5.7 (±4.3 hours) compared to 4.8 (±4.0) hours for the non-LTC population ($p = 0.111$). **Conclusion:** Our findings suggest that the highest volume of acuity for the LTC patients falls within the CTAS 3 or 4 categories whereas there is a higher proportion of CTAS 2 acuity patients in the community dwelling population. Exactly half of our LTC sample was admitted as compared to 43% of the community population. The LTC population also required EMS services for a considerably higher proportion of their presentations to the ED (75% compared to 41%). It is our intent that the findings of this study will help guide future quality improvement initiatives.
Keywords: geriatrics, long term care, quality improvement

P134

Evaluating barriers to clinical decision rule integration: a qualitative analysis

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Introduction: Clinical decision rules for computed tomography (CT) ordering in pulmonary embolism and mild traumatic brain injury have been shown to be under-used in clinical practice. Current literature does not explain why these validated decision rules continue to be under-used despite evidence of inappropriate use and increased costs. To better evaluate potential barriers to their use, qualitative methods involving focused interviews were conducted amongst emergency department (ED) physicians. **Methods:** Physicians were recruited via a brief presentation at Calgary Zone ED rounds. Ten attending and resident physicians (4 female, 6 male) were interviewed. Questions were designed to evaluate potential barriers to the integration of decision rules into the computerized order entry system. Interviews were audio-recorded and transcribed manually. A high-level thematic analysis was conducted to draw primary themes from open-ended questions, and responses were totaled for closed-ended questions. **Results:** Emerging themes suggest concerns surrounding timing of rule application in relation to test ordering, patient influences on ordering, and overuse reporting. All 10 physicians believed decision rules for CT ordering play a large role in the ED, and 8 were in favor of integration into the order entry system. However, over half expressed concern, noting that their thought process begins before order entry. A majority prioritized shared decision-making with patients. However, 8 indicated that patient expectations influence their ordering. A majority agreed that there is CT overuse in the ED, but many were hesitant in concluding that overuse

was primarily physician dependent. **Conclusion:** Primary barriers to decision rule integration are timing of application, hesitation surrounding patient input, and uncertainty over data. Physicians often make decisions prior to order entry. Mobile copies of decision rules should be available to better facilitate compliance. Concerns over patient influence on ordering are common. Patient-friendly materials on clinical decision rules should be available to better facilitate shared decision making while still promoting decision rules. While overuse is agreed upon, many prefer to see and track their own ordering data before supporting a physician-targeted intervention. Data reports to physicians may help affirm physician-associated overuse, and reinforce their role in responsible resource utilization.
Keywords: clinical decision making, resource utilization, imaging

P135
Canadian emergency medicine residents' training and competency in end-of-life care: a needs assessment
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Introduction: Emergency Physicians (EPs) face growing numbers of palliative care patients presenting to the emergency department (ED). Formal training for EM residents across Canada in this area is not well described. We sought to describe the training Canadian emergency medicine (EM) residents receive in end of life care issues, their attitudes toward it, self-reported knowledge and skills, and the importance they place on further training in this domain. **Methods:** We conducted an electronic survey across Canada. We collected demographic data, previous education in palliative care, attitudes toward end of life care, and a self-assessment of competency and desires for further training in the main components of palliative care pertinent to EM. We used simple descriptive statistics, a Mann-Whitney test to assess whether previous formal training in palliative care affected current comfort level, and a combination of self-reported knowledge and importance levels placed on key areas. **Results:** We received 112 responses from 17 different Universities in Canada, with 42% from the CCFP training stream, and 58% from the FRCP stream. Fifty-four percent of respondents had not completed a palliative care rotation during residency or fellowship, which was overwhelming accounted for by FRCP residents (13%, vs. 82% among CCFPs). Having completed formal training in palliative care was significantly associated with general comfort in managing terminally ill patients ($p < 0.0001$). Sixty percent of subjects felt a lack of knowledge and skills was their main limiting factor in providing ideal care for terminally ill patients in the ED. The skills deemed highest priority with lowest comfort level among residents included discussing withdrawing and withholding care, prognosticating, pharmacology and other symptom control. Preferred methods of receiving palliative care teaching included simulation, bedside teaching and small groups. **Conclusion:** The care of acute illness among palliative care patients is substantially underrepresented in the Canadian EM curriculum, particularly for FRCP trainees. Formal training is associated with increased comfort in caring for patients at the end of their life. High yield teaching interventions could be directed toward knowledge of withdrawing, prognosticating and symptom control. Simulation, bedside teaching and small groups are the preferred method for receiving such teaching.
Keywords: palliative care, end-of-life care, education

P136
A quality improvement initiative to optimize appropriate testing for venous thromboembolism in the emergency department
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Introduction: Venous thromboembolism (VTE) is a common diagnostic consideration among patients presenting to the emergency department (ED) and often requires the use of diagnostic testing. A normal d-dimer (DD) blood test can exclude VTE and eliminate the need for costly imaging and the associated contrast medium and radiation exposure. The purpose of this quality improvement initiative was to increase the use of DD testing for patients with a low and intermediate clinical pretest probability of VTE, increase the use of ventilation perfusion scans (VQ) as an alternative to CT pulmonary angiogram (CTPA) and decrease the use of CTPA and venous doppler ultrasound (VDUS) at St. Michael's hospital. **Methods:** A multi-specialty team developed an ED specific algorithm set for appropriate VTE testing that were posted on the ED online portal along with a poster in each zone of the ED after an ED launch campaign with request for feedback. A run chart was used to track DD, CTPA, VQ and VDUS utilization. Two-sided T-test comparison was conducted to compare pre- and post-implementation utilization. **Results:** Physician feedback was positive regarding the use of: DD in VTE intermediate risk patients and the VTE algorithm set. Feedback was negative for DD turnaround time. We found a significant increase in DD use (77 tests per month to 93; $p = 0.013$), but no significant change in the use of CTPA (27.3 per month to 30; $p = 0.38$), VDUS, or VQ. Number of monthly ED visits remained constant. **Conclusion:** This intervention increased DD utilization, but measuring appropriateness will require prospective collection of clinical pre-test probability. Integrated risk stratification and decision aids into computer physician order entry may be necessary to track and improve appropriateness.
Keywords: quality improvement, venous thromboembolism, utilization

P137
Emergency department discharge information sheets - a prescription for success?
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Introduction / Innovation Concept: Effective communication between health providers and patients is central to patient safety, health education and patient empowerment. Previous studies in the Calgary Zone demonstrated that less than fifty percent of emergency department patients thought discharge handouts communicated health information well and even fewer thought the handout information would aid them in care at home. A partnership between the Department of Information Design, Mount Royal University and the Department of Emergency Medicine, University of Calgary, seeks to provide an innovative solution to this problem. **Methods:** The Calgary Zone Department of Emergency Medicine has partnered with the Mount Royal University Department of Information Design community service learning course. Information design students will work to develop infographics based on the "Choosing Wisely Alberta" Campaign Topics, with content expertise provided by the Department of Emergency Medicine. **Curriculum, Tool, or Material:** The five "Choosing Wisely Alberta" topics are: CT scans for adults with head injuries, CT scans to find Blood Clots in the lung, Imaging Tests for Headaches, Imaging tests for lower back pain, Treating Sinusitis. The target audience for the project will involve staff physicians, patients, public and government. Student involvement will direct their individual projects to these target audiences and will consider important issues such as non-English speaking patients, patients with low health-

literacy (marginalized populations) and "super-users" of emergency departments, health policy (government and not-for-profit), physicians (emergency and primary care) and other health care workers. Infographics will be available for presentation at CAEP 2016. **Conclusion:** Information graphics will be used to facilitate clinician-patient discussions for empowered decision making, facilitate clinician-learner decisions based on evidence based guidelines, and improve knowledge translation for health system administrators and policy makers regarding appropriate emergency department resource allocation.

Keywords: innovations in EM education, knowledge translation, patient centered

P138

The Family Medicine Obstetrical Ultrasound (FaMOUS) course: a model for training office-based family physicians in first trimester point of care ultrasound

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Introduction / Innovation Concept: In Canada, family physicians (FPs) provide the majority of 1st trimester pregnancy care and are often first to evaluate complications, including threatened and spontaneous abortion and ectopic pregnancy. To receive a same day urgent US, most patients will be sent to the emergency department (ED). With increasing availability and affordability of point of care ultrasound (PoCUS), FPs are starting to use US in their offices, potentially diverting some ED visits for patients with reassuring US findings. To date, no formal certification process exists for FPs who wish to use PoCUS for 1st trimester indications. **Methods:** The objective of this educational initiative was to implement and evaluate a novel, 2-day didactic and hands-on certification process for FPs utilizing office-based PoCUS to identify intrauterine pregnancy and fetal cardiac activity. The FaMOUS course was modeled after the Canadian Emergency Ultrasound Society Emergency Department Echo (CEUS EDE) curriculum and adapted with permission for FPs. **Curriculum, Tool, or Material:** The curriculum consisted of a deliberate practice mastery model utilizing on-line materials, seminars and hands-on training. Prior to the 2-day course, FPs completed an e-learning module comprised of core competency material specific to obstetrical practice. Learners were required to score 100% on a post-module exam to participate in the 2-day course. Attendees participated in a 4-hour training session to learn US image generation and interpretation. This was followed by 10 hours of hands-on training with CEUS instructor supervision to complete the certification process (50 determinate scans). Thirteen FPs from 3 family practice units successfully completed the certification process. Cumulative knowledge and skill levels were assessed throughout the 2-day workshop through feedback from CEUS supervisors to confirm key concepts were learned. All 13 participants agreed to utilize PoCUS in their clinical assessments of patients with 1st trimester complaints using handheld PoCUS equipment provided to the sites. FPs will be surveyed at 3 month intervals for 12 months following the FaMOUS course to assess provider confidence, satisfaction and perceived impact on clinical decision-making. **Conclusion:** The FaMOUS certification course is a standardized curriculum by which FPs can learn PoCUS safely to improve quality and timeliness of care for patients experiencing 1st trimester complaints. If PoCUS is adopted by FPs, lengthy ED visits may be decreased for this patient population.

Keywords: innovations in EM education, point-of-care ultrasound (PoCUS), pregnancy

P139

Procedural sedation by advanced care paramedics for emergency GI endoscopy

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Introduction: Acute upper gastrointestinal (UGI) bleeding is a relatively common emergency resulting in death in 6 to 8% of cases. UGI endoscopy is the intervention of choice which requires procedural sedation and analgesia (PSA). The Halifax Infirmary emergency department (ED) performs 1000 PSAs annually, performed by advanced care paramedics (ACPs). This has been shown safe for other indications for PSA, such as orthopedic procedures. Considering that UGI endoscopy involves upper airway manipulation, and patients are at an increased risk of massive bleeding, this procedure would be expected to be more complex and have an increased risk of adverse events (AEs). This study aims to compare PSA for UGI endoscopy performed by ACPs to that for orthopedic procedures for AEs, airway intervention and medication use. **Methods:** This study is a retrospective review of an ACP-performed ED PSA quality control database. A dataset was built matching 64 UGI endoscopy PSAs to 192 orthopedic PSAs by propensity scores calculated using age, gender and ASA classification. Outcomes assessed were hypotension (SBP $<$ 100, or 15% decrease from baseline), hypoxia (SaO_2 $<$ 90), apnea ($>$ 30sec), vomiting, arrhythmias and death in the ED. The need for airway intervention and medication use was assessed. **Results:** The UGI endoscopy group was 4.60 times more likely to suffer hypotension than the orthopedic group (OR = 4.6, CI:2.2-9.6), and a fifth as likely to require airway repositioning (OR = 0.2, CI:0.1-0.5). One endoscopy patient required endotracheal intubation. No patient died in either group. Compared to the orthopedic group, the UGI endoscopy group was one-third as likely to receive fentanyl (OR = 0.3, CI:0.2-0.6). When fentanyl was administered, endoscopy patients received an average 26.7 mcg less than orthopedic patients. The endoscopy group was 15.4 times more likely to receive ketamine (OR = 15.4, CI:4.7-66.5), and received 34.4 mg less on average. Four endoscopy patients received phenylephrine compared to none in the orthopedic group. There were no other differences. **Conclusion:** ED PSA for UGI endoscopy appears to differ significantly from that performed for orthopedic procedures. It was associated with more frequent hypotension and increased use of ketamine as a sedative. Patients undergoing UGI endoscopy were less likely to receive fentanyl and require airway repositioning. Only patients in the endoscopy group required intubation or a vasopressor agent.

Keywords: procedural sedation and analgesia (PSA), paramedicine, endoscopy

P140

Emergency department decision-making for incapacitated and unrepresented patients: a comprehensive review of the literature

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Introduction: Incapacitated patients who lack substitute decision-makers (SDM) are commonly encountered in the emergency department (ED). The number of these patients will rise dramatically as the Baby Boomers age. We can expect an influx of elderly patients who lack decisional capacity due to dementia and other illnesses, and who present without family. It is estimated that 3 to 4 percent of U.S. nursing home residents have no SDM or advance directives. Medical decision-making for this cohort poses an ethical challenge, particularly in the ED setting.

Methods: A comprehensive review of the literature was conducted surrounding decision-making for incapacitated and unrepresented patients in the hospital setting. Articles were identified using MEDLINE (1946-October 2015) and Embase (1974-October 2015). The reference lists of relevant articles were hand searched. Articles describing decision-making processes that have been proposed, tested or applied in practice were chosen for full review. The aim of this review was to outline recognized medical decision-making processes for incapacitated and unrepresented patients, and to identify areas for future research. **Results:** The search yielded 20 articles addressing decision-making for incapacitated and unrepresented patients in the hospital setting. All of these articles focus on the intensive care unit and other hospital wards; no literature on the ED setting was found. Five types of formal consulting bodies exist to assist physicians in applying the best interest standard for this patient cohort: internal hospital ethics committees, external ethics committees, public guardians, court-appointed guardians, or judges. The majority of decisions for these patients, however, are made informally by a single physician or by a healthcare team, although it is well recognized that this approach lacks appropriate safeguards. There is no consensus surrounding the optimal approach to decision-making in these cases, and as such there is significant inconsistency in how medical decisions are made for these patients. **Conclusion:** There are several articles describing decision-making processes for incapacitated and unrepresented patients, none of which focus on the ED. These processes are not practical for use in the ED. Further inquiry is needed into the most ethical and respectful method of decision-making for this patient cohort in the ED.

Keywords: ethics, geriatrics

P141

Limited variation in diagnostic imaging use among emergency department physicians

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Introduction: Use of diagnostic imaging in the emergency department (ED) has significantly increased over time. The decision to use a certain type of imaging, if any at all, is not always clear. Accordingly, concerns of appropriateness are justified. A starting point to assess imaging appropriateness is to measure variation in its use. It has been suggested that where large variation exists, there may be inappropriate use. **Methods:** We retrospectively studied consecutive ED visits at North York General Hospital between April 1, 2009 and March 31, 2013 (n = 316,251), and developed a two-level hierarchical logistic regression model to quantify inter-physician variation in imaging use (high-cost imaging: computed tomography (CT), magnetic resonance (MR), nuclear medicine; low-cost: plain radiography, ultrasound) in the ED after adjusting for patient-, visit- and physician-level factors. **Results:** Plain radiography or ultrasound examinations were performed during 36.3% of ED visits; CT, MR, or nuclear medicine examinations were performed during 10.6% of ED visits; 4.1% of ED visits had both high- and low-cost imaging. After adjusting for patient-, visit- and physician-specific factors, only 2.4% and 2.2% of the variation regarding whether or not an ED visit resulted in at least one high-cost and low-cost imaging test, respectively, was attributable to individual physician practice patterns. Physicians who had a tendency to obtain more low-cost imaging also obtained more high-cost imaging, and those who obtained less low-cost imaging also obtained less high-cost imaging. **Conclusion:** Only a small portion of the variation in imaging use was attributed to differences in ED physician ordering patterns, however, these findings may still help promote discussion among clinicians, and improve imaging utilization.

Keywords: variation, case-mix adjustment, hierarchical logistic regression

P142

The anticoagulated trauma patient: a Canadian experience in the era of direct oral anticoagulants

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Introduction: The anticoagulated trauma patient is a particularly vulnerable population. Our current practice is guided by experience with patients taking vitamin K dependent antagonists (VKA, like warfarin). It is currently unknown how the increasing use of direct oral anticoagulants (DOACs) will change our trauma population. We collected data about this new subset of patients to compare their clinical characteristics to patients on pre-injury VKA therapy. **Methods:** Retrospective review of anticoagulated trauma patients presenting to Toronto's two adult trauma centres, Saint Michael's Hospital and Sunnybrook Health Sciences Centre, from June 2014-June 2015 was undertaken. Patients were recruited through the institutions' trauma registries and were eligible if they suffered a traumatic injury and taking an oral anticoagulant pre-injury. Clinical and demographic data were extracted by a trained reviewer and analysed with descriptive statistics. **Results:** Our study recruited 85 patients, 33% were taking DOACs and 67% VKAs. Trauma patients on DOACs & VKAs respectively had similar baseline characteristics such as age (75.9 vs 77.4), initial injury severity score (ISS (16.9 vs 20.6)) and concomitant antiplatelet use (7.1% vs 5.4%). Both groups' most common mechanism for injury was falls and the most common indication for anticoagulation was atrial fibrillation. Patients on DOACs tended to have lower average INR (1.25 vs 2.3) and serum creatinine (94.9 vs 127.4). **Conclusion:** Patients on DOACs pre-injury now account for a significant proportion of orally anticoagulated trauma patients. Patients on DOACs tended to have less derangement of basic hematological parameters complicating diagnosis and management of coagulopathy.

Keywords: direct oral anticoagulants, bleeding

P143

Retrospective review of microbiology results in adult patients presenting to the emergency department with acute epididymitis

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Introduction: North American practice guidelines for empiric antibiotic selection in the treatment of epididymitis are based on very small studies. These guidelines recommend antibiotic selection based on age. This study's objective was to determine if culture results in a Canadian emergency department population with acute epididymitis support these guidelines. **Methods:** We conducted an electronic health records review ED patients with a discharge diagnosis of epididymitis. All patients who presented to two emergency department sites of the Ottawa Hospital from 2012 through 2014 were included. Data collected were patient age, urine culture results, results of urine or urethral swab nucleic acid amplification test (NAAT) for gonorrhea or chlamydia, and results of scrotal ultrasound. Ultrasound radiology reports were independently reviewed by two authors and classified as positive, negative, or indeterminate. **Results:** We identified 379 cases of epididymitis. There were

169 patients aged 18-35 years, and 202 patients over 35 years. The rates of positive urine culture, in the under 35 and over 35 population respectively, were 5% and 42% ($p < .0001$). The rates of positive NAAT were 10% and 4% ($p = .43$). Ultrasound was performed in 252 patients; 160 (63%) were positive. There was no significant difference in the rates of positive urine culture or NAAT between the ultrasound-positive patients and patients who had negative, indeterminate, or no ultrasound. **Conclusion:** Our findings are not concordant with clinical practice guidelines. While the over 35 age group had a statistically higher rate of positive urine culture, the rate of positive NAAT was not different from the younger group. Both urine culture and NAAT are usually negative in the under 35 group. Positive culture rates are not higher in the subgroup of ultrasound "proven" epididymitis. Physicians should exercise clinical judgement in selecting empiric antibiotics for patients with epididymitis; basing choice on patient age alone may not be appropriate.
Keywords: epididymitis, sexually transmitted infections (STI), antibiotic

P144

Sentinel visits in emergency department patients with diabetes mellitus as a warning sign for hyperglycemic emergencies

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Introduction: Patients with poorly controlled diabetes mellitus (DM) often visit the emergency department (ED) for management of hyperglycemia, diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS). Many of these patients have a "sentinel" ED visit for other medical conditions prior to their hyperglycemic visit, which may worsen their glucose control. The objective of this study was to describe the epidemiology and outcomes of patients presenting with a sentinel ED visit prior to their visit for a hyperglycemic emergency. **Methods:** This was a health records review of patients ≥ 18 years presenting to one of four tertiary care EDs (combined annual census 300,000) with a discharge diagnosis of DM, hyperglycemia, DKA or HHS in a one-year period. Visits for hypoglycemia were excluded. Trained research personnel collected data from medical records including demographics, clinical history and results of investigations. Electronic charts were reviewed to determine if the patient came to the ED within the prior 14 days of their index hyperglycemia visit, and the details and outcomes surrounding both visits. Descriptive statistics were used where appropriate to summarize the data. **Results:** From January-December 2014, 609 ED visits had a discharge diagnosis of hyperglycemia. Mean (SD) age was 50.4 (19.5) years, and 343 (56.3%) were male. 101/609 visitors (16.6%) had an ED presentation within the previous 14 days from their hyperglycemia visit. 71 (70.3%) of these were discharged from this initial visit and 49/71 (69.0%) were discharged either without their blood glucose checked or with an elevated blood glucose (>11.0 mmol/L). Of the sentinel visits, 58 (57.4%) were for hyperglycemia and 15 (14.9%) were for infection. Upon returning to the ED, 45/101 (44.6%) visitors were subsequently admitted for management of severe hyperglycemia, DKA or HHS. **Conclusion:** This unique ED-based study demonstrates that patients with DM presenting with hyperglycemia or infection often return and may ultimately require admission. Clinicians should be vigilant in checking blood glucose when these patients present to the ED and provide clear discharge instructions for follow-up and glucose management. Future research should focus on improving glycemic control in these patients in order to prevent further hyperglycemic emergencies from occurring.
Keywords: diabetes, adverse events, sentinel visits

P145

HIV point of care testing by community paramedics in a vulnerable population: a pilot study

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Introduction: Literature suggests that up to 25% of people with HIV in North America are unaware of their status and are at risk to transmit the virus unknowingly. A high proportion of HIV patients are diagnosed when the disease is more advanced, with CD4 counts < 200. This study examined the rates of HIV testing, detection, and treatment of clients at an inner city shelter and detoxification centre after the introduction of a point of care testing (POCT) program by on-site community paramedics (CP). **Methods:** In 2013, in collaboration with a regional HIV program, CP received training and instituted an HIV POCT program and post-test counselling initiative. A retrospective electronic database review from October 16, 2013 to October 15, 2014 of adult patients who received testing was performed. Demographic and testing details of each patient encounter were abstracted and select variables were compared to a historic population who received POC HIV testing at an inner city emergency department (ED) in the same city. **Results:** 1,207 HIV POC tests were performed on 997 patients during the pilot. 57% of the patients tested were less than 40 years of age (range 18-73 years) compared to 55% in the historic ED population. A total of 9 reactive cases were identified in the study population including 3 new cases, 5 previously known cases, and 1 false reactive result. The mean age of the new cases was 47 years, vs 44 in the historical control. All 3 new cases were referred to a local HIV clinic for further care and treatment. New HIV cases represented 0.25% of total tests performed, which is less than the expected prevalence rate of 1% for this population, as well as the rate of 1.4% found in the ED population. **Conclusion:** Despite lower than expected reactive rates, the large scale implementation of a CP HIV POCT program in an inner city shelter and detoxification centre is feasible. All patients with new reactive tests were immediately connected to care. Future research will focus on risk factors and barriers to testing.
Keywords: community paramedicine, human immunodeficiency virus (HIV), point of care

P146

Designing better continuing education for rural emergency physicians

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Introduction / Innovation Concept: Rural emergency physicians often work alone, and identify higher needs for continuing professional development in emergency medicine (EM) than urban doctors. We have offered the Community Emergency Medicine Outreach program (CEMO) at 12 rural hospitals in Eastern Ontario since 2009. Each emergency team selects topics in Adult EM for discussion at half-day outreach sessions at their local hospital. **Methods:** The CEMO program director participated in a Masters of Health Professions Education program. Newly learned concepts were applied to further the development of CEMO. **Curriculum, Tool, or Material:** Five important lessons learned, and their impacts on CEMO: First, curriculum design is a dynamic process. While CEMO was originally developed for physicians, the program has attracted many participants from other disciplines including nurses, administrators, pharmacists, and learners. Content and delivery have been redesigned to enhance interprofessional learning, which promotes team harmony, local problem

solving, and knowledge translation into practice. Second, learning must be highly relevant to the local context to be effective. The content of each CEMO session is tailored to each group's perceived and ascribed learning needs. CEMO is informed by sociocultural, transformative, experiential and cognitivist learning theories. Teaching strategies include interactive discussion of locally encountered clinical cases, and simulation. Third, it is more effective to integrate new technologies into a larger curriculum than to offer them as stand-alone modules. CEMO incorporates innovative presentation software, screencasts, procedural videos, and online audience response systems to engage participants. Fourth, learning effectiveness is best measured using multiple sources of assessment, and multiple assessments over time. CEMO's learner assessment strategies include self-reflection at sessions, and months later. Participants consider CEMO's effects on their practice, including reactions of co-workers and patients to their new skills, knowledge and behaviours. Finally, program evaluation may take many forms, and begins with defining evaluation goals and questions. We have developed a program logic model for CEMO, and a combined process and outcome evaluation is in progress. **Conclusion:** The application of important educational concepts promotes the design of effective continuing education in emergency medicine for rural health professionals.
Keywords: education innovation, continuing professional development, rural

P147

International scope of emergency ultrasound: barriers to utilizing ultrasound to guide central venous catheter placement by providers in Kenya

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Introduction: While ultrasound (U/S) use for internal jugular central venous catheter (CVC) placement is standard of care in many institutions in North America, most developing countries have not adopted this practice. Previous surveys of American physicians who are not currently using U/S to place CVCs have identified lack of training and equipment availability as the most important barriers to the use of U/S. We sought to identify Kenyan physicians' perceived barriers to the use of U/S to guide CVC insertion in a resource-constrained environment. **Methods:** The study was conducted at the Aga Khan University Hospital in Nairobi, Kenya. Physicians participating in a one-hour course teaching U/S guided CVC placement were asked to complete a survey before beginning training, which was used to assess previous experience with U/S, and evaluate perceived barriers to U/S. Survey responses were analyzed using summary statistics and the Rank-Sum test to compare the difference between participants' responses based on different specialty, gender and previous history of using U/S. **Results:** There were 23 physicians who completed the course and the survey. They included 6 internal medicine, 5 critical care, 5 anesthesia, 2 emergency medicine and 5 physicians from other specialties. The mean length of practice was 5 years. 52% (95% CI: 0.30-0.73) had put in >20 CVCs. 21.7% (95% CI: 0.08-0.44) of participants had previous U/S training, but none have received any training on the use of U/S for CVC insertion. The respondents expressed agreement on the ease of the use, improved success rate, and decreased failure rate with U/S guidance. However, less agreement was found regarding the perceived superior convenience and cost effectiveness of U/S CVC placement (see Figure). The lack of training or comfort with the U/S and the availability of U/S and equipment to maintain sterility were reported as the main barriers for use. Neither previous U/S experience nor specialty of the respondent significantly affected responses. **Conclusion:** Barriers to the use of U/S guidance for the placement of CVCs in Nairobi, Kenya are similar to those found among American physicians. These include training and comfort level with U/S in placement of CVCs, as well as resources required for U/S equipment and to keep the field sterile.
Keywords: ultrasound, international, central venous access

CAEP/ACMU 2016 Scientific Abstracts Keyword Index

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As Chair of the CAEP Research Committee, it is my pleasure to introduce the dedicated team of volunteers who made CAEP's 2015/16 Grant and Abstract Competitions such a huge success. With their support, we were able to grow the annual CAEP research competitions, which included 61 grant applications and 300 abstract submissions. We could not have achieved this without the support of our volunteers and our generous EM Advancement Fund (EMAF) donors.

Sincerely,
Jeff Perry, MD, MSc

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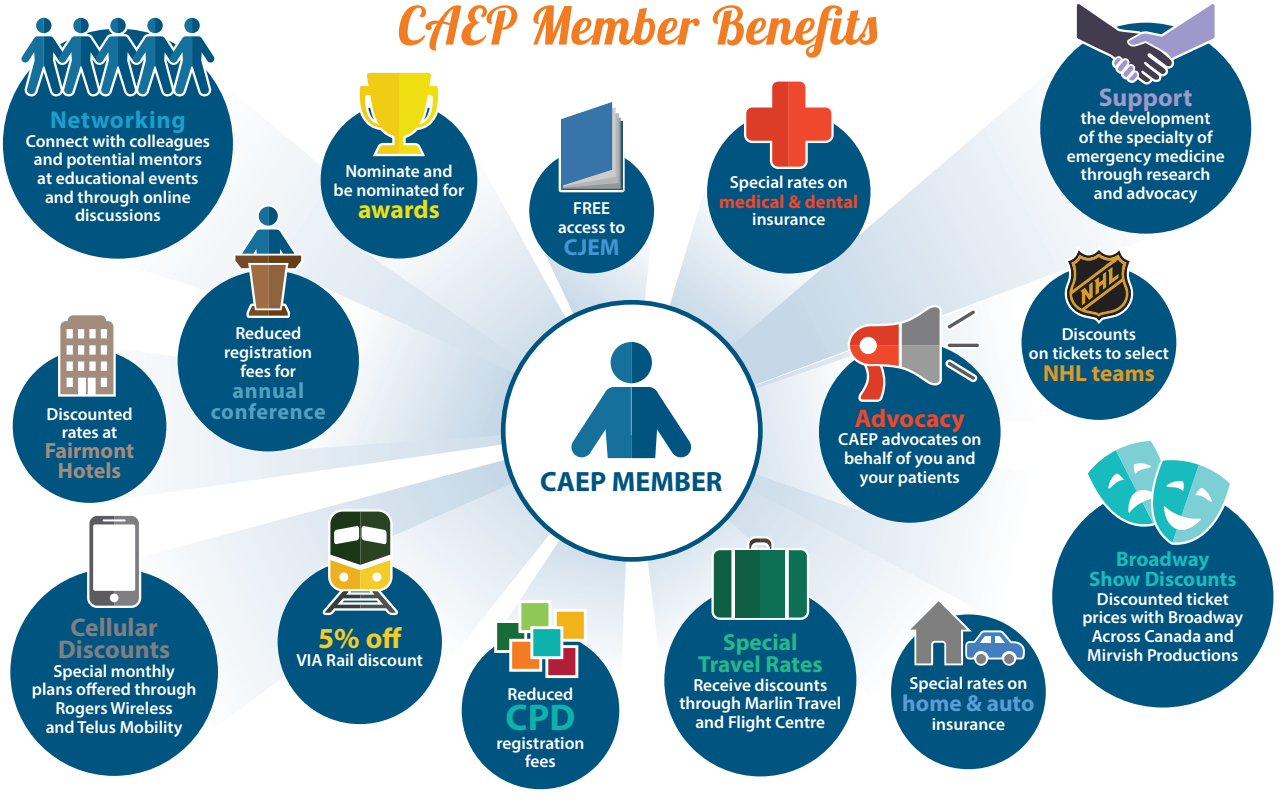

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