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CAEP Academic Symposium Papers

CAEP 2016 Academic Symposium on Education Scholarship: Training our Future Clinician Educators in Emergency Medicine

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ABSTRACT

Objective: To develop consensus recommendations for training future clinician educators (CEs) in emergency medicine (EM).

Methods: A panel of EM education leaders was assembled from across Canada and met regularly by teleconference over the course of 1 year. Recommendations for CE training were drafted based on the panel's experience, a literature review, and a survey of current and past EM education leaders in Canada. Feedback was sought from attendees at the Canadian Association of Emergency Physicians (CAEP) annual academic symposium. Recommendations were distributed to the society's Academic Section for further feedback and updated by a consensus of the expert panel.

Results: Recommendations were categorized for one of three audiences: 1) Future CEs; 2) Academic departments and divisions (AD&D) that support training to fulfill their education leadership goals; and 3) The CAEP Academic Section. Advanced medical education training is recommended for any emergency physician or resident who pursues an education leadership role. Individuals should seek out mentorship in making decisions about career opportunities and training options. AD&D should regularly perform a needs assessment of their future CE needs and identify and encourage potential individuals who fulfill education leadership roles. AD&D should develop training opportunities at their institution, provide support to complete this training, and advocate for the recognition of education scholarship in their institutional promotions process. The CAEP Academic Section should support mentorship of future CEs on a national scale.

Conclusion: These recommendations serve as a framework for training and supporting the next generation of Canadian EM medical educators.

RÉSUMÉ

Objectif: Le projet visait à élaborer des recommandations consensuelles sur la formation des futurs médecins enseignants (ME) en médecine d'urgence (MU).

Méthode: Un groupe de meneurs en enseignement de la MU provenant de toutes les régions du Canada a été formé et s'est réuni régulièrement par téléconférence sur une période d'un an. Les recommandations concernant la formation des ME reposaient sur l'expérience du groupe, un examen de la documentation scientifique et une enquête menée parmi les meneurs présents et passés en matière d'enseignement de la MU, au Canada. Les participants au Symposium sur les affaires universitaires de l'Association canadienne des médecins d'urgence (ACMU), qui se tient chaque année, ont eu l'occasion de donner de la rétroaction. Les recommandations ont aussi été transmises à la section des affaires universitaires de l'Association pour rétroaction, puis celles-ci ont été mises à jour par voie de consensus, par un groupe d'experts.

Résultats: Les recommandations ont été divisées en catégories selon l'un des trois groupes suivants : 1) les futurs ME; 2) les départements et divisions universitaires (DDU) qui soutiennent la formation afin de poursuivre leurs buts de chefs de file en enseignement; 3) la section des affaires universitaires de l'ACMU. Une formation spécialisée en enseignement de la médecine est recommandée pour tout médecin d'urgence ou tout résident désireux de jouer un rôle de meneur en enseignement. Les personnes intéressées devraient s'adresser à des mentors pour les éclairer dans leurs prises de décision concernant les perspectives de carrière et les possibilités de formation. Quant aux DDU, ils devraient procéder régulièrement à une évaluation de leurs besoins en futurs ME, et repérer des personnes susceptibles de faire de bons ME et les encourager à jouer pleinement leur rôle de meneur en enseignement. De plus,

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les DDU devraient offrir des possibilités de formation dans leur établissement, fournir du soutien pour compléter la formation et promouvoir la reconnaissance des travaux scientifiques en enseignement dans le processus de promotion de leur établissement. Enfin, la section des affaires universitaires de l'ACMU devrait soutenir le mentorat des futurs ME, à l'échelle nationale.

Conclusions: Ces recommandations servent de cadre pour la formation de la future génération de médecins enseignants en MU au Canada, et pour le soutien à lui accorder.

Keywords: clinician educator, emergency medicine, faculty development, training, medical education, Masters in medical education

INTRODUCTION

Emergency medicine (EM) education in Canada is changing and evolving rapidly. Simulation,[1] point-of-care ultrasound,[2] Free Open Access Medical (FOAM) Education,[3] competency-based medical education,[4] and drive to produce sound education scholarship[5] exemplify a paradigm shift in both the content and delivery of medical education. As the complexity of medical training increases, emergency physicians (EPs) who take on education leadership roles require expertise in curriculum development, instructional methods, assessment, faculty development, scholarship, and more. Accordingly, the manner in which education leaders are identified, trained, and supported needs to be clearly defined.

The clinician educator (CE) is defined as a clinician who is active in a health professional practice and applies theory to education practice, engages in education scholarship, and serves as a consultant to other professionals on education issues.[6] EPs in education leadership roles might not fulfill all aspects of this definition, due in part to a lack of formal training for CEs (in contrast to well-defined training pipelines for clinician scientists). In 2013, the Canadian Association of Emergency Physicians (CAEP) Academic Symposium made recommendations for defining education scholarship[7] and developing and supporting scholars,[8] along with a "how to" guide for education scholarship.[9] The goal of the 2016 consensus process is to help EM residents and early career EPs with an interest in education understand the options for training and support requisite for developing expertise in education.

Formation of an expert panel

An expert panel of Canadian EM education leaders was assembled with attention to the following factors: geographic representation, language, scope of practice, training route, previous and present education leadership roles, and advanced training in medical education. The final panel composition included 11 EPs representing 9 Canadian medical schools from both French and English speaking schools. The panel included EPs with certification from the College of Family Physicians of Canada through the Special Competence in Emergency Medicine (CCFP-EM), training through the Royal College of Physicians and Surgeons of Canada (FRCPC), and training in pediatric EM through the Royal College (FRCPC-PEM). The panel represented a variety of education leadership positions and a mix of advanced training in medical education. The panel met monthly over the course of a year via teleconference to discuss and develop the recommendations.

Scoping review

Our panel was more interested in breadth over depth and, as such, chose to use a scoping review for our literature search. Scoping reviews do not formally appraise the quality of or synthesize results of research papers and can generate a very large number of studies to search through. It did, however, allow us to rapidly identify key concepts and use papers with multiple study designs.[10] With the help of a hospital librarian, the panel searched PubMed and Embase using the following search terms: *medical educator*, *clinician educator*, *clinician teacher*, *career professional development*, *career choice*, and *professional role*. The search was limited to articles from January 1, 2005 to December 7, 2015. Abstracts were reviewed independently by two panelists (RW and JA) to determine inclusion, and disagreements were resolved by consensus. Articles were distributed amongst the panel for critical appraisal using the following pre-determined categories: CE scope of practice, assessment of CEs, assessment of training programs, attracting CEs, faculty development, barriers and facilitators for CEs, and academic promotion. Thematic analysis of the included article summaries was performed by two authors (JA and RW).

Survey

The panel members divided the 17 Canadian medical schools and used referral sampling to identify individuals at each institution who currently or previously

	Database: Ovid MEDLINE(R) in-process & other non-indexed citations and Ovid MEDLINE(R) (1946 to present)		Database: Embase (1974 to 2016 January 05)	
	Search terms	Articles	Search terms	Articles
1	(medical educators or clinician educators or clinical teachers).tw, kw.	2,409	(medical educators or clinician educators or clinical teachers).tw.	2,603
2	(Medical faculty/or *medical education/) and *teaching/	3,208	health educator/and medical education/	232
3	1 or 2	5,410	*teacher/and medical education/	860
4	(recommends adj5 [training or education]).tw.	5,557	or/1-3	3,609
5	([career or professional] adj development).tw, kw.	6,994	career planning/	1,919
6	staff development/	7,862	professional knowledge/ or professional development/	16,959
7	career choice/	19,116	(recommends adj5 [training or education]).tw.	7,040
8	professional role/	9,533	5 or 6 or 7	25,475
9	or/4-8	47,192	4 and 8	187
10	3 and 9	419	limit 9 to yr = "2005 – Current"	176
11	limit 10 to yr = "2005 – Current"	298	*remove duplicates from 10*	*174*
12	*remove duplicates from 11*	*293*		

Figure 1. Search strategy for the literature review.

fulfilled the definition of a CE. By consensus, the panel came to a practical definition in order to enlist our sample of CEs. This was defined as: *an emergency physician who holds or has held a formal education position in the last 10 years and makes/made decisions about curriculum*.

The panel identified 262 education leaders from 16 of the 17 medical schools (the panel was unable to identify a contact person at the Université de Sherbrooke). By way of a structured written survey, educators were asked to identify the most important competencies[6] required for success in education leadership, whether they had acquired advanced training in medical education prior to assuming or during their position, and whether they would recommend advanced training to others prior to taking on that role.

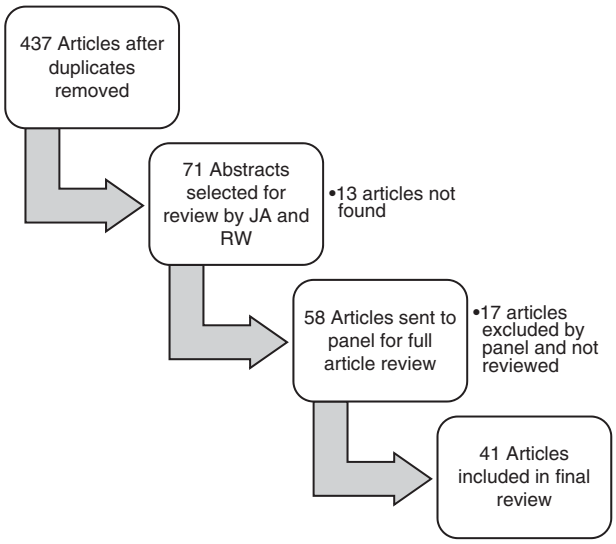

Figure 2. Review of articles from the scoping review.

Results of the scoping review

The search strategy is shown in Figure 1. After duplicates were removed, 437 articles remained. JA and RW reviewed the abstracts and agreed by consensus on 41 articles for a complete review (Figure 2). Several themes were identified from the systematic review of the literature: the importance of the CE role for the ongoing advancement of medical education, strategies for being a successful CE, descriptions of training programs, and the challenges associated with academic promotion for CEs.

Medical educators form a critical role to the advancement of a medical institution.[6,11] This goes beyond expanding and refining the repertoire of medical school teaching.[12] It also includes supporting the academic mission of the institution and adapting to the changing environment of educational standards and accreditation.

A CE becomes a consultant to her or his colleagues and to the institution in which they work, helping them achieve the previous goals. Strategies for success as a CE have been identified: clarify what success means for you; seek mentorship; develop a niche and engage in relevant professional development; network; transform educational activities into scholarship; and seek funding and other resources.[11]

Experiential learning is no longer sufficient for becoming a CE.[13] Training programs for medical education have exploded over the last two decades. There is a large number of master's programs,[14] fellowships,[15] and academies,[16,17] Fellowships have been developed across

Table 1. Demographics of respondents (n = 142)

Demographics	n (%)
Training	
FRCPC (EM)	75 (53%)
FRCPC (PEM)	13 (9%)
CCFP (EM)	45 (32%)
CCFP	1 (1%)
Other[a]	8 (6%)
Years in practice	
0–5	28 (20%)
6–10	29 (20%)
11–15	26 (18%)
16–20	22 (15%)
>20	31 (22%)
Not specified	6 (4%)
Type of practice	
Tertiary care ED	135 (95%)
Community ED	17 (12%)
Multiple types	16 (11%)
Other	6 (4%)

[a]Other certifications listed include FRCPC (pediatrics), CSPQ, ABP, ABEM.

Table 2. Percentage time devoted to professional roles (n = 142)

Professional roles	Mean % (+/–SD)	Range (min., max.)
Clinical	62.1 (+/–16.6)	60 (10, 90)
Education	18.3 (+/–10.4)	15 (0, 70)
Administrative	13.8 (+/–13.1)	10 (0, 70)
Research	5.3 (+/–7.7)	5 (0, 45)
Other	0.3 (+/–2.6)	0 (0, 30)

specialties at individual medical schools,[18] and there are specific fellowships for EM education[19–21] and efforts to ensure the quality of these various training programs.[22,23]

CEs have historically faced challenges in academic promotion for a variety of reasons.[24] Whereas some institutions have had success in accepting novel forms of scholarship, others still base promotion primarily on grants and peer-reviewed publications;[25] whereas some CEs obtain/receive grants and publish, many produce other forms of scholarship.[7]

Results from the survey of education leaders

Of the identified 265 education leaders, 142 completed the survey for a response rate of 53.6%. The survey was distributed electronically with a pre-notification message and three email reminders sent over 3 weeks in February 2016. The survey was created in FluidSurveys (Ottawa, ON), and the data were analysed using Excel. There was a broad range of certification and years of experience amongst the respondents (Table 1). Most of the respondents have spent the majority of their professional time in the clinical domain (Table 2). The majority of respondents recommended advanced training prior to taking on an educational leadership role (Table 3).

Greater than 50% of respondents felt that all of the competencies of a CE[6] were important or very important (see Table 3). The degree of agreement varied by competency and by the education leadership role (Table 4). The competencies that were consistently identified by all roles were leadership, communication skills, assessment, and curriculum development.

Presentation of results and draft recommendations at the Academic Symposium

The recommendations that were drafted by the panel were presented to 100 EPs at the 2016 CAEP Academic Symposium on June 4, 2016. Through a live survey poll and facilitated discussion, audience members provided feedback to the expert panel. The main themes identified were to categorize the recommendations at the individual, the academic departments and divisions (AD&D), and CAEP Academic Section levels. The audience discouraged having recommendations at the specific CE competency level for each type of leadership role, because the competencies were too granular and were subject to institutional and role variability.

RECOMMENDATIONS

Recommendations for emergency physicians and residents (our future clinician educators):

1) Advanced training in medical education is recommended for any EP or resident who plans to take on an education leadership role.
2) Advanced training should take the form of at least one of the following: targeted courses/workshops, formal certifications, a fellowship, or a master's degree; the skills acquired should be applicable to the role that he or she plans to pursue.
3) EPs or residents who consider becoming CEs should seek out mentorship to consider all career pathways and training opportunities.

Table 3. Competencies important for success stratified by advanced medical education training

	Very important	Important	Neutral	Only somewhat important	Not important at all
With Med Ed training					
Education theory	18 (30%)	20 (33%)	9 (15%)	12 (20%)	2 (3%)
Educational psychology	13 (25%)	19 (37%)	11 (21%)	7 (13%)	2 (4%)
Clinical teaching	20 (43%)	18 (38%)	9 (19%)	0 (0%)	0 (0%)
Teaching outside of clinical care areas	13 (31%)	18 (43%)	11 (26%)	0 (0%)	0 (0%)
Communication skills	31 (69%)	14 (31%)	0 (0%)	0 (0%)	0 (0%)
Curriculum development	26 (55%)	18 (38%)	0 (0%)	3 (6%)	0 (0%)
Assessment	27 (55%)	18 (37%)	2 (4%)	2 (4%)	0 (0%)
Program evaluation	21 (46%)	15 (33%)	8 (17%)	2 (4%)	0 (0%)
Faculty development	17 (35%)	23 (47%)	6 (12%)	1 (2%)	2 (4%)
Administration of educational programs	14 (30%)	11 (24%)	17 (37%)	4 (9%)	0 (0%)
Leadership	18 (41%)	23 (52%)	3 (7%)	0 (0%)	0 (0%)
Organizational and/or jurisdictional issues	5 (13%)	16 (42%)	9 (24%)	6 (16%)	2 (5%)
Education research or scholarship	8 (19%)	16 (37%)	8 (19%)	8 (19%)	3 (7%)
Recommend advanced Med Ed training	17 (47%)	15 (42%)	3 (8%)	1 (3%)	0 (0%)
Without Med Ed training					
Education theory	8 (22%)	19 (51%)	3 (8%)	0 (0%)	7 (19%)
Educational psychology	4 (12%)	13 (39%)	5 (15%)	6 (18%)	5 (15%)
Clinical teaching	9 (33%)	14 (52%)	1 (4%)	2 (7%)	1 (4%)
Teaching outside of clinical care areas	3 (12%)	14 (56%)	4 (16%)	3 (12%)	1 (4%)
Communication skills	15 (60%)	10 (40%)	0 (0%)	0 (0%)	0 (0%)
Curriculum development	12 (44%)	7 (26%)	6 (22%)	2 (7%)	0 (0%)
Assessment	15 (56%)	10 (37%)	2 (7%)	0 (0%)	0 (0%)
Program evaluation	12 (44%)	9 (33%)	4 (15%)	2 (7%)	0 (0%)
Faculty development	6 (22%)	17 (63%)	2 (7%)	1 (4%)	1 (4%)
Administration of educational programs	9 (35%)	13 (50%)	4 (15%)	0 (0%)	0 (0%)
Leadership	15 (56%)	8 (30%)	4 (15%)	0 (0%)	0 (0%)
Organizational and/or jurisdictional issues	4 (17%)	14 (58%)	5 (21%)	1 (4%)	0 (0%)
Education research or scholarship	2 (8%)	7 (28%)	10 (40%)	1 (4%)	5 (20%)
Recommend advanced Med Ed training	7 (19%)	14 (39%)	11 (31%)	1 (3%)	3 (8%)

Recommendations for academic departments and divisions:

1) AD&D should work with their institutional strategic plans to regularly perform a needs assessment of their future CE needs. This will allow them to identify and encourage potential individuals who would fulfill education leadership roles.
2) AD&D should provide advanced training and mentorship opportunities, protected time or preferential scheduling, and financial support to complete advanced training.
3) AD&D should advocate for the recognition of education scholarship in their institution's promotions process.

Recommendations for the CAEP Academic Section:

1) To advance EM, the CAEP Academic Section should support the mentorship and networking of CEs across Canada.

Discussion of recommendations

The panel sees a tremendous change on the horizon for EM education. To be prepared for the future, our CEs need to have the full set of skills and knowledge required to become education consultants.[6] This also resonated from the results of our education leaders survey. This set of skills is too complex to learn on the job, and specific training will be necessary. This will put our clinicians in a position to achieve all of the competencies of a CE. This will require action from individuals, AD&D, and the CAEP Academic Section.

EPs and residents should receive formal training in medical education prior to taking on a leadership role. This recommendation came from the majority of respondents of our survey. The endorsement was greater for those with previous medical education training and may represent some degree of cognitive dissonance bias in both groups. Those who have previous training may be more likely to think it was

Table 4. Competencies "very important" or "important" for success by role, as identified by all

	Education theory	Educational psychology	Clinical teaching	Teaching outside of clinical care areas	Communication skills	Curriculum development	Assessment
Clerkship Director	8 (53%)	6 (55%)	9 (90%)	6 (75%)	8 (100%)	9 (90%)	10 (100%)
Residency Program Director	10 (59%)	7 (47%)	15 (83%)	11 (79%)	15 (100%)	16 (94%)	18 (100%)
Simulation Director	10 (77%)	9 (69%)	6 (75%)	6 (75%)	9 (100%)	7 (88%)	6 (67%)
Faculty Development Director	5 (83%)	5 (83%)	4 (100%)	4 (100%)	5 (100%)	5 (100%)	4 (80%)
Ultrasound Education Director	1 (100%)	0 (0%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Education Scholarship Position	6 (75%)	5 (71%)	2 (50%)	2 (50%)	4 (100%)	4 (100%)	4 (100%)
Fellowship Director	3 (75%)	3 (75%)	1 (33%)	2 (67%)	3 (100%)	3 (100%)	3 (100%)
Dean	4 (67%)	2 (67%)	4 (80%)	2 (50%)	4 (100%)	3 (60%)	5 (100%)
UG Director / Pre-clerkship	2 (67%)	1 (33%)	3 (100%)	2 (67%)	3 (100%)	1 (33%)	3 (100%)
PG EM Rotation Coordinator	3 (50%)	2 (33%)	5 (83%)	4 (67%)	6 (100%)	4 (67%)	5 (83%)
CME Director	2 (67%)	1 (50%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Course Director	3 (75%)	2 (67%)	2 (100%)	1 (50%)	2 (100%)	2 (100%)	2 (100%)
Other	8 (65%)	6 (54%)	8 (85%)	6 (58%)	9 (100%)	7 (69%)	8 (92%)

	Program evaluation	Faculty development	Administration of educational programs	Leadership	Organizational and/or jurisdictional issues	Education research or scholarship	Recommend advanced medical education training?
Clerkship Director	7 (70%)	5 (56%)	8 (80%)	8 (89%)	4 (67%)	5 (56%)	7 (88%)
Residency Program Director	15 (94%)	14 (82%)	13 (81%)	14 (82%)	6 (46%)	8 (57%)	17 (63%)
Simulation Director	5 (63%)	7 (88%)	7 (88%)	7 (100%)	3 (43%)	3 (43%)	3 (60%)
Faculty Development Director	3 (75%)	5 (100%)	3 (75%)	5 (100%)	3 (75%)	2 (50%)	4 (100%)
Ultrasound Education Director	1 (100%)	1 (100%)	1 (100%)	1 (100%)	0 (0%)	1 (100%)	1 (100%)
Education Scholarship Position	4 (80%)	3 (75%)	1 (25%)	4 (100%)	3 (75%)	4 (100%)	3 (75%)
Fellowship Director	3 (100%)	3 (100%)	2 (67%)	3 (100%)	2 (67%)	1 (33%)	4 (80%)
Dean	4 (80%)	5 (83%)	5 (100%)	4 (100%)	3 (100%)	1 (33%)	6 (100%)
UG Director / Pre-clerkship	2 (67%)	3 (100%)	1 (33%)	2 (67%)	1 (33%)	0 (0%)	0 (0%)
PG EM Rotation Coordinator	4 (67%)	5 (83%)	2 (33%)	5 (83%)	4 (67%)	2 (33%)	0 (0%)
CME Director	1 (100%)	1 (100%)	0 (0%)	1 (100%)	1 (100%)	0 (0%)	0 (0%)
Course Director	1 (50%)	2 (67%)	0 (0%)	2 (100%)	2 (100%)	1 (33%)	0 (0%)
Other	7 (77%)	9 (87%)	4 (62%)	8 (92%)	7 (82%)	5 (42%)	8 (67%)

valuable because they invested their time and money. Those without previous training may be less likely to think it was valuable because they would potentially be admitting that they were not as prepared as they should have been for the role they took on. Keeping this bias in mind, 58% of those without advanced training still felt it should be required.

There is a myriad of training opportunities available for medical education. Within training options, there are multiple formats. A master's program can be face to face, distance learning, or a hybrid model.[14] Not all institutions will have local access to training, so travel may be required. Because of these factors, it will be difficult for prospective CEs to know what the best training is for them. The literature search[11] and our survey both strongly support the need for mentorship from senior CEs to guide them through this process. Additionally, individuals should discuss their interests with their department heads who can advise them on future career opportunities.

Training CEs will require strong leadership from AD&D. AD&D needs to work with their institutional strategic plans to identify their educational goals. From here, they will be able to determine where their CE needs are. CE positions need to be planned for in advance, and potential candidates should be identified. As soon as candidates are identified, they should be connected with potential mentors who can guide them through their training. This will allow candidates to tailor their advanced training towards the role that they plan to take on.

AD&D also needs to advocate for training opportunities at their own institution to make them more accessible. Additionally, future CEs need to be supported. Getting advanced training in medical education is expensive and time-consuming. From our survey, individuals who completed advanced training received very little support to complete advanced training, and those who did not complete training cited lack of support as a barrier. This would ideally involve protected time and/or financial support but, at a minimum, requires preferential scheduling to complete the advanced training. These measures will ensure that taking on advanced training is feasible for many. As a speciality, we will need a constant supply of CEs, because the number of CE positions in EM are vast and expanding.

AD&D also needs to advocate for academic promotions criteria that recognize education scholarship. This was identified in the literature as a significant barrier for many CEs.[24,25] The traditional clinician scientist pathway does not always fit the career trajectory of a CE. Additional forms of scholarship need to be represented in the portfolio of a CE. This will ensure that CEs feel their scholarly contributions are valued.

The CAEP Academic Section can play a networking role towards this goal. The Education Scholarship Committee is a community of practice for Canadian EM educators with representatives across Canada. This working group can serve as a contact point for future CEs looking for mentorship towards their career goals.

In summary, these recommendations serve as a framework for training and supporting the next generation of Canadian EM medical educators.

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CAEP Academic Symposium Papers

CAEP 2016 Academic Symposium: A Writer's Guide to Key Steps in Producing Quality Medical Education Scholarship

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ABSTRACT

A key skill for successful clinician educators is the effective dissemination of scholarly innovations and research. Although there are many ways to disseminate scholarship, the most accepted and rewarded form of educational scholarship is publication in peer-reviewed journals.

This paper provides direction for emergency medicine (EM) educators interested in publishing their scholarship via traditional peer-reviewed avenues. It builds upon four literature reviews that aggregated recommendations for writing and publishing high-quality quantitative and qualitative research, innovations, and reviews. Based on the findings from these literature reviews, the recommendations were prioritized for importance and relevance to novice clinician educators by a broad community of medical educators.

The top items from the expert vetting process were presented to the 2016 Canadian Association of Emergency Physicians (CAEP) Academic Symposium Consensus Conference on Education Scholarship. This community of EM educators identified the highest yield recommendations for junior medical education scholars. This manuscript elaborates upon the top recommendations identified through this consensus-building process.

RÉSUMÉ

L'une des principales clés du succès parmi les médecins cliniciens enseignants est la diffusion efficace des travaux scientifiques touchant la recherche ou l'innovation. Certes, il existe de nombreux moyens de diffuser des travaux scientifiques, mais la forme la plus courante et la plus prestigieuse est la publication de travaux de recherche en éducation dans des revues à comité de lecture.

Les auteurs offrent, dans l'article, une voie à suivre aux médecins enseignants en médecine d'urgence (MU), désireux de publier leurs travaux scientifiques par la voie classique des articles évalués par les pairs. Le contenu repose sur quatre examens de la documentation qui ont permis de dégager des recommandations sur la rédaction et la publication de travaux de qualité concernant la recherche quantitative ou qualitative, les rapports sur l'innovation ou les revues systématiques. Les recommandations, tirées des examens de la documentation, ont été classées par ordre de priorité en fonction de l'importance et de la pertinence pour les nouveaux cliniciens enseignants, par un large éventail de médecins enseignants.

Les principaux éléments extraits de cet examen détaillé, réalisé par des experts, ont été présentés durant la conférence consensuelle sur les travaux scientifiques en enseignement, tenue dans le cadre du Symposium sur les affaires universitaires de l'ACMU de 2016. La communauté de cliniciens enseignants en MU a dégagé les recommandations qui leur semblaient les plus utiles aux jeunes chercheurs en enseignement de la médecine. L'article fait donc état des principales recommandations relevées tout le long de ce processus consensuel d'édification.

Keywords: academic writing, education scholarship, publishing

INTRODUCTION

Emergency medicine (EM) is committed to medical education.[1] Previous work by the Academic Section of the Canadian Association of Emergency Physicians (CAEP) demonstrates that our discipline is involved in teaching at every Canadian medical school.[2] However, the volume of our specialty's contribution to education scholarship is not proportional. Improved dissemination is vital to advance the field because it allows educators to build on each other's work.[3]

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In 2013, Bhanji et al. created a "how-to" guide for EM education scholarship.[4] This primer served as a launching point to inspire clinical teachers interested in engaging in scholarship. The dissemination of EM-relevant education research and scholarship has many merits, ranging from personal satisfaction and academic recognition[4] to improved learning environments and enhanced patient care. This dissemination may galvanize a national community of practice, allowing clinician educators to learn from each other's successes and failures.

Unfortunately, the quality of Canadian medical education scholarship has lagged behind that of our clinical research.[3] Novice academics, in particular, have had difficulty publishing within medical education: rejection rates from medical education journals can be 87% or higher, and there are not as many venues or guides to publication available to medical education researchers.[5] Fortunately, studies have shown that many flaws leading to manuscript rejection are preventable or fixable,[6] suggesting that, through guidance and support, it may be possible to increase the dissemination of medical education research.

The purpose of this 2016 CAEP Academic Symposium consensus conference was to highlight key steps to elevate the level of Canadian EM education scholarship by providing high-yield recommendations to education scholars attempting to disseminate their research via peer-reviewed publication. Herein, we identify the key quality markers for quantitative research, qualitative research, innovation reports, reviews, and knowledge synthesis studies within medical education.

METHODS

In 2016, the Academic Section of CAEP held its second consensus conference on education. In preparation for this consensus conference, a series of four structured literature reviews were conducted to identify markers of high-quality education publications.

Search methodology

We conducted a series of scoping reviews to aggregate advice from the literature about how to best write four types of education scholarship manuscript: quantitative studies,[7] qualitative studies,[8] innovation reports,[9] and reviews/synthesis works.[10] These reviews resulted in distinct, genre-specific lists of quality markers related to these types of education scholarship. The number of items identified by each group ranged from 30 for innovation reports[9] to 157 for quantitative research.[7] It was recognized that the high number of recommendations limited their practical application. A consensus process was used to identify key items.

External validation of quality indicator lists

To triangulate our findings and triage the essential markers of quality, an online survey for each category of scholarship was conducted. Four surveys (one for each topic) were published on CanadiEM.org weekly from April 4, 2016 to May 1, 2016 and emailed to the corresponding authors of key papers found in the literature reviews. We also attempted to crowd-source the expert opinions of relevant EM and medical education virtual communities of practice using social media.[11,12] Specifically, the surveys were promoted on Twitter using the hashtags #MedEd (Medical Education) and #FOAMed (Free Open Access Medical education) and on the CanadiEM Facebook page. The survey also allowed participants to submit additional quality elements not identified by the thematic analysis using free text. Demographic information on survey participants was captured.

This survey allowed us to incorporate the expertise of medical educators unable to attend the consensus conference. Survey participants were asked to identify the top 25 quality markers by endorsing whether they thought each of the items should be included in the final list. Appendix A (see supplementary material) includes the surveys and demographics of survey respondents. Appendix B provides the top 25 quality markers for each category of medical education scholarship identified by the survey participants.

Consensus conference final ranking

Poster presentations containing the top 25 quality markers for the four categories of education scholarship were provided to the 2016 CAEP Academic Symposium on Education Scholarship Consensus Conference participants. In the event of a tie for the 25th item, all items tied for that position were included. Each item was listed along with the percentage of votes that it received in the online consensus process.

Using a previously published methodology for achieving a group consensus,[13-19] participants reviewed each of the four posters in a small group and indicated the top five most important elements in each by placing a sticker next to them. Participants were also asked to add

any additional relevant items not represented within the list for each category. The key items for each category were presented to the reassembled large group of consensus conference participants for endorsement or amendment during the conference proceedings. This process was facilitated by the authors of this report.

Recommendation review

Following the consensus conference, selected recommendations for each of the four categories were reviewed. Although there were significant disparities between the consensus recommendations, four common themes were identified by the authors, which were represented in nearly every category. These recommendations were explicitly identified and expanded upon as the top four items of importance for the dissemination of all types of medical education research by the consensus conference.

RECOMMENDATIONS

Figure 1 outlines the four thematic elements identified by the consensus conference as being important to the success of those seeking to publish their education scholarship. Figure 2 outlines the top key category-specific recommendations in each area. Further clarification of these items can be found in Appendix C (see supplementary material).

DISCUSSION

In the Canadian EM education community, there is an increasing desire to encourage teachers and educators to generate scholarship.[3,4,22] The Education Working Group within CAEP's Academic Section has sought to encourage the scholarly dissemination of work so that EM educators from across the country can improve their teaching techniques and educational systems. The first series of papers from the 2013 Academic Symposium 1) helped define education scholarship,[22] 2) described how we could support careers of educators,[23] and 3) provided beginners with a guide on how to begin developing a scholarly track record.[4] We sought to build upon this previous work by assisting educators in generating high quality education scholarship.

Because many novice educators find the traditional peer review publication processes daunting, we sought to isolate the most common stumbling blocks and provide advice to overcome them. Our proceedings during this academic symposium allowed us to view the literature guiding education scholarship through the two lenses of most of the participants: the experienced educators who have mentored novice educators through the scholarly process, and the novice or junior educator who is entering into this field for the first time. By merging these two perspectives, we have generated four overall recommendations (see Figure 1) and multiple genre-specific recommendations (see Figure 2, with clarification in Appendix C).

Recommendation 1: Respect related work and show that the research or innovation adds to the field

It is critical for education scholars to conduct a thorough, up-to-date, and critical literature search to ground their work in the existing literature.[4,6,24-26] Per Bordage, incorporating a "…thoughtful, focused, up-to-date review of the literature…"[6] was one of the top five reasons for recommending acceptance of a manuscript.[6] Failing to cite recent literature or citing only local examples can be a red flag for editors.[27] Moreover, once links to previous work have been demonstrated, authors need to articulate how an innovation is novel or fills a void in the current literature.[28-30]

Recommendation 2: Use existing conceptual frameworks and theories to inform and guide scholarship

Conceptual frameworks are ways of thinking about a study or a dilemma, a lens through which one can examine the complexities of educational or social phenomenon.[31]

Recommendation 1:	Respect related work and show that the research or innovation adds to the field.
Recommendation 2:	Use existing conceptual frameworks and theories to inform and guide scholarship.
Recommendation 3:	State clearly the goal(s) or question(s) of the article, ensuring that they are timely, relevant, prevalent, and/or necessary.
Recommendation 4:	Respect category-specific conventions when submitting for publication.

Figure 1. Key Elements of Publishable Medical Education Scholarship

Key Recommendations for Clarification about Quantitative Medical Education Scholarship	Key Recommendations for Clarification about Qualitative Medical Education Scholarship
1. Ensure the research question is important to a key audience within the field medical education.[26,35-38] 2. Define a unique research question before justifying the most appropriate methodology to answer it.[26,34,35,40-46] 3. Define clearly the population of interest and the inclusion/exclusion criteria of participants.[39,47] 4. Discuss the results in relation to the strengths and weaknesses in the methodology.[46]	1. Declare and report one's theoretical paradigms, values, or position.[23,48,49] 2. Use a sampling plan that ensures that participants are relevant to the research question; ensure participant selection is well-reasoned.[48-50] 3. Ensure that the data collection is comprehensive enough to support rich and robust observations of the observed/experienced events.[58,50] 4. Use techniques to minimize biased or incomplete analysis: sufficiency[52], triangulation[21,51,52], respondent feedback[52] (a.k.a. member checking), and fair dealing.[52] 5. Critique the study, reflecting on whether the results are readily transferable.[53]
Key Recommendations for Clarification about Reviews & Synthesis Scholarship	**Key Recommendations for Clarification about Innovation Scholarship**
1. Justify the type of review (e.g. systematic review, meta-analysis, scoping review, etc.).[22,54] 2. Specify criteria for study eligibility giving a rationale.[3,54-59] 3. Describe how quality was assessed.[22,57-60] 4. Summarize main findings, including strength of evidence for each main outcome.[22,54,58] 5. Interpret the results in the context of other evidence and provide implications for future research.[22,54,56,58,63]	1. Present a clear and thorough description of the problem, its importance and the need for innovation, including how the problem has been identified, and who is affected.[26,64,65] 2. Present justification for the innovation to pass the "who cares?" test.[33,65] 3. Describe clearly the innovation-specific metrics used to evaluate the innovation.[3,66] 4. Describe both successes and failure in implementation, and subsequent lessons learned.[33,53,65] 5. State clearly the impact of the innovation on the field.[24,65,67]
For those seeking more clarification around these recommendations, please see Appendix C.	

Figure 2. Key Genre-based Recommendations for Medical Education Scholarship

These frameworks can act to "illuminate and magnify"[32] various aspects of education scholarship. The lack of a conceptual or theoretical framework led to the rejection of manuscripts submitted to major educational journals 62.2% of the time.[6] An exception to this rule may be in the development of a new theory via quantitative methods such as grounded theory. Even then, however, it is important to ensure that links to previous similar work are made.[33]

Recommendation 3: State clearly the goal(s) or question(s) of the manuscript, ensuring that they are timely, relevant, prevalent, and/or necessary

Having an important goal is key to successful publication[34] and a top reason that reviewers used to explain why they recommended acceptance of papers.[6] The academic community values clarity of writing.[20,21] Editors,[27] reviewers,[27] and especially readers[30] benefit from clear articulation of the intentions underpinning scholarship.[35]

Recommendation 4: Respect category-specific conventions when submitting for publication

The various categories of medical education scholarship have different conventions. When writing a paper, it is important that authors adhere to the language and style specific to each of these categories. Figure 2 more fully identifies key recommendations that must be considered for different categories of education scholarship, and these recommendations are more fully clarified within Appendix C.

With regards to all types of scholarship, it is crucial to explain why a particular study is important, and more specifically, to whom it is important. Many reviewers and editors will remind authors to answer two central questions: "So what?" and "Who cares?"[6] The "So what?" question ensures that you have clearly made a case for why your research question is novel and interesting to the field. At times, a study may answer a

new question or add a new innovative spin to previous work. Other times, a study may replicate or contradict previous findings or theories.

Junior authors should seek the mentorship of those more well-versed in an area for help when writing their manuscripts. An experienced educator may know of work that is linked conceptually but may not have been studied in the exact same context (e.g., work in intensive care unit education may be relevant to an author who is seeking to study emergency consultations skills). Linking to previous literature is of the utmost importance when reporting new findings.[4,6,24-26]

Completing a thorough review of the literature is advisable, but this preparatory reading will not always lead to a publishable manuscript.[10] Reviews of previous literature may not coalesce into meta-analyses or systematic reviews because the existing literature is too heterogeneous to answer a defined question.[10] Clearly defined questions for synthesis works are important, but the aggregation of data must first be justifiable, as we point out in our genre-specific recommendations (see Figure 2).

Finally, we would like to advise educators that works on scholarly innovation are important; however, not every educational endeavour will be innovative. Innovation reporting requires the same amount of rigour as other forms of scholarship, with the same necessity to build upon previous work and add new ideas.[9] Careful thought should be placed into whether the work of scholarship is best disseminated as an innovation report, or whether it is best delivered to other educators as a package of peer-reviewed teaching materials via new scholarly portals[3,4] (such as MedEdPortal, JETem.org, EMSimCases.com, etc.).

LIMITATIONS

The main limitation of our study was that the demographic make-up of consensus conference participants was not optimal or selective. An open call for participation was made to all emergency physician members of CAEP, potentially limiting a broader inclusion of EM educators. Also, the demographics of participants indicated significant representation from very early career EM scholars (students, residents, and junior educators) who may lack significant experience in medical education scholarship. Thus, the endorsement of key steps may be influenced by limited or inexperienced consensus.

CONCLUSION

Education scholarship is imperative to advance EM education. To effectively publish and disseminate education scholarship, it is important to prevent fatal flaws.[4,6,24-26,36,37] Clinician educators are a prime source of innovations and research that can advance the field of medical education, and we hope that this document and its associated reviews[7-10] will help foster continued education scholarship amongst the ranks of EM educators. This guide serves as a primer for both novice education scholars and clinician educators to assist in elevating EM education scholarship by attending to key steps in the publication process.

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SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit https://doi.org/10.1017/cem.2017.30

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CAEP Academic Symposium Papers

CAEP 2016 Academic Symposium: How to have an impact as an emergency medicine educator and scholar

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ABSTRACT

Background: In a time of major medical education transformation, emergency medicine (EM) needs to nurture education scholars who will influence EM education practice. However, the essential ingredients to ensure a career with impact in EM education are not clear.

Objective: To describe how to prepare EM educators for a high-impact career.

Methods: The Canadian Association of Emergency Physicians (CAEP) Academic Section commissioned an "Education Impact" working group (IWG) to guide the creation of consensus recommendations from the EM community. EM educators from across Canada were initially recruited from the networks of the IWG members, and additional educators were recruited via snowball sampling. "High impact educators" were nominated by this network. The high impact educators were then interviewed using a structured question guide. These interviews were transcribed and coded for themes using qualitative methods. The process continued until no new themes were identified. Proposed themes and recommendations were presented to the EM community at the CAEP 2016 Academic Symposium. Feedback was then incorporated into a final set of recommendations.

Results: Fifty-five (71%) of 77 of identified Canadian EM educators participated, and 170 names of high impact educators were submitted and ranked by frequency. The IWG achieved sufficiency of themes after nine interviews. Five recommendations were made: 1) EM educators can pursue a high impact career by leveraging either traditional or innovative career pathways; 2) EM educators starting their education careers should have multiple senior mentors; 3) Early-career EM educators should immerse themselves in their area of interest and cultivate a community of practice, not limited to EM; 4) Every academic EM department and EM teaching site should have access to an EM educator with protected time and recognition for their EM education scholarship; and 5) Educators at all stages should continuously compile an impact portfolio.

Conclusions: We describe a unique set of recommendations to develop educators who will influence EM, derived from a consensus from the EM community. EM leaders, educators, and aspiring educational scholars should consider how to implement this guide towards enhancing our specialty's educational mission.

RÉSUMÉ

Contexte: À une époque où l'enseignement de la médecine connaît des mutations importantes, la médecine d'urgence (MU) se doit de soutenir les chercheurs en enseignement qui influenceront la pratique de l'enseignement dans cette dernière discipline. Toutefois, on ne connaît très bien les ingrédients essentiels à une carrière influente dans l'enseignement de la MU.

Objectif: L'exercice visait à décrire la préparation des éducateurs en MU en vue d'une carrière influente.

Méthode: La section des affaires universitaires de l'Association canadienne des médecins d'urgence (ACMU) a formé un groupe de travail sur l'« influence en éducation » et l'a chargé de guider l'élaboration de recommandations consensuelles en s'appuyant sur la communauté en MU. Des éducateurs en MU de partout au Canada ont d'abord été recrutés à partir des réseaux des membres du groupe de travail, auxquels se sont joints d'autres éducateurs choisis à l'aide de la méthode du sondage en boule de neige. Les « éducateurs influents » ont été désignés par le réseau, puis rencontrés en entrevues menées à l'aide d'un guide de questions structuré. On a par la suite transcrit et codé les entrevues pour dégager les thèmes, à l'aide de méthodes qualitatives. Le processus s'est poursuivi jusqu'à ce qu'on ne puisse plus trouver de nouveau thème. Les thèmes proposés et les recommandations ont été présentés à la communauté en MU à l'occasion du

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Symposium sur les affaires universitaires de l'ACMU 2016. Les rétroactions ont ensuite été intégrées au document de travail pour finalement former un ensemble définitif de recommandations.

Résultats: Sur 77 éducateurs repérés en MU au Canada, 55 (71 %) ont participé à l'exercice. Cent soixante-dix noms d'éducateurs influents ont été soumis, puis classés par ordre de fréquence. Le groupe de travail a atteint un plafond de thèmes après neuf entrevues. Il s'est dégagé de l'exercice cinq recommandations : 1) les éducateurs en MU peuvent poursuivre une carrière influente en empruntant soit les voies classiques, soit des voies innovatrices du cheminement de carrière; 2) les éducateurs en MU qui commencent leur carrière dans l'enseignement devraient avoir plusieurs mentors d'expérience; 3) les éducateurs en MU en début de carrière devraient s'investir dans leur domaine de prédilection et cultiver une communauté de praticiens, même en dehors de la MU; 4) tous les départements de MU dans les universités et tous les lieux d'enseignement de la MU devraient avoir accès auprès d'un éducateur en MU, disposer de périodes réservées et reconnaître les travaux de recherche en enseignement de la MU; 5) les éducateurs devraient, à toutes les étapes, entretenir continuellement un portefeuille d'influence.

Conclusions: L'exercice a permis de dresser un ensemble unique de recommandations visant à former des éducateurs qui auront de l'influence en médecine d'urgence, ensemble consensuel établi à partir de la communauté en MU. Les meneurs en médecine d'urgence, les éducateurs et les futurs chercheurs en enseignement devraient se pencher sur la manière d'appliquer le guide afin de porter encore plus loin la mission éducative de notre spécialité.

Keywords: scholarship, impact, medical education

INTRODUCTION

Education scholarship is a critical activity for a rapidly expanding specialty like emergency medicine (EM). According to van Melle, "Education scholarship is an umbrella term which can encompass both research and innovation in health professions education."[1] In an era of major change in the way that health professionals will be trained in Canada and worldwide, EM needs more education scholars who can innovate, research, and disseminate advances in education.[2-5] However, what is unclear is how EM education scholars can achieve high impact careers that influence and advance the practice of EM in ways that ultimately have a positive effect on patient care.

The Canadian Association of Emergency Physicians (CAEP) Academic Section was created in 2013 with the vision to "promote high-quality emergency patient care by conducting world-leading education and research in emergency medicine (EM)." The three committees of the CAEP Academic Section take turns leading a symposium on education,[6-8] research,[9-12] or leadership at the CAEP annual conference to present their latest findings and recommendations.[13-15] At CAEP 2016, the area of focus was education scholarship with the theme: "The Pathway to Success." The goal of the 2016 Academic Symposium on Education Scholarship was to provide pragmatic recommendations in three areas: 1) recommended training for those pursuing academic roles in EM education, 2) recommendations on how to make an impact in medical education, and 3) the specifics on how to publish in the area of education scholarship. In this paper, we describe the results of the consensus recommendations on how to have a high impact career in medical education.

METHODOLOGY

We created an "Education Impact" working group (IWG) to identify the essential career elements of recognized medical educators who have influenced and advanced medical education, regardless of the specialty. The seven-member working group was formed from education scholars representing both EM training streams and six medical schools from across Canada. They met by teleconference 10 times from September 2015 to July 2016. The IWG developed their consensus recommendations using a systematic approach that engaged the Canadian EM community. At the outset, the IWG conducted a literature review of education scholarship and adopted the van Melle definition. We then defined education impact as: *a productive scholarly career recognized as having a significant and powerful influence on the practice of others.*

Using the previous definitions, the IWG members then identified individuals involved in EM education scholarship from the 17 Canadian medical schools, with a final list of individuals reviewed for completeness by the full working group. Each person on this list was contacted with the same structured request to 1) name individuals whom they would call high impact medical educators (who were not required to be physicians or emergency physicians) and to 2) identify others involved in EM scholarship ("snowball sampling") who

Table 1. List of interview questions for high impact medical educators

Demographics questions

Training

1. If you practice clinically, what is your clinical discipline?
   - What residency training did you do?
2. What graduate degrees do you have?

Career

1. How many years have you been practicing as a medical educator?
2. Describe your career progression, as an educator.
   - What is your current position?
   - What past positions have you held related to education?

Time and supports

1. What portion of your professional time is allocated to education?
   - How many hours per week does this amount to?
2. What supports do you have to pursue your education scholarship?

IMPACT questions

1. You have been identified by the EM community as a high impact educator. How has your work influenced medical education?
   - Provide up to three examples.
2. What factors have allowed you to be high impact?
3. What markers of success do you or did you aspire to? / How do you know that you have influenced medical education?
4. Have markers of success (or of being high impact) in medical education changed through your career, and how so?
5. In what ways do you think measures of impact in medical education will change in the future?

could participate in the consensus process. All names for the high impact educator list were collected electronically and ranked by frequency. It was decided a priori that if the names of any of the IWG were put forth they would be excluded from the rank list. The top five individuals on the rank list were interviewed by IWG members using a standard interview script. Each interviewee was asked the same series of questions (Table 1), with which they were provided in advance of the interview. Following the initial five interviews, the transcripts were coded for themes using interpretive descriptive methods by two of the working group (JRF, WJC).[16] Subsequently, the next highest ranked individual was interviewed, and this continued until sufficiency (absence of additional themes) was reached. All interviews were audio recorded, and field notes were taken.

ANALYSIS

Two independent authors (JRF, WJC) reviewed the audio recordings and field notes, and conducted an inductive analysis to identify emerging themes. These themes were presented to the full IWG for review. Themes that were felt to be similar were merged or grouped within broader themes. The themes were presented at the 2016 CAEP Academic Symposium to 90 attendees from the EM community, including practicing physicians, residents, medical students, and senior EM leaders. Participants self-selected based on their interest in the CAEP Academic Section and/or the topic. The attendees vetted the proposed themes for understanding and validity before working in small groups to provide recommendations around an assigned theme. These recommendations were then presented to the symposium attendees at-large for further discussion and refinement. At a follow-up teleconference, the themes and draft recommendations were refined by the IWG, and the recommendations were finalized and circulated to the Academic Section for final comments in August 2016. All feedback was incorporated into a final set of recommendations for the Canadian EM community.

RESULTS

Fifty-five (71%) of 77 identified EM medical educators participated. In total, 170 names of high impact educators were submitted (ranging from 1 to as many as 11 nominations per person); 102 unique names were identified as medical educators with impact, and IWG members were removed. For the interviews, theme sufficiency was reached upon completion of the ninth interview. Seven broad themes were identified, and each included from three to nine subthemes (Table 2).

RECOMMENDATIONS

The IWG developed the following recommendations for EM educators who wish to have a career that influences and advances medical education, practice, and patient care:

EM educators can pursue a high impact career by leveraging either traditional academic structures or innovative career pathways

Two distinct career paths emerged from the consensus process. The first was labelled "traditional academic"

Table 2. Themes identified from high impact medical educators about their career path

Theme	Subtheme
1. There are two major career arcs for highly high impact educators.	1.1. Trailblazers within academe
	1.2. Dissatisfied rebels
	1.3. *All* seek to change the system.
2. Enablers of high impact	2.1. Preparation
	2.1.1. Identifying mentors and role models
	2.1.2. Saying yes at key opportunities and capitalizing on them
	2.1.3. Taking on increasing roles
	2.1.4. Gaining credentials in medical education
	2.2. Community
	2.2.1. Establishing a network of expert colleagues and collaborators
	2.2.2. Working with your community
	2.3. Strategy
	2.3.1. Focusing on a program of scholarship (traditional or otherwise) that is unique and influential
	2.3.2. Carving out protected time
	2.4. Resources
	2.4.1. Accessing resources
	2.4.2. Accessing institutional support
3. Multifaceted work-life integration	3.1. A passion: work is hobby and mission
	3.2. Mix of professional work
	3.3. Mix of funding
	3.4. Entrepreneurial: working beyond what colleagues do
	3.5. Trade-offs
4. Motivations	4.1. Internal
	4.1.1. Joy of endeavour (i.e., pleasure of teaching, researching, speaking, influencing, etc.)
	4.2. External formal
	4.2.1. Recognition (i.e., awards, invitations, promotions, etc.)
	4.3. External informal
	4.3.1. Uptake of work (used work for a case, etc.)
	4.3.2. Triggering discussions in the community
5. The many faces of "impact" or success	5.1. Teaching generations of medical education
	5.2. Mentoring other leaders
	5.3. Use of traditional scholarship (e.g., publications, grants, awards)
	5.4. Invitations to speak or consult
	5.5. Uptake of work
	5.6. Stimulating a discussion in a community
	5.7. Changing practice
	5.8. Worldwide network
	5.9. Name associated with field or body of work
6. Disruptive technology	6.1. New tech has greater reach
	6.2. Can bypass traditional structures
	6.3. Perhaps greater influence
	6.4. Sometimes demeaned by traditional structures
7. Evolution of impact	7.1. Shift from scholarly activities to scholarship
	7.2. Greater recognition for education in university
	7.3. New measures of scholarship (e.g., H-index, impact factor, citations)
	7.4. Need new metrics for digital age
	7.5. Need better measures of knowledge translation and uptake

and involved a career focused on developing scholarly innovations, obtaining grants, conducting research, and disseminating via traditional print journals within the infrastructure of universities. High impact educators used these activities within academe as a platform to influence the practice of other educators and practitioners, and were recognized as important scholars. The second career pathway was labelled as "innovative" and was described as a way of having impact enabled by digital technology. In the field of medical education, digital platforms (e.g., social media) were perceived as a means of reaching a broader audience in a more timely fashion than traditional channels of disseminations (e.g., print journals). The use of these new technologies helped the high impact educators support the accelerated translation and uptake of their education innovations by bypassing traditional structures.[17,18] Using the innovative pathway, they developed new organizations and digital platforms (e.g., https://www.aliem.com/ and https://www.emrap.org/) on which to innovate and widely disseminate their work. EM educators can use one or both of these career paths when deciding on their approach to having impact.

EM educators starting their education careers should have multiple senior mentors

All contributors identified the need and benefits of effective mentorship for those embarking on a career of scholarship. Mentors enable development of scholars, break down barriers to career advancement, enhance networking, and can coach junior scholars to be more high impact. It was emphasized that no single mentor can meet all of these needs, hence the "personal board of directors" concept to support aspiring scholars via nurturing by several leaders.[1,19] The nine interviewees described actively engaging in the medical education community as an essential first-step to identifying potential mentors. They described mentorships as being developed over time while working closely with more senior educators. Therefore, aspiring EM educators should seek opportunities for scholarly collaboration with seasoned educators within their focused area of interest. As soon as a mentoring relationship is established, EM educators can access their primary mentor's broad network of colleagues and collaborators to identify additional mentors.

Early-career EM educators should immerse themselves in their area of interest and cultivate a community of practice, not limited to EM

Contributors to the consensus process highlighted the need for focus and immersion in the field of medical education for EM. The interviewed high impact educators expressed a passion for their contributions to the medical community, and each was motivated to reach beyond the typical expectations of his or her field. Aspiring EM educators need to find an area of focused interest within medical education (their "niche"), equip themselves with the training and credentialing needed to effectively engage within the community of practice, and find their unique way of contributing. Initially chosen niches are often not in the exact domain where the educator will ultimately establish high impact, but the journey of each of these interests often leads to a deeper discovery of how to influence and advance medical education. Furthermore, developing a network of expert colleagues and collaborators, as well as working with the medical education community were viewed as essential. This concept invokes parallels with other human endeavours that pursue elite performance (e.g., music, sport, chess) in that dedication and collaborations are required to truly achieve a level that is high impact.[20]

Every academic EM department and EM teaching site should have access to an EM educator with protected time and recognition for their EM education scholarship

EM, as a rapidly growing specialty in an era of dramatic change in medical training, urgently requires a cadre of expert medical educators. The IWG recommends that every Canadian academic EM program recruit and support one or more dedicated clinician educators.[21] To enable our young specialty to be a leader and innovator in medical education, we need high impact educators to be a resource to every major EM organization.

Educators at all stages should continuously compile an impact portfolio

Contributors emphasized the need for all scholars to document their impact on an ongoing basis. More than a traditional portfolio for academic promotion (documenting publications, abstracts, and grants), the IWG identified the need for an "impact portfolio" that

documented other measures of influence. This larger body of work can include such elements as evidence of invited presentations, consultations, awards and honours, mentees and graduate students, uptake of innovations, stimulated discourses in a community, changes to practice, or a named field.

CONCLUSION

The concept of high impact educational scholarship and how to achieve it was identified as a priority for the EM community. In this paper, we describe a unique set of recommendations on the essential ingredients for developing a cadre of scholarly EM educators recognized as influential and practice-changing innovators. EM leaders, educators, and aspiring educational scholars should consider how to implement this guide to enhance our specialty's educational mission.

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CAEP/ACMU 2017 Scientific Abstracts, June 3rd to June 7th, 2017, Whistler, British Columbia

Research in emergency medicine (EM) affects and improves emergency patient care. Research helps to identify and standardize best care to optimize patient 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 2017 in Whistler, we received an astounding 335 abstracts from EM researchers from across Canada and internationally. This was an increase of more than 11% from the 2016 competition. The top-ranked abstracts will present at the plenary session, and the best resident, pediatric, new investigator, education innovation, VTE, 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 provided three 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. We also partnered with CanVECTOR to offer a new grant for the top VTE-related proposal. 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. A new feature at CAEP 2017 will be the Grizzly Den, where researchers can "pitch" their research and try to convince the Grizzlies to fund their study.

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 2017 Final Program contains the scheduled times for the abstract presentations.

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

Abbreviations
PL = Plenary; LO = Lightning oral; GD = Grizzly den; MP = Moderated poster; P = Poster

CAEP/ACMU 2017 Research Abstract Awards

First place, Plenary Presentation, Grant Innes Research Paper and Presentation Award
Ian Stiell
PL01 Creation of the Canadian heart failure risk scale for acute heart failure patients

Second place, Plenary Presentation
Audrey-Anne Brousseau
PL02 Derivation and validation of a feasible emergency department specific frailty index to predict adverse outcomes

Third place, Plenary Presentation
Christian Vaillancourt
PL03 Implementation of the Canadian C-Spine Rule by paramedics: a safety evaluation

Fourth place, Plenary Presentation, Top Resident Abstract Award
Shannon Fernando
PL04 Initial Serum Lactate Predicts Deterioration in Emergency Department Patients with Sepsis

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Top New Investigator Award
Leila Salehi
LO54 A descriptive analysis of ED length of stay of admitted patients 'boarded' in the emergency department

Top Pediatric Abstract Award
Amy Plint
LO25 How safe are our pediatric emergency departments? A multicentre, prospective cohort study

Top Medical Student Project Award
Dana Stewart
LO32 Are EMS offload delay patients at increased risk of adverse outcomes?

Top Education Innovation Abstract Award
Paula Sneath
LO13 GridlockED: an emergency medicine game and teaching tool

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CAEP-CanVECTOR Awards

Sameer Sharif
LO81 Optimizing the use of CT scanning for pulmonary embolism in the emergency department

Eddy Lang
LO85 Substantial variation in CTPE ordering patterns and diagnostic yield in a large group of specialty-trained emergency physicians

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CAEP Resident Research Abstract Awards

Allison McConnell
LO33 Prehospital adverse events associated with nitroglycerin use in STEMI patients with right ventricle infarction

Luke Taylor
LO43 Does point of care ultrasound improve resuscitation markers in emergency department patients with undifferentiated hypotension? The first Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED 1) Study; an international randomized controlled trial

Sameer Masood
LO66 Did the Choosing Wisely Canada campaign work? A retrospective analysis of its impact on emergency department imaging utilization for head injuries

Michael Beyea
LO68 Extracorporeal membrane oxygenation in the emergency department for resuscitation of out-of-hospital cardiac arrest patients: a systematic review

Alexis Cournoyer
LO71 For patients suffering from out-of-hospital cardiac arrest, is survival influenced by the capabilities of the receiving hospital?

Adam Harris
LO76 Emergency department procedural sedation in elderly patients

Cristian Toarta
LO096 Syncope prognosis based on emergency department diagnosis: a prospective cohort study

Grizzly Den Presentations

Khalifa Alqaydi
GD01 Age-adjusted D-dimer and two-site compression point-of-care ultrasonography to rule out acute deep vein thrombosis

Simon Berthelot
GD02 An international consensus study to identify quality indicators for ambulatory emergency care

Naveen Poonai
GD03 Hyoscine butylbromide (Buscopan) versus acetaminophen for non-surgical abdominal pain in children: a randomized controlled superiority trial

Catherine Varner
GD04 A blinded, randomized controlled trial of opioid analgesics for the management of acute fracture pain in older adults discharged from the emergency department

Kerstin de Wit
GD05 Careful Anticoagulation Review in Emergency Medicine (CARe-EM)

Justin Yan
GD06 Derivation and internal validation of a clinical prognostic tool for recurrent emergency visits for hyperglycemia in patients with diabetes mellitus: a multicentre prospective cohort study

CAEP/ACMU 2017 Grant Awards

2017 CAEP-CanVECTOR Grant Awardee

Kerstin de Wit

Patient preferences in emergency CT scanning for pulmonary embolism

2017 EMAF Grant Awardees

Ariane Boutin

Randomized controlled trial evaluating the additive value of intranasal fentanyl on ibuprofen in the pain management of children with moderate to severe headaches

Debra Eagles

A study to evaluate barriers and facilitators to the emergency department discharge of patients with recent-onset atrial fibrillation and flutter

Catherine Varner

Challenging the dogma: A randomized controlled trial comparing prescribed light exercise to standard management for emergency department patients with acute mild traumatic brain injury

2017 Junior Investigator Awardees

Shannon Fernando

Analysis of bystander CPR quality during out-of-hospital cardiac arrests using data derived from automated external defibrillators

Sarah Kilbertus

Transition to practice: evaluating the need for formal training in supervision and assessment techniques among senior emergency medicine residents and new to practice emergency physicians

Rohit Mohindra

A prospective randomized pilot trial to reduce readmission for frail elderly patients with acute decompensated heart failure

Trevor Skutezky

Improving patient care by engaging emergency department staff in a participatory design of a patient safety event reporting platform at an urban tertiary care hospital

Robert Suttie

Can emergency physicians reliably perform carotid artery point-of-care ultrasound to detect critical stenosis?

Abbreviations:
PL = Plenary; LO = Lightning oral; GD = Grizzly den;
MP = Moderated poster; P = Poster

*Corresponding authors are underlined.

Plenary Oral Presentations

PL01

Creation of the Canadian Heart Failure Risk Scale for acute heart failure patients

I.G. Stiell, MD, MSc, C.M. Clement, J.J. Perry, MD, MSc, R.J. Brison, MD, A. McRae, MD, B.H. Rowe, MD, MSc, B. Borgundvaag, MD, S. Aaron, MD, L. Mielneczuk, MD, L. Calder, MD, MSc, J. Brinkhurst, BSc, A. Forster, MD, G.A. Wells, PhD, University of Ottawa, Ottawa, ON

Introduction: Acute heart failure (AHF) is a common, serious condition that frequently results in morbidity and death and is a leading cause for hospital admissions. There is little evidence to guide ED physician disposition decisions for AHF patients. We sought to create a risk-stratification tool for use by ED physicians to determine which AHF patients are at high risk for poor outcomes. **Methods:** We conducted a prospective cohort study in 9 tertiary hospital EDs and enrolled adult patients presenting with shortness of breath due to AHF. Patients were assessed for standardized clinical and laboratory variables and then followed to determine short-term serious outcome (SSO), defined as death, intubation, myocardial infarction, or relapse requiring admission within 14 days. We identified predictors of SSO by stepwise logistic regression and then rounded beta coefficients to create a risk scale. **Results:** We enrolled 1,733 patients with mean age 77.1 years, male 54.5%, and initially admitted 50.1%. SSOs occurred in 202 (11.7%) cases (14.0% in those admitted and 9.3% in those discharged from the ED). We created the CHFRS consisting of:1. Initial Assessment a) History of valvular heart disease b) On anti-arrhythmic c) Arrival heart rate $\geq$ 110d) Treated with non-invasive ventilation2. Investigations a) Urea >12 mmol/L or Cr $>150\,\mu$mol/L b) Serum CO2 >35 mmol/L or pCO2 >60 mmHg (VBG or ABG) c) Troponin >5x Upper Reference Level 3. Fails reassessment after ED treatment:(i) Resting vital signs abnormal, (SaO2 <90% on room air or usual O2, or HR >110, or RR >28); OR(ii) Unable to complete 3-minute walk test. The risk of SSO varied from 5.0% for a score of 0, to 77.4% for a score of 9. Discrimination between SSO and no SSO cases was good with an area under the ROC curve of 0.70 (95% CI 0.66-0.74). There was good calibration between the observed and expected probability of SSO and internal validation showed the risk scores to be very accurate across 1,000 replications using the bootstrap method. **Conclusion:** We have created the CHFRS tool which consists of 8 simple variables and which estimates the short-term risk of SSOs in AHF patients. CHFRS should help improve and standardize admission practices, diminishing both unnecessary admissions for low-risk patients and unsafe discharge decisions for high-risk patients. This will ultimately lead to better safety for patients and more efficient use of hospital resources.

Keywords: heart failure, risk stratification, patient safety

PL02

Derivation and validation of a feasible emergency department specific frailty index to predict adverse outcomes

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Introduction: Frailty is an overarching concept in geriatric medicine. However its utility in the emergency department (ED) was not well understood. Objectives were to derive and validate an ED specific frailty index (FI-ED), using a cumulative deficits model; and to evaluate its ability to predict adverse outcomes. **Methods:** This was a large multinational prospective cohort study using data from: The Management of Older Persons in Emergency Departments (MOPED) and the interRAI study. The FI-ED was derived from the Canadian sample and validated in the multinational sample. Inclusion criteria were all patients ≥ 75 years old presenting to an ED. The FI-ED used 24 variables identified in the interRAI ED-Contact Assessment tool, a brief focussed geriatric assessment. Its ability to predict adverse outcomes were analysed by logistic regression with odds ratio (OR). **Results:** There were 3903 participants: 2153 in the derivation sample and 1750 in the validation sample. In the derivation sample, increasing FI-ED was significantly associated with admission (OR 1.43 [95% CI 1.34-1.52]), death in hospital (OR 1.55 [1.38-1.73]), prolonged hospital stay (OR 1.37 [1.22-1.54]), needs for Comprehensive Geriatric Assessment (OR 1.51 [1.41-1.60]) and discharge to long-term care (OR 1.30 [1.16-1.47]). In the validation sample, results were similar except for long-term care disposition (OR 0.84 [0.75 0.85]). **Conclusion:** The FI-ED conformed to characteristics previously reported in other geriatric populations. It was accurately derived and validated from a brief geriatric assessment feasible in the ED and can be used to predict adverse outcomes.

Keywords: frailty, geriatric, emergency

PL03

Implementation of the Canadian C-Spine Rule by paramedics: a safety evaluation

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Introduction: The Canadian C-Spine Rule (CCR) was validated by emergency physicians and triage nurses to determine the need for radiography in alert and stable Emergency Department trauma patients. It was modified and validated for use by paramedics in 1,949 patients. The prehospital CCR calls for evaluation of active neck rotation if patients have none of 3 high-risk criteria and at least 1 of 4 low-risk criteria. This study evaluated the impact and safety of the implementation of the CCR by paramedics. **Methods:** This single-centre prospective cohort implementation study took place in Ottawa, Canada. Advanced and primary care paramedics received on-line and in-person training on the CCR, allowing them to use the CCR to evaluate eligible patients and selectively transport them without immobilization. We evaluated all consecutive eligible adult patients (GCS 15, stable vital signs) at risk for neck injury. Paramedics were required to complete a standardized study data form for each eligible patient evaluated. Study staff reviewed paramedic documentation and corresponding hospital records and diagnostic imaging reports. We followed all patients without initial radiologic evaluation for 30 days for referral to our spine service, or subsequent visit with radiologic evaluation. Analyses included sensitivity, specificity, kappa coefficient, t-test, and descriptive statistics with 95% CIs. **Results:** The 4,034 patients enrolled between Jan. 2011 and Aug. 2015 were: mean age 43 (range 16-99), female 53.3%, motor vehicle collision 51.9%, fall 23.8%, admitted to hospital 7.0%, acute c-spine injury 0.8%, and clinically important c-spine injury (0.3%). The CCR classified patients for 11 important injuries with sensitivity 91% (95% CI 58-100%), and specificity 67% (95% CI 65-68%). Kappa agreement for

interpretation of the CCR between paramedics and study investigators was 0.94 (95% CI 0.92-0.95). Paramedics were comfortable or very comfortable using the CCR in 89.8% of cases. Mean scene time was 3 min (15.6%) shorter for those not immobilized (17 min vs. 20 min; p = 0.0001). A total of 2,569 (63.7%) immobilizations were safely avoided using the CCR. **Conclusion:** Paramedics could safely and accurately apply the CCR to low-risk trauma patients. This had a significant impact on scene times and the number of prehospital immobilizations.

Keywords: clinical decision rule, c-spine injury, emergency medical services

PL04

Initial serum lactate predicts deterioration in emergency department patients with sepsis

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Introduction: Early Emergency Department (ED) identification of septic patients at risk of subsequent deterioration is necessary in order to optimize disposition. High-risk patients admitted directly from the ED to the ICU have better outcomes than those admitted to the floor first. Initial ED serum lactate level has been associated with 28-day mortality in admitted patients, but there is little evidence on its use in predicting short-term deterioration. Furthermore, it is unclear whether the addition of respiratory rate (RR) to lactate would create a stronger predictive model of deterioration than either alone. **Methods:** Prospective cohort study of ED patients (age $\geq$ 18) screened and treated for sepsis (defined as physician suspicion of infection and 2 or more of the SIRS criteria). Lactate and vital signs were obtained within 2 hours of ED arrival. Main outcome was deterioration (defined as any of the following: death; ICU admission >24 hours; Intubation; Vasoactive medications for >1 hour; or Non-invasive positive pressure ventilation for >1 hour) within 72 hours. Patients meeting an endpoint within 1 hour of arrival were excluded. Discharged patients were contacted at 72 hours to ensure that they had not met the endpoint or presented to another institution. **Results:** 985 patients presenting to either of two urban high-volume EDs were enrolled, of whom 84 (8.5%) met the primary outcome. Initial serum lactate $\geq$ 4.0 had a specificity of 97.4% (95% CI, 94.1-100%), but a sensitivity of 27.4% (95% CI, 17-8-36.9%) for predicting deterioration. Of patients with a lactate $\geq$ 4.0, 4 (8.7%) were discharged home, and did not reach an endpoint at 72 hours. Lactate $<$2.0 had a sensitivity of 95.5% (95% CI: 93.4-97.1%) and specificity of 84.5% (95% CI: 80.4-88.6%) for ruling out 72-hour deterioration. Of patients with a lactate <2.0, 224 (56.1%) were discharged home. Combining lactate with RR (AUC: 0.72, 95% CI: 0.66-0.79) did not yield better predictive capability than lactate alone (AUC: 0.70, 95% CI: 0.64-0.76). **Conclusion:** Initial ED lactate is predictive of deterioration within 72 hours in patients with sepsis. The combination of lactate and RR was not more predictive of deterioration than lactate alone. This suggests that serum lactate has a role in predicting deterioration in patients with sepsis, and has utility in determining disposition.

Keywords: sepsis, risk stratification, lactate

Oral Presentations

LO01

Prevalence of pulmonary embolism among Canadian emergency department patients with syncope: a multicenter prospective cohort study

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Introduction: A recent cross-sectional study reported a 17.3% prevalence of pulmonary embolism (PE) among patients with syncope. However, the study had several flaws including spectrum and work-up bias with over-diagnosis due to excessive investigations. We sought to evaluate the prevalence of PE among Canadian emergency department (ED) patients presenting with syncope. **Methods:** We enrolled adults with syncope at 5 EDs and collected demographics, proportion of patients evaluated for suspected PE, their Wells PE score values and results of investigations [d-dimer, computed angiography (CT) of chest or ventilation-perfusion (VQ) scan]. 30-day adjudicated outcome included diagnosis of PE requiring treatment. We used descriptive statistics to report the results. **Results:** 4,739 patients [mean age 54.3 years, 54.4% females, and 587 (12.4%) hospitalized] were enrolled. 323 patients (6.8%) had further evaluation and investigations performed for suspected PE: 255 patients had D-dimer performed, 140 had CT chest and 17 had VQ performed. Of the 323 patients, 300 patients were low risk (Wells score $\leq$4) and 23 were high-risk (score >4). A total of 16 patients (0.3%) in the study cohort were diagnosed with PE: 10 patients were diagnosed in the ED, 5 patients were diagnosed while hospitalized as inpatient, and 1 patient was diagnosed on a return ED visit. Overall the prevalence of PE was 0.3% among all ED patients with syncope; and a 0.9% among those hospitalized for syncope. **Conclusion:** Our study shows that the prevalence of PE is very low among all patients presenting to the ED with syncope. The prevalence is also very low among those hospitalized for syncope than previously reported. While PE should be suspected and further investigations performed among syncope patients if clinically appropriate, caution should also be taken against indiscriminate over-investigations for PE.

Keywords: syncope, pulmonary embolism, prevalence

LO02

Heart failure and palliative care in the emergency department

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Introduction: Heart failure (HF) is a common ED presentation that is associated with significant morbidity and mortality. Despite recent evidence and recommendations for early palliative care (PC) involvement in these patients, they are still significantly under-served by PC services, often resulting in multiple ED visits. We sought to evaluate use of PC services in patients with HF presenting to the ED. Secondary objectives of the study were to investigate: 1) one year mortality, ED visits, and admissions; 2) application of a novel palliative care referral score. **Methods:** We conducted a health records review of 500 consecutive HF patients who presented to two academic hospital EDs. We included patients aged 65 years or older who were diagnosed as having a HF exacerbation by the emergency physician (ICD-10 code 150.-). Our primary outcome was PC involvement. Secondary outcomes included one year mortality rates, ED visits, admissions to hospital, as well as the application of a novel PC referral score developed by the institutional cardiac Palliative Care Committee. The score consisted of 6 different aspects of the patient's illness, including laboratory tests, hospital usage, and markers of decompensation. We conducted appropriate univariate analyses. **Results:** Patients were mean age 80.7 years, women (53.2%), and had significant comorbidities (atrial fibrillation (51.2%), diabetes (40.4%) and COPD (20.8%)). Compared to those

with no PC, the 79 (15.8%) patients with PC involvement had a higher one year mortality rate (70.9% vs. 18.8%, $p < 0.0001$), more ED visits/year for HF (0.82 vs. 0.52, $p < 0.0001$), and more hospital admissions/year for HF (1.4 vs. 0.85, $p < 0.0001$). Using the heart failure palliative care score criteria, 60 patients had scores >=2. Compared to those with scores <2, these patients had a higher 1-year mortality rate (50% vs. 24%, $p < 0.0001$) and more ED visits/year for HF (0.83 vs. 0.54, $p < 0.01$). Only 40.0% of these high risk patients had any PC involvement. **Conclusion:** We found that few HF patients had PC services involved in their care. Using this novel HF palliative care referral score, we were able to identify patients with a significantly greater risk of mortality and morbidity. This study provides evidence that the ED is an appropriate setting to identify and refer high risk HF patients who would likely benefit from earlier PC involvement and may be a future avenue for PC access for these patients.

Keywords: palliative care, heart failure, emergency department

LO03

Application and usefulness of outpatient cardiac testing among emergency department patients with syncope

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Introduction: 2.6% of emergency department (ED) syncope patients will have underlying cardiac serious conditions (e.g. arrhythmia, serious structural heart disease) identified within 30-days of disposition. If those at risk are discharged home, outpatient cardiac testing can detect underlying arrhythmias and structural heart disease, and thereby improve patient safety. We describe the frequency of outpatient referrals for cardiac testing and the proportion of cardiac serious adverse events (SAE) among high risk and non-high (low and medium) risk ED syncope patients, as defined by the Canadian Syncope Risk Score (CSRS). **Methods:** We conducted a multicenter prospective cohort study to enroll adult syncope patients across five large tertiary care EDs. We collected demographics, medical history, disposition, CSRS value, outpatient referrals and testing results (holter, echocardiography), and cardiac SAE. Adjudicated 30-day SAE included death due to unknown cause, myocardial infarction, arrhythmia, and structural heart disease. We used descriptive analysis. **Results:** Of 4,064 enrolled patients, a total of 955 patients (23%) received an outpatient referral (mean age 57.7 years, 52.1% female). Of the 299 patients (7%) hospitalized, 154 received outpatient cardiac testing after discharge. Among the 3,765 patients discharged home from the ED, 40% of the non-high risk patients (305/756) and 56% of the high risk patients (25/45) received outpatient cardiac testing. Of all patients who received outpatient cardiac testing, 4 patients (0.8%) had serious cardiac conditions identified and all were arrhythmias. Among those with no cardiac testing, 5 patients (0.9%) suffered cardiac SAE (80% arrhythmias) outside the hospital. Of the 20 (44%) high risk patients who did not receive outpatient cardiac testing, 2 (10%) patients suffered arrhythmias outside the hospital. While among the 451 non-high risk patients, only 0.8% suffered arrhythmia outside the hospital. **Conclusion:** Outpatient cardiac testing among ED syncope patients is largely underutilized, especially among high risk patients. Better guidelines for outpatient cardiac testing are needed, as current practice is highly variable and mismatched with patient risk.

Keywords: cardiac, syncope, resource utilization

LO04

Very low concentrations of high-sensitivity troponin T at presentation can rapidly exclude acute myocardial infarction in a significant proportion of ED chest pain patients

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Introduction: Chest pain is one of the most common presenting complaints to emergency departments (EDs) across the world, and the exclusion of acute myocardial infarction (AMI) using troponin testing is central to the care of many of these patients. Testing strategies using conventional troponin assays require repeat testing over many hours to avoid missed diagnoses. This study aims to validate the ability of very low concentrations of troponin at presentation to exclude AMI in ED chest pain patients. **Methods:** This prospective cohort study was conducted at a single urban tertiary centre and regional percutaneous coronary intervention site in Calgary, Alberta. Patients were eligible for enrolment if they presented to the ED with chest pain, were 25-years or older and required biomarker testing to rule out AMI at the discretion of the attending emergency physician. Patients were excluded if they had clear acute ischemic ECG changes, new arrhythmia or renal failure requiring hemodialysis. High-sensitivity troponin-T (Roche Elecsys hs-cTnT) results were obtained in all patients at presentation. Relevant outcomes were obtained from administrative data. The primary outcome was AMI within 30-days of ED visit, the secondary outcome was 30-day major adverse cardiac events (MACE). The study was REB approved. **Results:** A total of 1,016 patients were enrolled from August 2014-September 2016, of which 174 (17.1%) patients had an initial troponin below the limit of blank (<3 ng/L) and 369 (36.3%) had a level below the limit of detection (<5 ng/L). The sensitivity and negative predictive value (NPV) of a troponin below limit of blank (<3 ng/L) for 30-day AMI were 100% (95% CI 89.3%-100%) and 100% (95% CI 97.8-100%), respectively. The sensitivity and NPV of a troponin below limit of detection (<5 ng/L) for 30-day AMI were 93.8% (95% CI 80.0-98.3%) and 99.5% (95% CI 98.1-99.9%) respectively. Sensitivity for 30-day MACE at both cutoffs was lower: 96.1% (95% CI 92.5-98.0%) for <3 ng/L, and 88.4% (95% CI 83.3-92.1%) for <5 ng/L, respectively. **Conclusion:** A high sensitivity troponin T result below the limit of blank is highly sensitive at excluding AMI and identifies patients at reasonably low risk of 30-day MACE. A result below the limit of detection will identify a larger population of patients as low risk but has a greater risk of missed AMI and MACE.

Keywords: chest pain, troponin, myocardial infarction

LO05

In patients presenting to the ED with STEMI, is the provision of morphine associated with worse patient outcomes?

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Introduction: ST-elevation myocardial infarction (STEMI) presenting to the ED is a significant health burden. The provision of IV morphine with doses titrated to provide comfort is recommended in the AHA STEMI Guidelines, yet there is limited evidence of safety in this setting. The primary objective of this study was to measure potential harm associated with the provision of IV morphine in STEMI patients presenting to the ED. **Methods:** This was a two centre retrospective chart review from an urban, inner city, academic ED with an annual census of 85,000 visits, and an affiliated community hospital with 35,000 annual visits. Consecutive patients from April 2009 to January

2015 presenting to the 2 EDs with a diagnosis of STEMI were identified in the ED database. Eight trained research assistants, blinded to the study hypothesis, used standardized data collection templates. The primary investigator double collected 20% of all data to ensure completeness and accuracy. **Results:** We included 311 patients with STEMI (124 received morphine [M]; 187 no morphine [nM]). The ages of the two groups were similar (mean 64 yrs [M] & 67 yrs [nM]; median 63 yrs [M] & 66 yrs [nM]; IQR 45-81 [M] and 45.5-86.5 [nM]); as were the proportion of female patients (21.0% [M] & 23.5% [nM]. The pre-STEMI Charlson comorbidity scores (mean 2.6), median time to first ECG (11 min [M] & 16 min [nM]), and mean time-to-needle for PCI (96.8 min [M] & 92.0 min [nM]) were similar between groups. The mean CCU length of stay (LOS) (9.3 days vs 6.3 days) and hospital LOS (7.4 days vs 4.6 days) were longer for patients receiving morphine than those not receiving morphine. Rates of congestive heart failure, acute kidney injury and cardiac arrest in hospital were unchanged between the groups. Unadjusted mortality was similar (10.5% [M] vs 13.3% [nM]) between groups. Binary logistic regression controlling for age, Charlson score, first and peak troponin values demonstrated an association between receiving morphine in the ED and an increased risk of death at 30 days (OR 8.1; 95% CI 7.1.-9.1). **Conclusion:** The provision of morphine to patients with STEMI in the ED may be associated with increased CCU and hospital LOS. When controlling for age, pre-STEMI Charlson score, first and peak troponin values, receiving morphine was associated with an increased risk of death at 30 days. Further research to elucidate this association is warranted.
Keywords: acute myocardial infarction, morphine, mortality

LO06

Role of the age adjusted D-dimer in suspected deep venous thrombosis

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Introduction: It is well established that a negative D-dimer will reliably rule out thromboembolism in selected low risk patients. Multiple modified D-dimer cutoffs have been suggested for older patients to improve diagnostic specificity. However, these approaches are better established for pulmonary embolism than for deep venous thrombosis (DVT). This study will evaluate the diagnostic performance of previously suggested D-dimer cutoffs for low risk DVT patients in the ED, and assess for a novel cutoff with improved performance. **Methods:** This health records review included patients >50 years with suspected DVT who were low-risk and had a D-dimer performed. Our analysis evaluated the diagnostic accuracy of D-dimer cutoffs of 500 and the age adjusted (age x 10) rule for patients >50 years; and 750, and 1,000 cutoffs for patients >60 years. 30-day outcome was a diagnosis of DVT. We also assessed the diagnostic accuracy for a novel cutoff (age x 12.5). **Results:** 1,000 patients (mean age 68 years; 59% female) were included. Of these, 110 patients (11%) were diagnosed with DVT. The conventional cutoff of <500 µg/L demonstrated a sensitivity of 99.1% (95% CI 95.0-99.9) and a specificity of 36.4% (95% CI 33.2-39.7). For patients >60 years, the absolute cutoffs of 750 and 1,000 showed sensitivity of 98.7% (95% CI, 92.9, 99.9), and the specificity increased to 48.6% (95% CI, 44.5-52.8%) and 62.1% (95% CI, 58.1-66.1%) respectively. For all study patients, age adjusted D-dimer demonstrated a sensitivity of 99.1% (95% CI 95.0-99.9) and a specificity of 51.2% (95% CI, 47.9-54.6). A novel age adjusted cutoff (age x 12.5) for patients >50, demonstrated a sensitivity of 97.3% (95% CI 92.2-99.4) and a specificity of 61.2% (95% CI 58.0-64.5). When compared to conventional cutoff, the age adjusted cutoffs (age x 10 and age x 12.5) would have resulted in an absolute decrease in further investigations of 13.1% and 22.2%, respectively, with false negative rates of 0.1% and 0.3%. **Conclusion:** Among older patients with suspected DVT and low clinical probability, the age adjusted D-dimer increases the proportion of patients among whom DVT can be ruled out. A novel cutoff (age x 12.5) demonstrated improved specificity. Future large scale prospective studies are needed to confirm this finding and to explore the cost savings of these approaches.
Keywords: deep venous thrombosis, D-dimer

LO07

Does point of care ultrasonography improve diagnostic accuracy in emergency department patients with undifferentiated hypotension? The first Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED1) Study; an international randomized controlled trial

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Introduction: Point of care ultrasonography (PoCUS) is an established tool in the initial management of hypotensive patients in the emergency department (ED). It has been shown rule out certain shock etiologies, and improve diagnostic certainty, however evidence on benefit in the management of hypotensive patients is limited. We report the findings from our international multicenter RCT assessing the impact of a PoCUS protocol on diagnostic accuracy, as well as other key outcomes including mortality, which are reported elsewhere. **Methods:** Recruitment occurred at 4 North American and 3 Southern African sites. Screening at triage identified patients (SBP < 100 mmHg or shock index >1) who were randomized to either PoCUS or control groups. Scans were performed by PoCUS-trained physicians. Demographics, clinical details and findings were collected prospectively. Initial and secondary diagnoses were recorded at 0 and 60 minutes, with ultrasound performed in the PoCUS group prior to secondary assessment. Final chart review was blinded to initial impressions and PoCUS findings. Categorical data was analyzed using Fishers two-tailed test. Our sample size was powered at 0.80 (α:0.05) for a moderate effect size. **Results:** 258 patients were enrolled with follow-up fully completed. Baseline comparisons confirmed effective randomization. The perceived shock category changed more frequently in the PoCUS group 20/127 (15.7%) vs. control 7/125 (5.6%); RR 2.81 (95% CI 1.23 to 6.42; p = 0.0134). There was no significant difference in change of diagnostic impression between groups PoCUS 39/123 (31.7%) vs control 34/124 (27.4%); RR 1.16 (95% CI 0.786 to 1.70; p = 0.4879). There was no significant difference in the rate of correct category of shock between PoCUS (118/127; 93%) and control (113/122; 93%); RR 1.00 (95% CI 0.936 to 1.08; p = 1.00), or for correct diagnosis; PoCUS 90/127 (70%) vs control 86/122 (70%); RR 0.987 (95% CI 0.671 to 1.45; p = 1.00). **Conclusion:** This is the first RCT to compare PoCUS to standard care for undifferentiated hypotensive ED patients. We found that the use of PoCUS did change physicians' perceived shock category. PoCUS did not improve diagnostic accuracy for category of shock or diagnosis.
Keywords: point of care ultrasound (PoCUS), hypotension, diagnosis

LO08

Effect of an intact "chain of survival" sequence on survival to discharge from out-of-hospital cardiac arrest

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Introduction: The "chain of survival" is a 5-link theoretical construct that has been central to cardiac arrest resuscitation for over 40 years. Although the role of each link has been extensively studied, little is known about the impact of performing the chain of survival in sequence. The purpose of this study was to estimate the proportion of out-of-hospital cardiac arrest (OHCA) responses by Emergency Medical Services (EMS) that had an intact chain of survival sequence response, and the effect of this on survival to hospital discharge. **Methods:** We conducted a prospective cohort study of adult (>age 20 years) OHCA patients using data collected between 2005-2007 by the Resuscitation Outcomes Consortium (ROC). ROC is a research network involving 10 research sites and 264 EMS agencies across North America. Using routinely collected data, we coded cases as receiving an intact or non-intact chain of survival sequence based on EMS cardio pulmonary resuscitation (CPR), rhythm analysis or defibrillation, epinephrine administration or endotracheal intubation, and transport to a hospital with an electrophysiology lab or percutaneous coronary intervention capability, contingent on the patient's condition when EMS arrived. Multiple variable logistic regression was performed, adjusting for known (Utstein) survival predictors, to estimate the independent effect of intact chain of survival sequence on survival to hospital discharge. REB approval was obtained. **Results:** We enrolled12,821 OHCA cases, of which, 29.4% (n = 3,773) had an intact chain of survival and 7.6% (n = 972) survived to hospital discharge. Cases with an intact chain of survival were younger, and more likely to arrest in public, receive bystander CPR, occur in the USA and specific ROC sites, and had faster EMS response times. The adjusted odds ratio of survival to hospital discharge with an intact chain of survival sequence was 2.4 (95% CI: 2.1-2.8). A sensitivity analysis of 4,056 cases with known timing of endotracheal intubation found a similar adjusted odds ratio of 2.1 (95% CI: 1.6-2.8). **Conclusion:** Our results indicate that OCHA resuscitation with an intact chain of survival occurs in approximately 1/3 of cases, and results in over a two-fold increase in the odds of surviving to hospital discharge. Initiatives to improve EMS teamwork and increase the proportion of OHCA resuscitation with an intact chain of survival appear to be warranted.

Keywords: cardiac arrest, resuscitation, system design

LO09

Assessing the ability of emergency department patients to self-triage by using an electronic questionnaire: a pilot study

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Introduction: The process of triage is used to prioritize the care of patients arriving in the emergency department (ED). To our knowledge, self-triage has not been previously studied in the general emergency department (ED) setting. In an attempt to test the feasibility of implementing this in the ED, we sought to assess the ability of ED patients to triage themselves using an electronic questionnaire. **Methods:** This was a prospective observational study. An iPad-based questionnaire was designed with a series of 'yes' or 'no' answers related to common chief complaints. A score corresponding to a Canadian Triage and Acuity Scale (CTAS) category was assigned based on their answers, without the knowledge of patients or ED staff. These scores were subsequently compared to the official CTAS score assigned by triage nurses. A convenience sample of ambulatory patients arriving at the ED were enrolled over a four week period. Patients arriving by ambulance were excluded. We also sought to assess patients' ability to predict their ultimate disposition. **Results:** A total of 492 patients were enrolled. The mean age of enrolled patients was 43.9. Of enrolled patients, 56 (11.4%) were under 20 years old, 168 (34.1%) between ages 20-39, 116 (23.6%) between ages 40-59 and 152 (30.9%) older than 60 years. We had 245 (49.8%) patients identify as male. Patient-determined CTAS scores were as follows: 146 CTAS 1 (26.7%), 66 CTAS 2 (13.4%), 176 CTAS 3 (35.8%) and 104 CTAS 4 and 5 (21.1%). Formal triage CTAS scores were: 47 CTAS 2 (9.6%), 155 CTAS 3 (31.5%), and 290 CTAS 4 and 5 (59%). With our survey tool, 22.2% of patients matched their official triage scores. We found that that 69.9% of participants over-estimated their CTAS score while 7.9% underestimated it. Two hundred and three patients (41.3%) felt that they needed to be admitted. In fact, 73 patients (17.3%) were admitted to hospital. **Conclusion:** Using an electronic questionnaire, ambulatory patients frequently overestimated the acuity of their presenting complaint. Patients were also not unable to accurately predict their disposition. Further study of different approaches to self-triage is needed before possible implementation in EDs.

Keywords: triage, quality improvement, Canadian Triage and Acuity Scale

LO10

Quantity of opioid to prescribe for acute pain to limit misuse after emergency department discharge

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Introduction: A 2008 survey found that 1.9% of the entire US population was using prescription pain medication non-medically and that 56% obtained them from a friend or relatives. Diversion of pain medication may occur when a portion of the prescription is unused for pain relief after an ED visit. We hypothesized that at least 10 pills (~40%) of an opioid prescription 2 weeks after an ED visit, will not be consumed and become available for potential misuse. **Objective:** Determine the quantity of unused opioids pills for common acute pain diagnoses, 2 weeks after an ED visit for acute pain. **Methods:** Prospective observational cohort study of consecutive ED patients from a tertiary academic urban hospital with 60,000 ED visits annually. Inclusion criteria: aged ≥18 years, acute pain conditions present ≤2 weeks, pain intensity at triage of ≥4 (on a 0-10 numeric rating scale; NRS), and discharged with a new opioid prescription. ED physicians identified (24/7) eligible patients. They recorded the pain complaint/location, the final diagnosis, the quantity and type of prescribed pain medication. Discharged patients completed paper or electronic 14-day diary (REDCap database) to document their pain medication consumption. As a mitigation strategy, they were also contacted by phone at 2 weeks for the same information. A paired t-test was used to test the difference between the amounts of opioids prescribed and consumed. **Results:** 350 patients were recruited. Mean age 50 (SD ±16) and 54.2% were men. Painful diagnosis: fracture (18.2%), acute back pain (15.3%), renal colic (15.3%), Sprain (excluding back/neck pain) (6.9%), Contusion (6.4%), acute neck pain (5.8%), abdominal pain (4.9%), and other (27.2%). Opioids prescribed: oxycodone (47%), morphine (37%) and hydromorphone (16%). Means quantity of opioid pills prescribed: 24 (IC95%: 23-26). Filled opioid prescription: 92%. Means quantity of opioid pills consumed: 8 (IC95%: 7-9). Means quantity of unused opioids pills: 16. Opioid pills available

for misuse in our cohort: 5,600 pills. **Conclusion:** After an ED visit for acute pain a significant portion of opioids prescribed is unused and available for misuse. A large pragmatic study should be done to confirm that an opioid prescription strategy based on our results will limit unused opioid pills while maintaining pain relief.
Keywords: opioids

LO11

Opiate prescribing in Ontario emergency departments

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Introduction: Increased prescribing of high potency opioids has been associated with increasing opioid addiction and linked to serious adverse outcomes including misuse, diversion, overdose and death. Problems related to opioids are a major Canadian public health concern yet few data are available on prescribing in most Canadian provinces. The objective of this study was to describe opioid prescribing in Ontario EDs and patient harms associated with this practice. **Methods:** We conducted a population-based cohort study among Ontario residents aged 15-64 years who were eligible for public drug coverage between April 2008 and March 2012. Using administrative databases, we identified patients with no opioid use in the past 12 months who received a prescription opioid from an emergency or family physician. Patients were followed for 2 years following their index prescription. The primary outcome was hospital admission for opioid toxicity and secondary outcome was dose-escalation exceeding 200 mg morphine equivalents (MEQ). **Results:** Of the 77,270 unique patients included, 33,492 (43.3%) and 43,778 (56.7%) prescriptions were issued by emergency physician (EP) and family physicians (FP), respectively. FP patients were older (45.9 vs 41.2 yr, MSD 0.35), had fewer ED visits (0.9 vs 2.3, MSD 0.46), and more FP visits (11.5 vs 8.7 MSD 0.31) in the year prior to their index visit. For combination products, EPs were more likely to prescribe oxycodone compared to FPs (37.2% vs 16.7%, Δ 20.5, 95% CI: 19.9, 21.2). For single agent products, EPs were more likely to prescribe hydromorphone compared to FPs (44.5% vs 21.7%, Δ 22.8, 95% CI: 20.4, 25.2). FPs were more likely to prescribe codeine either as a combination or single agent formulation. EP prescriptions led to significantly more hospital admissions for opioid toxicity (0.5% vs 0.3%, Δ 0.2, 95% CI: 0.1, 0.3), while FP prescriptions more often resulted in dose escalation beyond 200 mg MEQs (0.1% vs 0.7%, Δ 0.6, 95% CI: 0.4, 0.7). **Conclusion:** A large percentage of opioid-naïve patients receive an initial opiate prescription in the ED, where the use of high potency opioids is much more common, with 1/200 of these patients subsequently hospitalized for opioid toxicity. Creation of a physician accessible provincial registry would be useful to monitor opioid prescribing and dispensing, inform clinical practice, and identify patients at high-risk who may benefit from early interventions.
Keywords: opioid, physician prescribing, toxicity

LO12

The utility of femoral nerve blocks in the emergency department; a national survey of practice

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Introduction: Approximately 30,000 hip fractures occur annually in Canada, and the incidence will increase with an aging population. Pain control remains a challenge with these patients, as many are elderly and prone to delirium. Regional anesthesia has shown to be very effective with minimal risks, but it is not clear how often emergency physicians are using this technique to provide analgesia for patients with proximal hip fractures. This is the first Canada-wide survey to evaluate the use of regional anaesthesia in the emergency department for hip fractures. It also evaluates physician comfort level with performing these blocks, perceived educational needs in this area, and barriers to performing nerve blocks. **Methods:** A 13-question survey was sent to 1041 members of the Canadian Association of Emergency Physicians via email in January and February of 2016. Data was collected and analysed using an online collection program called "Survey Monkey". Ethics approval was obtained through the University of Manitoba Research Ethics Board. **Results:** 272 Emergency physicians and residents took part in the survey. The majority of respondents (75.9%) choose intravenous opioids as their first line of analgesia and only 7.6% use peripheral nerve blocks (PNB) as their first line choice for analgesia in hip fracture. In response to practitioner comfort with PNBs for hip fractures, most were not at all confident (45.0%) in their ability and many respondents have never performed a nerve block for a hip fracture (53.9%). The most commonly identified barriers to performing PNBs include lack of training, the time to perform the procedure and a lack of confidence. A larger percentage of respondents (34.2%), identified having had no training and no knowledge of how to perform PNBs for hip fractures. **Conclusion:** The vast majority of Canadian emergency physicians who took part in this survey do not utilize PNBs as a method of pain management for hip fractures. Over half have never performed one of these procedures and many have never received training in how to do so. Future efforts should focus on improving access to education, disseminating information regarding the effectiveness of PNB, and addressing logistical barriers in the ED.
Keywords: survey, regional anesthesia, emergency department

LO13

GridlockED: an emergency medicine game and teaching tool

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Introduction / Innovation Concept: In the controlled chaos of the emergency department (ED) it can be difficult for medical trainees similarly recognize that there is definite order to the chaos, and many may never truly appreciate its complexity. How should medical learners develop this skill? Didactic teaching cannot effectively portray the complexities of managing the ED. Much like education in cardiac arrest, trauma, and multi-casualty incident management, it is our belief that the management of patient flow through the ED is best learned through simulation. Thus, we developed GridlockED, a board game that requires players to work cooperatively to manage a simulated ED to win the game. **Methods:** GridlockED development took place over a six-month period during which iterative cycles of gameplay and redevelopment were used to optimize game mechanics and improve player engagement. The patient cases were created by medical students (PS, DT, JR) and subsequently reviewed for content validity by two attending emergency physicians (TC, AP). Input from attending emergency physicians, residents, medical students, and laypeople was integrated into the game through a Plan-Do-Study-Act (PDSA) model. **Curriculum, Tool, or Material:** Our game includes: 1) The game board; 2) Patient cards, which describe a patient, their level of acuity, and the tasks that must be completed in order to disposition the patient; 3) Event cards, which cause random positive or negative events to occur-much like random events occur in real life that change the dynamics of the ED; 4) Game Characters, which move around the board to denote where tasks are being completed; 5) A tracking sheet to follow how many tasks each character has performed in each turn; 6) A shift-time clock, which is

used to track the 'hours' of your shift; 7) A 'Gridlock counter', which tracks how many ED backups or adverse patient outcomes occur ('Gridlocks'). The goal of the game is to work cooperatively with your teammates to complete patient tasks and move patients through the ED to an ultimate disposition (e.g. admission, discharge). The game is won if you finish your shift before reaching the maximum number of 'Gridlocks' allowed. **Conclusion:** Initial responses to GridlockED have been very positive, supporting it as both an engaging board game and potential teaching tool. We are excited to see it validated through research trials and possibly incorporated into emergency medicine training at both student and postgraduate training levels.
Keywords: emergency department flow, simulation, board game

LO14

The CanadiEM Digital Scholars Program: An innovative international digital collaboration curriculum

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Introduction / Innovation Concept: Digital media are a new frontier in medical education scholarship. Asynchronous education resources facilitate a multi-modal approach to teaching, and allows residents to personalize their learning to achieve mastery in their own time. The CanadiEM Digital Scholars Program is a nationwide initiative that provides residents with practical experiences in creating digital educational materials under the supervision of experts in the field. The program allows for collaboration and access to mentorship from top digital educators from across North America. **Methods:** Interested residents accepted into the program spent a period of their PGY4 year completing modules developed in the theory and science behind digital education. Four modules, developed in an iterative process, have been built on the topics of podcasting, blogging, digital identity, and patient communication. Each fellow was supervised members of the CanadiEM team, a faculty member from the resident's home institution, and digital experts from across North America. **Curriculum, Tool, or Material:** The first fellow completed all aspects of the designed curriculum. Above this, he also engaged in blog content creation, initiated research on digital scholarship, and managed the editorial section of CanadiEM. The second fellow is currently halfway through his year (and is expected to complete the program within the year) and has co-authored 30 blog posts and 53 podcasts in 6 months. **Conclusion:** The CanadiEM Digital Scholars Program utilizes a novel approach to foster development of digital educators utilizing experts across North America. We have demonstrated the feasibility and sustainability with our initial pilot years. This program is being scaled next year to include two scholars per year, which will facilitate cross-collaboration between the scholars.
Keywords: innovations in emergency medicine education, social media, free open access meducation (FOAM)

LO15

Not a hobby anymore: Establishment of the *Global Health Emergency Medicine* organization at the University of Toronto to facilitate academic careers in global health for faculty and residents

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Introduction / Innovation Concept: Demand for training in global health emergency medicine (EM) practice and education across Canada is high and increasing. For faculty with advanced global health EM training, EM departments have not traditionally recognized global health as an academic niche warranting support. To address these unmet needs, expert faculty at the University of Toronto (UT) established the Global Health Emergency Medicine (GHEM) organization to provide both quality training opportunities for residents and an academic home for faculty in the field of global health EM. **Methods:** Six faculty with training and experience in global health EM founded GHEM in 2010 at a UT teaching hospital, supported by the leadership of the ED chief and head of the Divisions of EM. This initial critical mass of faculty formed a governing body, seed funding was granted from the affiliated hospital practice plan and a five-year strategic academic plan was developed. **Curriculum, Tool, or Material:** GHEM has flourished at UT with growing membership and increasing academic outputs. Five governing members and 9 general faculty members currently run 18 projects engaging over 60 faculty and residents. Formal partnerships have been developed with institutions in Ethiopia, Congo and Malawi, supported by five granting agencies. Fifteen publications have been authored to date with multiple additional manuscripts currently in review. Nineteen FRCP and CCFP-EM residents have been mentored in global health clinical practice, research and education. Finally, GHEM's activities have become a leading recruitment tool for both EM postgraduate training programs and the EM department. **Conclusion:** GHEM is the first academic EM organization in Canada to meet the ever-growing demand for quality global health EM training and to harness and support existing expertise among faculty. The productivity from this collaborative framework has established global health EM at UT as a relevant and sustainable academic career. GHEM serves as a model for other faculty and institutions looking to move global health EM practice from the realm of 'hobby' to recognized academic endeavor, with proven academic benefits conferring to faculty, trainees and the institution.
Keywords: global health education, global health training, global health research

LO16

Safety and efficiency of emergency physician supplementation in a provincially nurse-staffed telephone service for urgent caller advice

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Introduction: In 2008 British Columbia created a nurse (RN) staffed telephone triage service, (TTS) to provide timely advice to non-911 callers (811). A perception exists that some callers are inappropriately directed to emergency departments (EDs) thereby worsening crowding. We sought to determine whether supplementary emergency physician (EP) triage would decrease ED visits while preserving caller safety and satisfaction. **Methods:** TTS RNs use computer algorithms and judgment to triage callers. Potentially sick callers are directed to "seek care now" (red calls). Often this is to an ED depending on acuity and time of day. In the Vancouver Health Region from April-September 2016 between 8:00-24:00 hours, a co-located EP also spoke with "red" callers to provide further guidance. Callers were followed up with 1 week and satisfaction was evaluated on a 5-point Likert scale. The TTS data was linked to the regional ED database to assess ED attendance within 7 days, and the provincial vital statistics database for 30-day mortality. Our primary outcome was the proportion of unique "red" callers who did not attend the ED compared with a historical cohort one year earlier without EP triage in place. Secondary outcomes were the proportion of "red" callers advised not to attend the ED but (a) attended, (b) admitted, or (c) died. **Results:** In the study period there were 5105 "red" calls of

which 3440 were transferred to the EP (67.4%), 2958 of EP assessed callers (86.0%) had a family doctor, but only one-quarter of such patients could contact their family doctor. Overall, 2301/3440 "red" callers did not attend an ED (67.0%) compared to 2508/4770 in the control period (52.6%), for an absolute reduction of 14.4% (95% CI 12.2 to 16.4%, $p < 0.0001$). In callers for those <17 years old there was a 20.3% (95% CI 16.5 to 24.1%) reduction in ED visits compared to the control group: 771/1520 (50.7%) vs 364/1067 (30.4%). 40% of callers attending an ED (458/1139) were advised to try non-ED follow up by the MD and 108 (9.5%) were admitted, with no difference in 30-day mortality between groups. Age and CTAS distribution were similar between the two groups and the non MD-transferred cohort. Mean caller satisfaction was excellent (4.7/5.0). **Conclusion:** EP supplementation of a RN advice service has the potential to reduce ED visits by almost 15% while providing excellent safety and satisfaction.

Keywords: input mitigation, telemedicine, emergency department crowding

LO17

A comparative evaluation of ED crowding metrics and associations with patient mortality

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Introduction: Over 700 different input, throughput and output metrics have been used to quantify ED crowding. Of these, only ED length-of-stay (ED LOS) has been shown to be associated with mortality. No comparative evaluation of ED crowding metrics has been performed to determine which ones have the strongest association with patient mortality. The objective of this study was to compare the strength of association of common ED input, throughput and output metrics to patient mortality. **Methods:** Administrative data from five years of ED visits (2011-2014) at three urban EDs were linked to develop a database of over 900,000 ED visits with patient demographics, electronic time stamps for care processes, dispositions and outcomes. The data were randomly divided into three partitions of equal size. Here we report the findings from one partition of 253,938 ED visits. The remaining two data partitions will be used to validate these findings. Commonly-used crowding metrics were quantified and aggregated by day or by shift (0800-1600, 1600-2400, 2400-0800), and the shift-specific metrics assigned to each patient. The primary outcome was 7-day all-cause mortality. Multilevel logistic regression models were developed for 7-day mortality, with selected ED crowding metrics and a common set of confounders as predictors. The strength of association between the crowding metrics and mortality was compared using Akaike's Information Criterion (AIC) and the Bayesian Information Criterion (BIC): ED crowding metrics with lower AIC and BIC have stronger associations with 7-day mortality. **Results:** Of 909,000 ED encounters, 124,679 (16.5%) arrived by EMS, 149,233(19.7%) were admitted, and 3,808 patients (0.5%) died within 7 days of ED arrival. Of input metrics, the model with ED wait-time was better (i.e. had a smaller AIC and BIC) than models for daily census, ED occupancy or LWBS proportion for predicting 7-day mortality. Of throughput metrics, the model with mean ED LOS was better than the model for mean MD care time. Of output metrics, the model with daily inpatient hospital occupancy was better than the model with mean boarding time. **Conclusion:** Based on one data partition, regression models based on the average wait-time, ED LOS and inpatient occupancy best predicted 7-day mortality. These results will be validated in the two other data partitions to confirm the best-performing ED input, throughput and output metrics.

Keywords: emergency department crowding, crowding metrics

LO18

How big is emergency access block in Canadian hospitals?

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Introduction: Emergency department (ED) access block is the #1 safety concern in Canadian EDs. Its main cause is *hospital access block*, manifested by prolonged *boarding* of inpatients in EDs. Hospital administrators often believe this problem is too big to be solved and would require large increases in hospital capacity. Our objective was to quantify ED access gap by estimating the cumulative hours that CTAS 1-3 patients are blocked in waiting areas. This value, expressed as a proportion of inpatient care capacity, is an estimate of the bed hours a hospital would have to find in order to resolve ED access. **Methods:** A convenience sample of urban Canadian ED directors were asked to provide data summarizing their CTAS 1-3 inflow, the proportion triaged to nursed stretchers vs. RAZ or Intake areas, and time to care space. Total ED access gap was calculated by multiplying the number of CTAS 1-3 patients by their average delay to care space. Time to stretcher was captured electronically at participating sites, but time to RAZ or intake spaces was often not. In such cases, respondents provided time from triage to first RN or MD assessment in these areas. The primary outcome was total annual ED access block hours for emergent-urgent patients, expressed as a proportion of funded inpatient bed hours. **Results:** Directors of 40 EDs were queried. Six sites did not gather the data elements required. Of 34 remaining, 29 (85.3%) provided data, including 15 tertiary (T), 10 community (C) and 2 pediatric (P) sites in 12 cities. Mean census for the 3 ED types was 72,308 (T), 58,849 C) and 61,050 (P) visits per year. CTAS 1-3 patients accounted for 73.4% (T), 67.7% (C) and 66.2% (P) of visits in the 3 groups, and 34% (T), 46% (C) and 44% (P) of these patients were treated in RAZ or intake areas rather than staffed ED stretchers. Mean time to stretcher/RAZ care was 50/71 min (T), 46/62 min (C), and 37/59 min (P). Average ED access gap was 47,564 hrs (T), 37,222 hrs (C) and 35,407 hrs (P), while average inpatient bed capacity was 599 beds (5,243,486 hrs), 291 beds (2,545,875 hrs) and 150 beds (1,314,000 hrs) respectively. ED access gap as a proportion of inpatient care capacity was 0.93% for tertiary, 1.46% for community and 2.69% for pediatric centres. **Conclusion:** ED access gap is very large in Canadian EDs, but small compared to hospital operating capacity. Hospital capacity or efficiency improvements in the range of 1-3% could profoundly mitigate ED access block.

Keywords: access block, crowding, efficiency

LO19

Introduction of a regional interactive group supervision tool to maximize multi-program research project support

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Introduction / Innovation Concept: University Departments of Emergency Medicine are responsible for the supervision of research and other scholarly projects for fellows, residents and students, though often lack resources to provide adequate input and oversight. Many departments cover large geographical areas and several programs. We piloted new research committee structures and processes to improve oversight and

output of research projects. **Methods:** We created an interactive group supervision tool based around formation of a collaborative research committee, with rotating chairs from each program, to provide supervision and face to face interaction, and direction for research learners. Included were all Dalhousie University adult and pediatric emergency medicine residency and fellowship programs, as well as trauma and EMS programs across Nova Scotia, New Brunswick, and Prince Edward Island. In addition to providing expertise in clinical trial coordination, database management, research administration, grant applications and Research Ethics Board submissions, we have completed a 2-year pilot of our interactive group supervision tool for research projects. **Curriculum, Tool, or Material:** The interactive tool consists of a structured PICOD form; allocation of topic and research mentors; standardized yearly milestones from project development through presentation and publication; and regular video-conferenced and in-person interactive group sessions involving several project leads, as well as program research directors, researchers, and co-ordinators. To date, all participating program learners have engaged with the tool, with positive feedback from learners, supervisors and program directors. **Conclusion:** We report our development of a regional collaborative interactive group supervision tool, that maximizes expert resources in the provision of research and scholarly project supervision.

Keywords: research supervision, interactive group tool, resource allocation

LO20

Student Run Simulation Team: A near-peer approach to simulation education

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Introduction / Innovation Concept: Student Run Simulation Team (SRST) is an extracurricular medical student group that provided peers with opportunities to learn and teach principles of acute care medicine in a simulated environment. Early exposure to simulation has been identified as a way for medical students to engage in self-directed education. SRST operated through a peer-led model. Senior medical students designed and delivered didactic sessions, simulation scenarios, and debriefed the scenarios to emphasise targeted objectives. **Methods:** Informal interviews conducted by the SRST as part of a needs analysis identified barriers to an effective transition from pre-clerkship to clerkship. Specifically, principles of team dynamics including effective communication and role clarification in emergency situations were identified as areas where students lacked confidence. The curriculum focused on leadership and an effective team approach to common acute presentations. SRST members acquired simulation skills under the guidance of a simulation team at the University of Calgary. In the inaugural year, 8 second year students developed and delivered the curriculum to 16 first year students. Quality improvement surveys and participant feedback contributed to ongoing program review and refinement. **Curriculum, Tool, or Material:** Didactic lectures and task-trainer based skills sessions were created to assist the medical students in developing a foundational approach to a patient presenting to the emergency department. Three distinct simulations of increasing complexity were designed for students to build on their skills. SRST members worked with simulation consultants during 4 custom designed training sessions to develop simulation skills (design and debriefing). The distinguishing aspect of SRST is an emphasis on the non-technical skills of teamwork, leadership, and communication, rather than knowledge acquisition alone. The structure also included a succession plan for continued peer-led education where the student participants will form the next year's team and will receive similar simulation education. **Conclusion:** SRST is the first student-run simulation initiative to be established in a Canadian medical school. This near-peer team allowed for early practice of non-technical skills in emergency settings. SRST facilitated opportunities for simulation education for both the junior students as participants, and the senior medical students as educators. This is an ongoing initiative, with plans to continue program development in future years.

Keywords: innovations in emergency medicine education, simulation, near-peer teaching

LO21

Mentorship in Canadian emergency medicine residency training programs: a needs assessment

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Introduction: Research supports the role of mentors in the personal development and career advancement of medical trainees. Compared to non-mentored peers, mentored residents are nearly twice as likely to describe excellent career preparation and demonstrate objective career success. In prior research, only 65% of training programs in Canada had a mentorship program, and 40% indicated a need for more formal mentorship models. **Methods:** A needs assessment survey was distributed to RCPSC Emergency Medicine (EM) Program Directors across Canada regarding mentorship available to resident physicians training at their centers. Additionally, all EM resident and staff physicians involved in mentorship were surveyed on their perceptions of current models at their institutions. Both surveys were comprised of binary, open ended, and 5 point likert scale questions. Responses were analyzed using Fisher's exact test. **Results:** Eleven Program Directors responded to the survey. Formal mentorship programs were found in 82% of training centers, with 77% of programs instituted within the past 5 years. Half of resident/mentor pairings were based on a combination of identified career goals, participant personality traits, or resident request. Other pairing methods included perceived resident needs or attending physician request. Most meetings are face-to-face, with one program requiring mutual scheduled shifts. Residents identified that mentorship was significantly associated with benefits to career ($p = 0.0016$) and niche ($p = 0.0019$) development. Formal mentorship was felt to have a significant association with resident academic development ($p = 0.05$) and lower rates of burnout ($p = 0.0018$) by staff physicians. Staff mentors also associated a personal development benefit related to involvement in a mentorship relationship ($p = 0.0355$). **Conclusion:** The majority of EM programs have adopted formal mentorship programs within the past 5 years. Residents and staff identify that mentorship relationships are associated with improved career and niche development as well as academic advancement. Future research will include a before and after study of the implementation of a formal mentorship program within the RCPSC-EM program at the University of Manitoba.

Keywords: mentorship, resident wellness, training

LO22

Implementation of an electronic clinical decision support tool to improve knowledge translation and imaging appropriateness for patients with mild traumatic brain injury and suspected pulmonary embolism

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Introduction / Innovation Concept: Utilization of CT imaging has increased dramatically over the past two decades, but has not necessarily improved patient outcomes. As healthcare spending grows unsustainably and evidence of harms from unnecessary testing accrues, there is pressure to improve imaging appropriateness. However, prior attempts to reduce unnecessary imaging using evidence-based guidelines have met with limited success, with common barriers cited including a lack of confidence in patient outcomes, medicolegal risk, and patient expectations. This project attempts to address these barriers through the development of an electronic clinical decision support (CDS) tool embedded in clinical practice. **Methods:** An interactive web-based point-of-care CDS tool was incorporated into computerized physician order entry software to provide real-time evidence-based guidance to emergency physicians for select clinical indications. For patients with mild traumatic brain injury (MTBI), decision support for the Canadian CT Head Rule pops up when a CT head is ordered. For patients with suspected pulmonary embolism (PE), the tool is triggered when a CT pulmonary angiogram is ordered and provides CDS for the Pulmonary Embolism Rule-out Criteria (PERC), Wells Score, age-adjusted D-dimer and CT imaging. To study the impact of the tool, all emergency physicians in the Calgary zone were randomized to receive voluntary decision support for either MTBI or PE. **Curriculum, Tool, or Material:** The tool uses a multifaceted approach to inform physician decision making, including visualization of risk and quantitative outcomes data and links to primary literature. The CDS tool simultaneously documents guideline compliance in the health record, generates printable patient education materials, and populates a REDCap™ database, enabling the creation of confidential physician report cards on CT utilization, appropriateness and diagnostic yield for both audit and feedback and research purposes. Preliminary data show that physicians are using the MTBI CDS approximately 30% of the time, and the PE CDS approximately 40% of the time. Evaluation of CDS impact on imaging utilization and appropriateness is ongoing. **Conclusion:** A voluntary web-based point-of-care decision support tool embedded in workflow has the potential to address many of the factors typically cited as barriers to use of evidence-based guidelines in practice. However, high rates of adherence to CDS will likely require physician incentives and appropriateness measures.

Keywords: knowledge translation, decision support, diagnostic imaging

LO23

A brief educational session is effective for teaching emergency medicine residents resuscitative transesophageal echocardiography

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Introduction: Resuscitative clinician-performed transesophageal echocardiography (TEE) is a relatively new ultrasound application that has the potential to guide the management of critically ill patients in the emergency department. The objective of this study was to determine the effectiveness of a brief training workshop for teaching a resuscitative TEE protocol to emergency medicine residents using a simulator. **Methods:** Emergency medicine residents with no prior TEE experience from a university-affiliated hospital were invited to participate in the study. Participants completed a questionnaire and baseline skill assessment using a high-fidelity simulator. The training session included a 20-minute lecture followed by 10 simulated repetitions of a 5-view TEE sequence with instructor feedback. Learning was evaluated by a skill assessment immediately after training and a transfer test 1-2 weeks after the training session. Ultrasound images and transducer motion metrics were captured by the simulator for blinded analysis. The primary outcome of this study was the percentage of successful views before and after training. Secondary outcomes included confidence level, image quality, percentage of correct diagnoses, and efficiency of movement. Assessment scores were compared using a two-tailed t-test. **Results:** 10 of 11 (91%) of invited residents agreed to participate in the study. Confidence level on a 10-point numeric rating scale (NRS) increased from a baseline of 1.0 (SD 0) to 7.0 (SD 1.9) after training ($p < 0.01$). The mean duration between training and transfer test was 9.6 days (SD 1.9). The percentage of successful views increased from 44% at baseline to 100% after training, and 90% on the transfer test ($p < 0.01$). The mean image quality on a 5-point scale was 2.2 (SD 1.0) at baseline, 3.8 (SD 0.7) after training ($p < 0.01$), and 3.1 (SD 0.6) on the transfer test ($p < 0.01$). The mean number of transducer accelerations were 524 (SD 202) at baseline, 219 (SD 54) after training ($p < 0.01$), and 400 (SD 149) on the transfer test ($p = 0.13$). Participants made the correct diagnosis in 70% of cases on the transfer test. **Conclusion:** After a brief training session using a simulator, emergency medicine residents were able to generate adequate TEE images on a delayed transfer test. Future studies are needed to determine effective strategies for maintaining motion efficiency and imaging quality.

Keywords: ultrasound, education, simulation

LO24

Is prehospital care supported by evidence-based guidelines? An environmental scan and quality appraisal using AGREE II

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Introduction: The Institute of Medicine (IOM) has recommended that high-quality, evidence-based guidelines be developed for emergency medical services (EMS). The National Association of EMS Physicians (NAEMSP) has outlined a strategy that will see this task fulfilled, consisting of multiple working groups focused on all aspects of guideline development and implementation. A first step, and our objective, was a cataloguing and appraisal of the current guidelines targeting EMS providers. **Methods:** A systematic search of the literature was conducted in MEDLINE (1175), EMBASE (519), PubMed (14), Trip (416), and guidelines.gov (64) through May 1, 2016. Two independent reviewers screened titles for relevance to prehospital care, and then abstracts for essential guideline features, including a systematic review, a grading system, and an association between level of evidence and strength of recommendation. All disagreements were moderated by a third party. Citations meeting inclusion criteria were appraised with the AGREE II tool, which looks at six different domains of guideline quality, containing a total of 23 items rated from 1 to 7. Each guideline was appraised by three separate reviewers, and composite scores were calculated by averaging the scaled domain totals. **Results:** After primary (kappa 97%) and secondary (kappa 93%) screening, 49 guidelines were retained for full review. Only three guidelines obtained a score of >90%, the topics of which included aeromedical transport, analgesia in trauma, and resuscitation of avalanche victims. Only two guidelines scored between 80% and 90%, the topics of which included stroke and pediatric seizure management. One guideline, splinting in an austere environment, scored between 70% and 80%. Nine guidelines scored between 60% and 70%, the topics of which included ischemic stroke, cardiovascular life support, hemorrhage control, intubation, triage, hypothermia, and fibrinolytic use. Of the remaining guidelines, 14 scored between 50% and 60%, and 20 obtained a score of <50%. **Conclusion:** There are few high-quality, evidence-based guidelines in EMS. Of those that are published, the majority fail to meet established

quality measures. Although a lack of randomized controlled trials (RCTs) conducted in the prehospital field continues to limit guideline development, suboptimal methodology is also commonplace within the existing literature.
Keywords: emergency medical services, prehospital care, guidelines

LO25

How safe are our pediatric emergency departments? A multicentre, prospective cohort study

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Introduction: Data regarding adverse events (AEs) (unintended harm to the patient from health care provided) among children seen in the emergency department (ED) are scarce despite the high risk setting and population. The objective of our study was to estimate the risk and type of AEs, and their preventability and severity, among children treated in pediatric EDs. **Methods:** Our prospective cohort study enrolled children <18 years of age presenting for care during 21 randomized 8 hr-shifts at 9 pediatric EDs from Nov 2014 to October 2015. Exclusion criteria included unavailability for follow-up or insurmountable language barrier. RAs collected demographic, medical history, ED course, and systems level data. At day 7, 14, and 21 a RA administered a structured telephone interview to all patients to identify flagged outcomes (e.g. repeat ED visits, worsening/new symptoms, etc). A validated trigger tool was used to screen admitted patients' health records. For any patients with a flagged outcome or trigger, 3 ED physicians independently determined if an AE occurred. Primary outcome was the proportion of patients with an AE related to ED care within 3 weeks of their ED visit. **Results:** We enrolled 6377 (72.0%) of 8855 eligible patients; 545 (8.5%) were lost to follow-up. Median age was 4.4 years (range 3 months to 17.9 yrs). Eight hundred and seventy seven (13.8%) were triaged as CTAS 1 or 2, 2638 (41.4%) as CTAS 3, and 2839 (44.7%) as CTAS 4 or 5. Top entrance complaints were fever (11.2%) and cough (8.8%). Flagged outcomes/triggers were identified for 2047 (32.1%) patients. While 252 (4.0%) patients suffered at least one AE within 3 weeks of ED visit, 163 (2.6%) suffered an AE related to ED care. In total, patients suffered 286 AEs, most (67.9%) being preventable. The most common AE types were management issues (32.5%) and procedural complications (21.9%). The need for a medical intervention (33.9%) and another ED visit (33.9%) were the most frequent clinical consequences. In univariate analysis, older age, chronic conditions, hospital admission, initial location in high acuity area of the ED, having >1 ED MD or a consultant involved in care, (all $p < 0.001$) and longer length of stay ($p < 0.01$) were associated with AEs. **Conclusion:** While our multicentre study found a lower risk of AEs among pediatric ED patients than reported among pediatric inpatients and adult ED patients, a high proportion of these AEs were preventable.
Keywords: pediatrics, patient safety, adverse events

LO26

The efficacy of high dose cephalexin in the outpatient management of moderate cellulitis for pediatric patients

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Introduction: Children with moderate cellulitis are often treated with IV antibiotics in the hospital setting, as per recommendations. Previously in our hospital, a protocol using daily IV ceftriaxone with follow-up at the day treatment center (DTC) was used to avoid admission. In 2013, a new protocol was implanted and suggested the use of high dose (HD) oral cephalexin with follow-up at the DTC for those patients. The aim of this study was to evaluate the safety and efficacy of the HD cephalexin protocol to treat moderate cellulitis in children as outpatient. **Methods:** A retrospective chart review was conducted. Children were included if they presented to the ED between January 2014 and 2016 and were diagnosed with a moderate cellulitis sufficiently severe to request a follow up at DTC and who were treated according to the standard of care with the HD oral cephalexin (100 mg/kg/day) protocol. Descriptive statistics for clinical characteristics of patients upon presentation, as well as for treatment characteristics in the ED and DTC were analyzed. Treatment failure was defined as: need for admission at the time of DTC evaluation, change for IV treatment in DTC or return visit to the ED. Outcomes were compared to historic controls treated with IV ceftriaxone at the DTC, where admission was avoided in 80% of cases. **Results:** During the study period, 682 children with cellulitis were diagnosed in our ED. Of these, 117 patients were treated using the oral HD cephalexin outpatient protocol. Success rate was 89.5% (102/114); 3 patients had an alternative diagnosis at DTC. Treatment failure was reported in 12 cases; 10 patients (8.8%) required admission, one (0.9%) received IV antibiotics at DTC, and one (0.9%) had a return visit to the ED without admission or change to the treatment. This compares favorably with the previous study using IV ceftriaxone (success rate of 80%). No severe deep infections were reported or missed; 4 patients required drainage. The mean number of visits per patient required at the DTC was 1.6. **Conclusion:** Treatment of moderate cellulitis requiring a follow-up in a DTC, using an oral outpatient protocol with HD cephalexin is a secure and effective option. By reducing hospitalization rate and avoiding the need for painful IV insertion, HD cephalexin is a favourable option in the management of moderate cellulitis for pediatric patients, when no criteria of toxicity are present.
Keywords: cellulitis, ambulatory care, children

LO27

System outcomes associated with an emergency department clinical decision unit

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Introduction: A clinical decision unit (CDU) is an area within the emergency department (ED) that allows for protocol-driven treatment & observation of patients who may not require hospital admission, but are not ready for discharge after initial assessment & treatment. A CDU was established at BC Children's Hospital in 2014 as a means to optimize hospital resource utilization. Preliminary administrative data review revealed a return to ED (RTED) rate of 15% following a CDU stay, 2-3 times the RTED rate reported in the literature. Whether this is the expected cost of reducing hospital admissions remains unclear. Research exploring the underlying reasons for RTED following a CDU stay is limited. Objectives: Following a CDU stay, to describe 1) disposition outcome distribution; 2) underlying reasons for RTED; and 3) the proportion of potentially preventable RTED. **Methods:** Retrospective cohort study of all ED visits with a CDU stay from Jan 1, 2015 to Dec 31, 2015. Health records data was extracted & entered into standardized online forms by trained research assistants, then blindly reviewed by two investigators to determine a) the most probable cause

of each RTED & b) the number of RTED that were clinically unnecessary. **Results:** Of the 1696 index CDU visits, 1503 (89%) were discharged home. However, 139 (9%) had ≥1 associated RTED. Among these, 48 (35%) were deemed clinically unnecessary (89% agreement, Kappa = 0.79) & therefore potentially preventable. The most common reason (88%) for unnecessary RTED was mismatch between expected natural progression of disease (not requiring further medical assessment or treatment) & families' understanding of disease symptom range & duration. In 90% of these cases, anticipatory guidance regarding natural progression of disease was not communicated to parents upon discharge. Among the remaining 1364 (91%) that did not return, 750 had an initial visit total ED length of stay of >8 hours, thus were considered averted hospitalizations attributable to the CDU. **Conclusion:** The CDU has had a positive impact on patient & system outcomes through the prevention of several inpatient admissions. However, we observed a relatively large proportion of RTED, 35% of which were clinically unnecessary & 27% of which had inadequate discharge instructions. This highlights opportunities to further optimize the effectiveness of the CDU through quality improvement initiatives focusing on the ED discharge process.

Keywords: clinical decision unit, return emergency visits, resource utilization

LO28

The Featured Leadership & Organization Workplace (FLOW) Hacks Series: Using the FOAMed domain for knowledge exchange and transfer of emergency department quality improvement projects

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Introduction / Innovation Concept: Emergency departments (ED) across Canada have experienced increased patient volumes and greater demands on resources. Quality improvement (QI) projects have become common in the ED with the goal of providing better and more efficient care. These projects typically attempt to improve resource utilization or patient experience. Unfortunately, the opportunity to share and exchange information among physicians about QI projects is limited. The Free Open Access Medical Education (FOAMed) domain provides a good opportunity for physicians to share their successes and challenges when implementing QI projects. The Featured Leadership & Organizational Workplace (FLOW) Hacks is an ongoing dissemination project hosted on CanadiEM.org that aims to provide ED physicians with a forum for knowledge exchange and transfer. **Methods:** Emergency physician leaders from across Canada have been recruited to share their QI experiences. The FLOW Hacks are summarized as a standardized set of questions that aim to convey the most important aspects of the QI project. The physician responses are published on a monthly basis as a feature on the site. Our objective is to represent EDs from across Canada and of variable size. **Curriculum, Tool, or Material:** Our standardized questions collect information not only on the innovation and team members but also the methodology used for the QI initiative, the data collected, and the performance measures used to assess the outcome. There is a particular focus placed on the challenges that were encountered in implementing the initiative, how they were overcome, and how they would change their approach if they could redo the project. The goal of this format is to showcase the best QI initiatives in Canada so that others can replicate the work and learn from the challenges and success of the authors. **Conclusion:** The FLOW Hacks series is an innovative project to disseminate QI projects to emergency physicians and managers. In the next phase of this project we will conduct a qualitative analysis of the published FLOW Hacks to identify the common mistakes and best practices in implementation of QI initiatives.

Keywords: innovations in emergency medicine education, quality improvement, free open access medical education

LO29

ILearnEM.com: a curation of quality FOAM resources to learn the fundamentals of emergency medicine

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Introduction / Innovation Concept: Free Open Access Medical Education (FOAM) is an emerging movement enabling crowdsourced sharing of vast amounts of medical knowledge on the web, especially in the dynamic field of emergency medicine (EM). However, the wide range of FOAM producers and the lack of organization in published FOAM content results in a challenge for learners to find quality resources that meet their educational needs. ILearnEM addresses this by curating content from popular FOAM sites to provide both new and seasoned learners with an organized, topic-structured EM curriculum. **Methods:** The resources on ILearnEM.com are drawn from the top 50 scoring websites on the Social Media Index (SMI), an indirect measure of quality and impact for online educational resources. The quality of each individual resource is reviewed by our curators using published Quality Checklists developed specifically for FOAM. Links to the original resources are systematically organized into core EM topics and separated into "Approach to" and "Beyond the Basics" categories. **Curriculum, Tool, or Material:** Since its launch in February 2016, ILearnEM.com has been distributed to the University of Ottawa medical students and residents, the Canadian CCFP-EM program directors, and through social media. Content on the website is updated every two weeks by our curators through an analysis of recent online publications from each of the top 50 SMI sites. The new resources are selected based on the level of quality and the relevance to the fundamentals of EM. Content updates are announced on social media (Twitter) to further engage learners by identifying the availability of new material. **Conclusion:** Based on a 10-month traffic analysis, 4234 unique visitors visited ILearnEM.com with an average of 1.9 visits/person and 10.4 pages/visit. Of those responding to an online survey (n = 138, response rate = 3.3%) visitors were 42.8% (n = 59) residents, 29.0% medical students (n = 40), 19.6% practicing physicians (n = 27), and 8.7% other healthcare professionals (n = 12). As one of few sites with an objective for a learner-oriented approach to curating content, ILearnEM will continue to be updated regularly based on user feedback to benefit the fast growing consumer base of medical student and resident learners.

Keywords: innovations in emergency medicine education, online medical education

LO30

Using a Massive Online Needs Assessment (MONA) to develop a Free Open Access Medical education (FOAM) curriculum

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Introduction / Innovation Concept: The boom in online educational resources for medical education over the past decade has changed how physicians learn and keep up to date with new literature. While nearly all emergency medicine residents use online resources, few of

these resources were designed to target knowledge gaps. Novel methods are required to identify learning needs to allow the targeted development of learner-centered curricula. **Methods:** A multidisciplinary team attempted to determine the feasibility of conducting a Massive Online Needs Assessment (MONA) to assess the perceived and unperceived educational needs in thrombosis and bleeding. An open, online survey was launched via Google Forms and disseminated using the online educational resource CanadiEM.org and social media platforms Twitter and Facebook with the goal of reaching participants of the Free Open Access Medical education (FOAM) community. **Curriculum, Tool, or Material:** The survey was designed to identify knowledge gaps and contained demographic, free text, and multiple choice questions. It took individuals approximately 30 minutes to complete and was incentivized with entry into a draw for one of four $250 Amazon Gift cards. Feasibility was defined *a priori* as 150 responses from at least 4 specialties in 4 or more countries. This sample was deemed the minimum number required to identify knowledge gaps (defined as <50% correct answers). The survey was open from September 20 to December 10, 2016. We received 198 complete responses from 20 countries. Respondents included staff physicians (n = 109), residents (n = 46), medical students (n = 29), nurses (n = 8), paramedics (n = 4), a pharmacist (n = 1) and a physician assistant (n = 1). The survey entry page hosted on CanadiEM.org received page views from 866 unique IP addresses. As such, a conservative approximation of the completion rate per unique viewer was 22% (198/866). **Conclusion:** It is feasible to use a MONA to collect data on the perceived and unperceived needs of an online community. Such needs assessments could be used to make online resources more learner-centered.

Keywords: free open access medical education, massive online needs assessment, curriculum development

LO31

Identification of high risk factors associated with 30 day serious adverse events among syncope patients transported to the emergency department by emergency medical services

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Introduction: The majority of syncope patients transported to the emergency department (ED) by emergency medical services (EMS) are low-risk with very few suffering serious adverse events (SAE) within 30-days and over 50% are diagnosed with vasovagal syncope. These patients can potentially be diverted by EMS to alternate pathways of care (primary care or syncope clinic) if appropriately identified. We sought to identify high-risk factors associated with SAE within 30-days of ED disposition as a step towards developing an EMS clinical decision tool. **Methods:** We prospectively enrolled adult syncope patients who were transported to 5 academic EDs by EMS. We collected standardized variables at EMS presentation from history, clinical examination and investigations including ECG and ED disposition. We also collected concerning symptoms identified and EMS interventions. Adjudicated SAE included death, myocardial infarction, arrhythmia, structural heart disease, pulmonary embolism, hemorrhage and procedural interventions. Multivariable logistic regression was used for analysis. **Results:** 990 adult syncope patients (mean age 58.9 years, 54.9% females and 16.8% hospitalized) were enrolled with 137 (14.6%) patients suffering SAE within 30-days of ED disposition. Of 42 candidate predictors, we identified 5 predictors that were significantly associated with SAE on multivariable analysis: ECG abnormalities [OR = 1.77; 95%CI 1.36-2.48] (non-sinus rhythm, high degree atrioventricular block, left bundle branch block, ST-T wave changes or Q waves), cardiac history [OR = 2.87; 95%CI 1.86-4.41] (valvular or coronary heart disease, cardiomyopathy, congestive heart failure, arrhythmias or device insertions), EMS interventions or concerning symptoms [OR = 4.88; 95%CI 3.13- 7.62], age >50 years [OR = 3.18; 95%CI 1.68-6.02], any abnormal vital signs [OR = 1.58; 95%CI 1.03-2.42] (any EMS systolic blood pressure >180 or <100 mmHg, heart rate <50 or >100/minute, respiratory rate >25/minute, oxygen saturation <91%). [C-statistic: 0.81; Hosmer Lemeshow p = 0.30]. **Conclusion:** We identified high-risk factors that are associated with 30-day SAE among syncope patients transported to the ED by EMS. This will aid in the development of a clinical decision tool to identify low-risk patients for diversion to alternate pathways of care.

Keywords: emergency medical services, syncope, risk factors

LO32

Are EMS offload delay patients at increased risk of adverse outcomes?

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Introduction: ED and hospital overcrowding cause offload delays that remove EMS crews from service and compromise care delivery to patients. Prolonged ED boarding times are associated with increased hospital LOS and patient mortality, but the impact of offload delays has not been studied. Our objective was to determine whether offload delays are associated with adverse system and patient outcomes. **Methods:** From July 2013 to June 2016, administrative data was collated from four Calgary adult EDs. All CTAS 2 and 3 EMS arrivals were studied. Those assigned an ED care space within 15 minutes were considered controls while those with delays of ≥60-minutes were considered 'delayed'. Multivariable logistic regression was used to determine propensity scores, which were used to match delayed patients to nearest neighbor controls. Matching variables for propensity modeling included age, sex, CTAS level, ED site, arrival day and time, living situation (homecare/facility vs. independent), complaint category (medical, cardiovascular, mental health/neuro, GI, trauma/MS, other) and previous ED use (visits within 1 year). The primary outcome was 7-day mortality. Secondary outcomes included hospital LOS and 30-day mortality. **Results:** A total of 111,743 patients were studied: 70711 controls and 41032 delayed (median time to stretcher of 8 vs. 109 minutes). There was significant baseline covariate imbalance: Delayed patients were more likely to be female, older, have lower CTAS acuity, arrive on weekdays and evenings, to have general medical complaints, and to arrive at the slowest offload site. In the unmatched analysis, delayed patients had lower 7-day mortality (2.1% vs. 2.6%), similar 30-day mortality (3.5% vs. 3.6%), and longer hospital LOS (10.3 vs. 9.8 days). In the propensity-matched analysis (41016 patients per group), covariate balance was substantially improved and outcomes differed slightly. Seven and 30-day mortality were essentially unchanged, but between group differences for hospital LOS disappeared (10.3 vs. 10.2 days). **Conclusion:** Propensity analysis suggests that EMS patients exposed to offload delays have similar 30-day mortality and slightly lower 7-day mortality than patients who receive timely ED access. While offload delays lead to substandard hallway care, patient dissatisfaction, and remove EMS crews from service, the levels of offload delay studied here were not associated with higher mortality or prolonged hospital LOS.

Keywords: offload delay, overcrowding, adverse outcomes

LO33

Prehospital adverse events associated with nitroglycerin use in STEMI patients with right ventricle infarction

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Introduction: Paramedics in our region do not perform 15-lead ECGs. As a result, patients experiencing a Right Ventricular Infarct (RVI) may receive nitroglycerin (NTG). In many cases, paramedics do not administer NTG to those with inferior STEMI out of concern that there may be an associated RVI. The purpose of this study is to determine if there is a difference in prehospital adverse events (AEs) associated with NTG administration in patients with unrecognized RVIs compared to those with an inferior STEMI and no RVI. **Methods:** Ambulance Call Records (ACR) of patients with prehospital STEMI between Jan 1, 2012 and Dec 31, 2015 were analyzed for the incidence of NTG administration. AEs were defined as HR < 60 bpm, systolic BP <100 mmHg or drop of 1/3, GCS decrease of >2, syncope, arrest or death. Hospital records were reviewed to determine patients diagnosed with an inferior STEMI without RVI and those with a concurrent or primary RVI as diagnosed on angiography, ECG or discharge diagnosis. **Results:** Of the 334 ACRs that were filtered and manually reviewed, 144 were excluded (not STEMI, inter-facility transports, duplicate ACR) resulting in 189 patients that had a prehospital STEMI. The mean (SD) age was 66.9 (13.5) years and 70.6% were male. Of 189 STEMI patients, 82 (42.9%) received NTG. Nineteen (41.3%) of these patients were subsequently diagnosed with RVI and 27 (58.7%) had inferior STEMI without RVI. For patients receiving NTG, AEs occurred in 11 (57.9%) within the RVI group, and 10 (37.0%) within the inferior STEMI group (**Δ** 20.9%, 95% CI -7.8% to 45.4%, p = 0.2). Cardiac arrest or death did not occur in either group. A total of 107 did not receive NTG and of these, 93 (86.9%) did not meet conditions or had contraindications for NTG use (22 RVI, 42 inferior STEMI). Three patients had a cardiac arrest and one died while in EMS care, none of which received NTG or had RVIs. **Conclusion:** Results of this study suggest no difference in the rate of AEs between patients with inferior STEMI and STEMI with RVI when NTG is administered in the prehospital setting. In our EMS system, the conditions and contraindications of NTG administration may be protective against AEs in RVIs, so the potential benefit of a prehospital 15-lead ECG may be limited.

Keywords: nitroglycerin, ST elevation myocardial infarction, prehospital

LO34

System and patient level determinants of EMS offload delay

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Introduction: Arriving EMS patients often experience offload delay due to a lack of available care spaces. Arrival in an overcrowded ED is the primary cause of offload delay, but patient characteristics may also play a role. Our objective was to describe system and patient level determinants of offload delay. **Methods:** From July 2013 to June 2016, administrative data was collated from the four Calgary Zone adult EDs. All CTAS level 2 and 3 patients arriving by ambulance were eligible for study. To define patient complexity and illness severity, we captured patient demographic data, living situation (homecare/facility vs. independent), vital signs, complaint category (medical, cardiovascular, mental health/neuro, GI, trauma/MS, other), biochemical parameters (serum Na, K, creatinine, hemoglobin, WBC), patient care needs (IV fluid bolus, IV antibiotics, CT scan, admission) and mortality at 7 and 30 days. **Results:** 162,002 EMS patients were studied. Of these, 67,785 went to a care space within 15 minutes (minimal offload delay), 53,185 between 15 and 59 minutes (moderate offload delay), and 41,032 at ≥60 minutes (severe offload delay). Vital signs, biochemical and hematologic parameters did not differ between groups. ED site was a strong predictor of offload delay (odds ratio {OR} = 1.0, 2.03, 2.14, 3.5 for the 4 EDs), as was arrival on weekday (OR = 1.38) or night shift (OR = 0.71). After adjusting for site, day and time of arrival, multivariate logistic regression models showed the following associations with offload delays of more than 15 minutes: male sex (OR = 0.94), age (OR = 1.01 per year of age), dependent living situation (OR = 1.15), CTAS 3 acuity (OR = 1.27), number of prior ED visits within a year (OR = 1.06 per visit), and complaint category: general medical (1.0), cardiovascular (0.90), mental health/neuro (0.90), GI (0.85), trauma/MS (0.61). Odds ratio estimates were precise—all with p < 0.001. Offload delay was associated with prolonged time to MD, increased EDLOS and higher LWBS/AMA rates. Delayed patients had similar rates of IV antibiotic use, but lower rates of IV fluid bolus, CT use, admission, and 7-day mortality. **Conclusion:** The strongest predictor of offload delay is arrival to a crowded ED, but patient factors including female sex, older age, dependent living status and repeat hospital use increase risk. Patients subjected to offload delay also appear to have lesser immediate care needs and lower short-term mortality.

Keywords: offload delay, determinants, overcrowding

LO35

Impact of EMS direct referral to community care on services received

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Introduction: The Community Referral by Emergency Medical Services (CREMS) program was implemented in January 2015 in Southwestern Ontario. The program allows Paramedics, who are interacting with a patient as a direct result of a call to 9-1-1, to directly refer patients in need of home care support to their local Community Care Access Centre (CCAC) for needs assessment. If indicated, subsequent referrals are made to specific services (e.g. nursing, physiotherapy and geriatrics) by the CCAC. Ideally, CREMS connects each patient with appropriate, timely care, supporting individual needs. Similar referral programs have been implemented in communities with preliminary data showing positive results. The primary objective of this project was to evaluate the success of the CREMS program by determining the number of referrals made by EMS in London-Middlesex to CCAC since implementation as well as the proportion of referred patients receiving a new or increase in service due to EMS referral. **Methods:** Data for all CCAC referrals from London-Middlesex EMS was collected for a thirteen month period (February 2015-February 2016). Data was evaluated for quantity of referrals and proportion that led to a patient receiving new or increased home care service. **Results:** There were 436 referrals made in the study period which represented 391 individuals. 54% of patients were between 65-84 years of age. Of the 391 patients, 162 (41%) were not known to CCAC and of those 119 (73%) received a new service due to EMS referral. The most common new services were occupational therapy (61%) and nursing (47%). Of the 229 (59%) of patients that were already known to CCAC, 101 (44%) received an increase in service due to EMS referral. No patients refused a new or increase in service. **Conclusion:** Of all patients referred to CCAC, 56% received a new service or had a change in existing services which suggests that a large number of patients benefited from early EMS referral to community services. The results of this project provide

impetus to continue and expand the CREMS program. Future studies will evaluate if the implementation of this program has reduced patient reliance on 911 requests for paramedic care as well as Emergency Department transports.
Keywords: emergency medical services

LO36

Out-of-hospital cardiac arrest in British Columbia: Ten years of increasing survival

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Introduction: Survival for victims of out-of-hospital cardiac arrest (OHCA) is typically between 8 and 12%. We sought to report the trends in survival in British Columbia (BC) over a 10-year period. **Methods:** The BC Resuscitation Outcomes Consortium prospectively collected detailed pre-hospital and hospital data on consecutive non-traumatic OHCAs from 2006 to 2016 within BC's four metropolitan areas. We included EMS-treated adult patients without DNR orders. To describe baseline characteristics we organized patient characteristics in three time periods: 2006-09, 2010-13, and 2014-16 (first and last periods reported below). The primary and secondary endpoints were survival at hospital discharge and return of spontaneous circulation (ROSC). We tested the significance of year-by-year trends in baseline characteristics, and performed multivariable Poisson regression, using calendar year as an independent variable, to calculate risk-adjusted rates for survival. **Results:** Between January 1, 2006 and March 31, 2016 there were a total of 26 433 non-traumatic OHCAs, with 15 145 included in this study. There were significant decreases in the proportion with initial shockable cardiac rhythms (28% to 23%) and bystander witnessed arrests (42% to 39%), however significant increases in the proportion with bystander CPR (40% to 49%) and ALS treatment (86% to 97%), and the median chest compression fraction (0.81 to 0.87). There was a significant increase in the median time until termination of resuscitation in those who did not achieve ROSC (27 to 32 minutes), and a significant decrease in the proportion of patients who were transported in absence of ROSC (17% to 6.5%). There was a significant improvement in achieving ROSC (44% to 48%; adjusted rate ratio per year 1.02, 95% CI 1.01 to 1.02) and survival at hospital discharge (10% to 14%; adjusted rate ratio per year 1.05, 95% CI 1.04 to 1.06). Both subgroups of initial shockable (adjusted rate ratio per year 1.04, 95% CI 1.03 to 1.05) and non-shockable (adjusted rate ratio per year 1.08, 95% CI 1.06 to 1.12) cardiac rhythms demonstrated survival improvement. **Conclusion:** Despite a significant decrease in those with initial shockable rhythms, out-of-hospital cardiac arrest survival in BC's metropolitan regions increased by approximately 40% over a 10-year period. During this time there were system changes and quality of care improvements as provided by bystanders and professionals.
Keywords: cardiac arrest, cardiopulmonary resuscitation

LO37

Routine application of defibrillation pads and time to first shock in prehospital STEMI complicated by cardiac arrest

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Introduction: ST-segment elevation myocardial infarction (STEMI) remains a significant cause of morbidity and mortality in North America, with recent studies suggesting that between 4 to 11% of patients diagnosed with STEMI suffer an out-of-hospital-cardiac arrest (OHCA). Previously published research has shown that shorter time to initial defibrillation in patients with VF/VT OHCA increases functional survival. The purpose of this study is to assess whether the routine application of defibrillation pads in STEMI decreases the time to initial defibrillation in those who suffer OHCA. **Methods:** Ambulance call records (ACR) for patients diagnosed with STEMI in Middlesex-London in the prehospital setting from Jan 1, 2012 to Jun 30, 2016 were reviewed. Patients were included in the study if they were 18 years of age or older with a confirmed diagnosis of STEMI and suffered an OHCA with an initial shockable rhythm (VF or VT) while in paramedic care. The pre-pad protocol (routine application of defibrillation pads in STEMI patients) was implemented by Middlesex-London EMS in July 2014. If inclusion criteria were met, ACRs were reviewed to determine whether the pre-pad protocol was implemented and to extract the time to initial defibrillation and relevant demographic and event features. Associated hospital charts were reviewed to evaluate inpatient event features and survival. T-test was used to assess the difference between mean times to defibrillation. **Results:** 446 patients were diagnosed with prehospital STEMI. Of those, 11 patients experienced a paramedic witnessed cardiac arrest. Four of the 11 had defibrillation pads applied upon diagnosis of STEMI. In patients who received pre-pad application, the mean time to initial defibrillation was 17.71 sec, compared to 72.71 sec in patients who had pads applied following arrest (MD 54.97 sec CI 22.69 to 87.24 sec). All patients treated with the pre-pad protocol survived to discharge from hospital, while one patient in the routine care group died in the ED. **Conclusion:** Routine application of defibrillation pads decreases the time to initial defibrillation in STEMI patients who suffer OHCA. Larger studies are required to evaluate whether this decreased time to defibrillation translates into mortality benefit in this subset of patients who experience OHCA.
Keywords: cardiac arrest, ST-segment elevation myocardial infarction, pre-hospital

LO38

Hypoglycemia is a rare peri-seizure finding in pre-hospital patients

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Introduction: Conventional wisdom states that hypoglycemia is a frequent peri-seizure phenomenon and must be tested for. Conventional wisdom also lists hypoglycemia as a cause of seizures. Recent literature disputes this. Paramedic medical directives continue to direct paramedics to determine the blood sugar level on all seizure patients. The purpose of this study was to determine the frequency of hypoglycemia in patients identified as having "seizure" as the primary or final problem code in Ambulance Call Reports (ACRs) from a large regional paramedic base hospital program. **Methods:** We conducted a retrospective analysis of iMedic platform, electronic ACRs, for a 2 year period (Jan 01, 2014 to Dec 31, 2015), from 8 Paramedic Services serving a rural and urban population of 1.4 million. 5854 calls, had "seizure" listed as a primary or final problem code. A 10% sample was generated using a random number table. ACRs were manually searched, data abstracted onto spread sheets, and the results analyzed using descriptive statistics (Wizard ver 1.8.16 for Mac). **Results:** 582 calls were analyzed. 430 (73.9%) were adults and 152 (26.1%) were paediatric (age <18). A blood sugar was determined in 501/582 (86.1%) of all calls; adults 388/430 (90.2%), peadiatric 113/152 (74.3%). The Glasgow Coma Score, when measured, was 15 in 280/575 (48.7%) cases. Seizures were witnessed by paramedics in 47/582 (8.1%) calls; adults 33/430 (7.7%), paediatric 14/152 (9.2%). In calls were paramedics witnessed a seizure a blood sugar was determined 36/47 (76.6%) of the time; adults 25/33 (75.8%), paediatric 11/14 (78.6%). Hypoglycemia (BS < 4.0 mmol/L in

an adult and 3.0 mmol/L in child < age 2) was found in 1 case when BS was checked-overall 1/501 (0.2%); adults 1/388 (0.3%), paedatric 0/113 (0.0%). Case 1-age 70 yr, GCS 12, BS 3.8 mmol/L. **Conclusion:** Hypoglycemia was rarely found in patients who had a pre-hospital seizure. It did not require treatment. When it was found, hypoglycemia was unlikely to be the cause of the seizure. The results are similar to the findings from other recent, retrospective, reviews. The routine determination of blood sugars in all patients who have had a seizure prior to paramedic arrival should be reconsidered.
Keywords: paramedic, seizure, hypoglycemia

LO39

Healthcare costs among homeless and/or substance using adults presenting to the emergency department: a single centre study

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Introduction: Active substance use and unstable housing are both associated with increased emergency department (ED) utilization. This study examined ED health care costs among a cohort of substance using and/or homeless adults following an index ED visit, relative to a control ED population. **Methods:** Consecutive patients presenting to an inner-city ED between August 2010 and November 2011 who reported unstable housing and/or who had a chief presenting complaint related to acute or chronic substance use were evaluated. Controls were enrolled in a 1:4 ratio. Participants' health care utilization was tracked via electronic medical record for six months after the index ED visit. Costing data across all EDs in the region was obtained from Alberta Health Services and calculated to include physician billing and the cost of an ED visit excluding investigations. The cost impact of ED utilization was estimated by multiplying the derived ED cost per visit by the median number of visits with interquartile ranges (IQR) for each group during follow up. Proportions were compared using non-parametric tests. **Results:** From 4679 patients screened, 209 patients were enrolled (41 controls, 46 substance using, 91 unstably housed, 31 both unstably housed and substance using (UHS)). Median costs (IQR) per group over the six-month period were $0 ($0-$345.42) for control, $345.42 ($0-$1139.89) for substance using, $345.42 ($0-$1381.68) for unstably housed and $1381.68 ($690.84-$4248.67) for unstably housed and substance using patients ($p < 0.05$). **Conclusion:** The intensity of excess ED costs was greatest in patients who were both unstably housed and presenting with a chief complaint related to substance use. This group had a significantly larger impact on health care expenditure relative to ED users who were not unstably housed or who presented with a substance use related complaint. Further research into how care or connection to community resources in the ED can reduce these costs is warranted.
Keywords: unstable housing, substance use, emergency department cost

LO40

Designing for the future: machine learning software in the age of competency-based medical education

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Introduction / Innovation Concept: Background: Competency based medical education (CBME) is a method of assessing resident performance through standardized tasks and milestones. The Royal College of Physicians and Surgeons of Canada has started phasing in CBME as the preferred training method, but no tool support exists to process this data. Approximately 400 data points are collected per resident per year at McMaster's Division of Emergency Medicine. This is an unwieldy amount of data to analyze. **Objective:** Recognizing that collection and analysis of resident data is an important facet to postgraduate medical education, McMaster University began developing a program to provide predictive automated data analysis of resident performance. **Methods:** To achieve the stated objective, we adapted a design thinking methodology, which emphasizes the importance of human-centered design. By interviewing stakeholders, we collected user requirements and "pain points" that allowed us to build and evaluate multiple prototypes addressing their problems, such as the ability to process data into reports, real-time reporting, and predictive analytics. We solicited feedback from our stakeholders to iteratively refine the prototypes, ensuring that it was user intuitive and met user needs. **Curriculum, Tool, or Material:** We developed a software platform that collects, aggregates, reports, and has the possibility of analyzing resident data in real time. It also can present performance data via a real-time dashboard. Having automated the report generating process, administrative workload is reduced to a monitoring capacity. Quantitative data on resident performance has been analysed using artificial Neural Network to identify patterns in resident performance. It performs with a sensitivity of 81% and a specificity of 43%, and accurately predict which residents require remedial support 43% of the time. When built into a learning management system, this allows for the provision of additional support to residents-at-risk. **Conclusion:** Combining machine learning with resident assessment data has allowed us to build a promising predictive model to predict resident outcomes. This gives us the potential to decrease administrative workload and improve data quality by providing real-time performance dashboards and eliminating the redundancies of manual data processing. If scaled, this innovation might assist program directors in determining competency of residents and human resource planning for the healthcare systems at large.
Keywords: design thinking, predictive analytics, machine learning

LO41

Disrupting quality improvement: integrating design thinking in the emergency department

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Introduction / Innovation Concept: Quality Improvement (QI) remains a challenge and has been identified as a key competency by the Royal College of Physicians and Surgeons. Hospitals can be dehumanized environments, both for patients and the staff working there. The distant understandings of each other's expectations during their health care encounter often create a sense of futility, frustration, and moral distress in therapeutic relationships. The transient nature of interactions and workplace culture in emergency departments (ED) enhances this distress. **Methods:** Working in a cross-disciplinary fashion, we explored how residents could develop quality improvement initiatives as a way to engage personal interests for QI measures. Key goals for developing these tools were 1) Learn cross-disciplinary tools for observation, inquiry, and improvement, 2) Develop reflective practice for residents, and 3) create ownership for the work and ongoing areas for improvement in local EDs for learners. **Curriculum, Tool, or Material:** We developed a process that would connect designers, residents, and content experts to an area of QI. Residents will be asked to identify an area in the ED that they field would benefit from a QI project (examples

include: trauma team activation, waiting room anxiety, and referral delays from the ED). Working with designers and stakeholders (including patient representatives), learners would map the experience of a particular project. Strengths and opportunities for improvements would be identified at each step of the project. The team would then prototype solutions which will be presented to site chiefs for implementation and evaluation. **Conclusion:** Working with designers offers a practical and powerful approach to undertaking QI projects in the ED. We hope that this process allows residents to undertake projects that they are personally invested in and helps build longitudinal relationships beyond direct clinical work with the local ED they are working in

Keywords: quality improvement, operations, curriculum

LO42

Ice Cream Rounds: the adaptation and implementation of a peer-support wellness rounds in an emergency medicine residency training program

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Introduction / Innovation Concept: Emergency Medicine (EM) is a specialty that requires physicians to deal with acutely ill patients in a fast-paced environment, which can create stress, mental exhaustion and burnout. Continually changing working teams in the Emergency Department does not always allow appropriate debriefing for difficult patient encounters and outcomes on shift. To address these challenges, we sought to adapt and implement a peer-support rounds called 'Ice Cream Rounds' used in some Pediatric training programs for an EM training program. **Methods:** CCFP and Royal College EM residents were surveyed to determine interest and need for Ice Cream Rounds. Of the 31/50 respondents, 87% (26/31) identified their co-residents as their main source of support after difficult patient encounters and 71% (22/31) felt that current opportunities to debrief after difficult experiences were only "sometimes" or "rarely" adequate. Overall, 84% (26/31) were interested in attending Ice Cream Rounds. Residents expressed that they did not want staff present for Ice Cream Rounds so two residents (SCS and TK) obtained training to lead peer-support sessions from The Faculty of Medicine Wellness Program. Attendance at rounds was voluntary and the EM program provided funding for refreshments. Two Ice Cream Rounds were piloted. Attendance and feedback was recorded from pilot sessions. **Curriculum, Tool, or Material:** Resident-only, peer-run confidential debriefing sessions. Sessions were voluntary and lasted one hour. Approximately 20-30/50 residents attended each Ice Cream Rounds. Discussions were confidential but include topics such as difficult patient encounters, poor patient outcomes, challenges in residency, and ethical issues. In response to positive attendance and feedback, the EM program provided 3-4 one-hour protected time slots with a stipend for refreshments for future academic years. Comments from residents consistently reaffirmed that Ice Cream Rounds was a helpful forum to discuss important issues with colleagues and provided a safe and confidential resource to help cope with residency challenges. **Conclusion:** We adapted, implemented, and evaluated a novel Peer-Support Wellness Rounds for debriefing resident issues and difficult patient encounters in a EM training program. To our knowledge this is the first Canadian initiative to implement such rounds in an EM training program. We believe that this template can be easily adopted by any EM training program and will effectively address wellness challenges faced by residents during their training.

Keywords: innovations in emergency medicine education, wellness, burn out

LO43

Does point of care ultrasound improve resuscitation markers in emergency department patients with undifferentiated hypotension? The first Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED 1) Study; an international randomized controlled trial

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Introduction: Point of Care Ultrasound (PoCUS) protocols are commonly used to guide resuscitation for emergency department (ED) patients with undifferentiated non-traumatic hypotension. While PoCUS has been shown to improve early diagnosis, there is a minimal evidence for any outcome benefit. We completed an international multicenter randomized controlled trial (RCT) to assess the impact of a PoCUS protocol on key resuscitation markers in this group. We report diagnostic impact and mortality elsewhere. **Methods:** The SHoC-ED1 study compared the addition of PoCUS to standard care within the first hour in the treatment of adult patients presenting with undifferentiated hypotension (SBP < 100 mmHg or a Shock Index >1.0) with a control group that did not receive PoCUS. Scans were performed by PoCUS-trained physicians. 4 North American, and 3 South African sites participated in the study. Resuscitation outcomes analyzed included volume of fluid administered in the ED, changes in shock index (SI), modified early warning score (MEWS), venous acid-base balance, and lactate, at one and four hours. Comparisons utilized a T-test as well as stratified binomial log-regression to assess for any significant improvement in resuscitation amount the outcomes. Our sample size was powered at 0.80 (α:0.05) for a moderate effect size. **Results:** 258 patients were enrolled with follow-up fully completed. Baseline comparisons confirmed effective randomization. There was no significant difference in mean total volume of fluid received between the control (1658 ml; 95% CI 1365-1950) and PoCUS groups (1609 ml; 1385-1832; $p = 0.79$). Significant improvements were seen in SI, MEWS, lactate and bicarbonate with resuscitation in both the PoCUS and control groups, however there was no difference between groups. **Conclusion:** SHOC-ED1 is the first RCT to compare PoCUS to standard of care in hypotensive ED patients. No significant difference in fluid used, or markers of resuscitation was found when comparing the use of a PoCUS protocol to that of standard of care in the resuscitation of patients with undifferentiated hypotension.

Keywords: point of care ultrasound (PoCUS), hypotension, emergency medicine

LO44

Initial validation of the core components in the SHoC-Hypotension Protocol. What rates of ultrasound findings are reported in emergency department patients with undifferentiated hypotension? Results from the first Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED1) Study; an international randomized controlled trial

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Introduction: Point of care ultrasound (PoCUS) has become an established tool in the initial management of patients with undifferentiated hypotension in the emergency department (ED). Current established protocols (e.g. RUSH and ACES) were developed by expert user opinion, rather than objective, prospective data. Recently the SHoC Protocol was published, recommending 3 core scans; cardiac, lung, and IVC; plus other scans when indicated clinically. We report the abnormal ultrasound findings from our international multicenter randomized controlled trial, to assess if the recommended 3 core SHoC protocol scans were chosen appropriately for this population. **Methods:** Recruitment occurred at seven centres in North America (4) and South Africa (3). Screening at triage identified patients (SBP < 100 or shock index > 1) who were randomized to PoCUS or control (standard care with no PoCUS) groups. All scans were performed by PoCUS-trained physicians within one hour of arrival in the ED. Demographics, clinical details and study findings were collected prospectively. A threshold incidence for positive findings of 10% was established as significant for the purposes of assessing the appropriateness of the core recommendations. **Results:** 138 patients had a PoCUS screen completed. All patients had cardiac, lung, IVC, aorta, abdominal, and pelvic scans. Reported abnormal findings included hyperdynamic LV function (59; 43%); small collapsing IVC (46; 33%); pericardial effusion (24; 17%); pleural fluid (19; 14%); hypodynamic LV function (15; 11%); large poorly collapsing IVC (13; 9%); peritoneal fluid (13; 9%); and aortic aneurysm (5; 4%). **Conclusion:** The 3 core SHoC Protocol recommendations included appropriate scans to detect all pathologies recorded at a rate of greater than 10 percent. The 3 most frequent findings were cardiac and IVC abnormalities, followed by lung. It is noted that peritoneal fluid was seen at a rate of 9%. Aortic aneurysms were rare. This data from the first RCT to compare PoCUS to standard care for undifferentiated hypotensive ED patients, supports the use of the prioritized SHoC protocol, though a larger study is required to confirm these findings.

Keywords: point of care ultrasound (PoCUS), hypotension, emergency medicine

LO45

Does the use of point of care ultrasonography improve survival in emergency department patients with undifferentiated hypotension? The first Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHOC-ED1) Study; an international randomized controlled trial

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Introduction: Point of care ultrasound (PoCUS) is an established tool in the initial management of patients with undifferentiated hypotension in the emergency department (ED). While PoCUS protocols have been shown to improve early diagnostic accuracy, there is little published evidence for any mortality benefit. We report the findings from our international multicenter randomized controlled trial, assessing the impact of a PoCUS protocol on survival and key clinical outcomes. **Methods:** Recruitment occurred at 7 centres in North America (4) and South Africa (3). Scans were performed by PoCUS-trained physicians. Screening at triage identified patients (SBP < 100 or shock index > 1), randomized to PoCUS or control (standard care and no PoCUS) groups. Demographics, clinical details and study findings were collected prospectively. Initial and secondary diagnoses were recorded at 0 and 60 minutes, with ultrasound performed in the PoCUS group prior to secondary assessment. The primary outcome measure was 30-day/discharge mortality. Secondary outcome measures included diagnostic accuracy, changes in vital signs, acid-base status, and length of stay. Categorical data was analyzed using Fishers test, and continuous data by Student T test and multi-level log-regression testing. (GraphPad/SPSS) Final chart review was blinded to initial impressions and PoCUS findings. **Results:** 258 patients were enrolled with follow-up fully completed. Baseline comparisons confirmed effective randomization. There was no difference between groups for the primary outcome of mortality; PoCUS 32/129 (24.8%; 95% CI 14.3-35.3%) vs. Control 32/129 (24.8%; 95% CI 14.3-35.3%); RR 1.00 (95% CI 0.869 to 1.15; p = 1.00). There were no differences in the secondary outcomes; ICU and total length of stay. Our sample size has a power of 0.80 (α:0.05) for a moderate effect size. Other secondary outcomes are reported separately. **Conclusion:** This is the first RCT to compare PoCUS to standard care for undifferentiated hypotensive ED patients. We did not find any mortality or length of stay benefits with the use of a PoCUS protocol, though a larger study is required to confirm these findings. While PoCUS may have diagnostic benefits, these may not translate into a survival benefit effect.

Keywords: point of care ultrasound (PoCUS), hypotension, emergency medicine

LO46

The impact of rapid antigen detection testing on antibiotic prescription for acute pharyngitis: a systematic review and meta analysis

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Introduction: Acute pharyngitis is a common reason for primary care or emergency department visits, often resulting in antibiotic prescription. Rapid antigen detection tests (RADT) are routinely used to diagnose Group A Streptococcus (GAS) pharyngitis. However, due to its low sensitivity, patient pressures and conflicting guidelines, the RADT often complicates management decisions. Our aim was to assess the impact of RADT in patients presenting with acute GAS pharyngitis on the antibiotic prescription rate and appropriateness of antibiotic management. **Methods:** We systematically searched Medline, Embase, and Cochrane databases from 1980 to June 2016. Studies were selected according to a predefined PRISMA protocol and data extracted by two independent reviewers. Prospective and retrospective studies that evaluated the impact of RADT on antibiotic prescription for pharyngitis were included. Study quality was assessed using Cochrane Risk of Bias Tool and the Newcastle-Ottawa Scale. Our main outcome was a dichotomous measure of antibiotic prescription, with or without RADT availability. Studies were combined if there was low clinical and statistical heterogeneity ($I^2 < 30\%$). Bivariate Mantel-Haenszel random effects model was used to perform meta analyses using SPSS 22 and Revman 5. **Results:** We identified 4003 studies: 139 were selected for full text review; 10 met our inclusion criteria (N = 10859 participants,

median age 31 years, 56.7% female). Mean antibiotic prescription rate in the RADT and control arm was 38.2% (SD 15.6) and 55.9% (SD 16.3), respectively. The use of RADT was associated with lower antibiotic prescription rate in both adults (OR = 0.60 [95% CI 0.45-0.80], I^2 = 8%, N = 1407) and pediatrics (OR = 0.49 [95% CI 0.44-0.55], I^2 = 5%, N = 976). There was no overall difference ($p < 0.3$) in antibiotic prescription rate among disease severity (Centor scores 1-4). The use of RADT did not significantly impact the appropriateness of antibiotic management (OR = 1.15 95% CI 0.94-1.5). **Conclusion:** The use of RADT is associated with a reduction in antibiotic prescription for patients with GAS pharyngitis without an increase in appropriate antibiotic use. Despite low prevalence of the disease in the population, antibiotic prescription rates are still high. These findings suggest great potential for antibiotic stewardship and reevaluation of current guidelines for managing GAS pharyngitis.

Keywords: rapid antigen detection test, pharyngitis, antibiotics

LO47

Use of C-reactive protein can safely decrease the number of emergency department patients with sepsis who require blood cultures

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Introduction: Sepsis protocols call for the acquisition of blood cultures in septic emergency department (ED) patients.However, the criteria for blood cultures are vague, they are costly, only positive 8-12% of the time, with up to half of these being false positives. The objective of this study was to establish if positive blood cultures could be excluded in low-risk sepsis patients with levels of CRP below 20 ml/L. **Methods:** This was a multicenter prospective cohort study of 765 ED patients at St Paul's and Mount St Joseph's hospitals in Vancouver with sepsis (2 or more SIRS criteria and infection) and none of: immuncompromised, injection drug use, indwelling vascular device or septic shock (SBP < 90 mmhg). Consecutive patients with sepsis had CRP and blood cultures obtained at the same time.OUTCOMES. True positive blood cultures, false positive blood cultures, positive blood cultures that changed patient management. True and false positive blood cultures were based on Infectious Disease Society of America Guidelines, and change in management was defined as change in type or length of antibiotic therapy and was blindly adjudicated by a medical microbiologist. **Results:** 765 ED patients with sepsis met inclusion criteria. Mean age was 48.3 years and 57% were male. Blood cultures were positive in 99/765 (12.9%) subjects, of which 19 were false positive (19.2%). CRP was >20 mg/L in 595/765 (77.8%) of patients. Of 170 subjects with a CRP < 20 mg/L, 3 had a positive blood culture (1.8%; 95% CI 0.1%- 5%). Management was not changed in any patient with a positive blood culture and CRP level < 20 mg/L. Of 19 subjects with a false positive blood culture, CRP was <20 mg/L for 6 (31.6%). **Conclusion:** In this cohort of low-risk sepsis patients, based on a CRP of <20 mg/L, acquisition of blood cultures could be safely avoided in 22.2% of patients, at significant savings to the health care system.

Keywords: sepsis, blood culture, C-reactive protein

LO48

Evaluation of the effect of nightshifts on patient outcomes: a multicenter study

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Introduction: Nightshifts may represent a more challenging work environment due to staff fatigue. Our objective was to determine if an association exists between health outcomes for patients seen in Calgary Zone Emergency Department (ED) during nightshifts as compared to other time periods. **Methods:** Administrative data from a city-wide electronic health record was collected from four urban EDs on all discharged patients during a 2-year period: January 2015-December 2016. A total of 454,125 patient visits were included and patients with a scheduled return to the ED were excluded. Three primary outcomes were selected to assess the effects of night shifts on the quality of care received by patients in the ED at night; (i) unscheduled returns to the ED within 7 days resulting in admission, (ii) mortality within 48 hrs and, (iii) mortality within 7 days of being seen by a physician. Non-night shifts were defined as patients seen on day and evening or 700-2300. The data was analyzed using descriptive statistics and precision reported via 95% confidence intervals. **Results:** For the outcome of returns resulting in admission, a 2.6% rate was noted for patients seen at night compared to 2.3% during non-night; OR 1.15 (95% CI 1.09-1.21). Furthermore, patients seen at night had a 0.033% rate of death, while non-night patients had a 0.022% chance of death within 48 hrs of discharge; OR 1.53 (95% CI 0.98-2.38). For mortality within 7 days, the rate of death observed was 0.10% and 0.078% respectively; OR 1.24 (95% CI 0.97-1.60). **Conclusion:** Our study identified presenting to the ED at night as a potential risk factor for adverse patient outcomes using 3 primary quality of care indicators. An adjusted analysis is needed to account for potential confounding variables and effect modifiers and is underway.

Keywords: nightshifts, staff fatigue, quality of care

LO49

Characterizing highly frequent users of a large Canadian urban emergency department

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Introduction: Highly frequent users (HFU) of the emergency department (ED) remain a poorly defined and complex population. This study describes patient and visit characteristics for HFU of the ED, and analyzes subgroups of patients with mental illness, substance abuse, and/or ≥30 yearly ED visits. **Methods:** We performed a health records review of 250 randomly selected adults with >99th percentile of ED visit frequency (≥ 7 visits) at a tertiary care academic hospital with two EDs in 2014. Two reviewers collected demographic variables (age, sex, and comorbidities) and visit data (ED diagnosis, ED length of stay (LOS), ED presentation time (daytime 0800-1559 h, evening 1600-2359 h, overnight 2400-0759 h), consultation services, and final disposition). Data were analyzed using descriptive and univariate analyses, student t and Mann Whitney U tests. **Results:** Of 897 eligible patients who experienced 9,376 ED visits we included 250 patients (2,670 visits) in our main analyses, and an additional 11 patients (494 visits) outside of the random selection with ≥30 ED visits. Mean age was 53.4 ± 1.3 (SEM), and 55.6% were female. Most patients had a fixed address (88.9%), and a family physician (87.2%). Top comorbidities included gastrointestinal (61.6%), cardiovascular (52%), and chronic pain issues (47.2%). Top ED diagnoses included musculoskeletal pain (9.6%), abdominal pain (8.4%) and alcohol-related presentations (8.5%). Hospital admission was required for 15.6% of visits. From all possible visits (3164 visits), consultations for social workers, geriatric emergency medicine nurses, or Community Care Access Centres were made for 5.9% of visits, with 47.3% of these patients presenting during daytime hours. Among visits requiring these consultations, median ED LOS was greatest in the evening (12.7 hours, range 1.4-45.2 hours), compared to daytime (5.4, 1.2-33.6; p = 0.0002) or overnight (7.9, 1.0-38.3, p = 0.02).

Inter-rater review of 4.5% of abstracted health records revealed a kappa score of 0.8. **Conclusion:** This study highlights that a remarkably low proportion of HFUs received allied health consultations at the study sites, likely corresponding to a lack of available consultants outside of daytime work hours. Our findings suggest the need to address significant gaps in order to balance the clinical needs of patients who frequent the ED with currently available resources.

Keywords: frequent users, administration, emergency department crowding

LO50

Headache presentations to emergency departments in Alberta: understanding investigative approaches

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Introduction: Headaches are a common emergency department (ED) presentation. The objective of this study was to characterize headache presentations in Alberta over a five-year period and explore the proportion of patients with potentially severe pathology. **Methods:** Administrative health data for Alberta (years 2011-2015) were obtained from the National Ambulatory Care Reporting System (NACRS) for all adult (>17 years) headache presentations (ICD-10-CA: G43, G44, R51). Patients with a primary or secondary diagnosis code of headache were eligible for inclusion in the study. Exclusions were made using the following criteria: 1) sites without computed tomography (CT) scanners; 2) presentations with a Canadian Triage and Acuity Scale (CTAS) score of 1; 3) patients with trauma or external mechanism of injury (e.g., ICD-10-CA codes S,T, V,W,X,Y); and 4) presentations receiving an enhanced/contrast CT (head). NACRS data were linked with a provincial diagnostic imaging data. Data are reported as means and standard deviation (SD), medians and inter-quartile range (IQR) or proportions, as appropriate. **Results:** From 2011-2015, 98,333 presentations were made by 66,970 patients (~0.3 presentations per patient per year; equivalent to one presentation every 3.4 years). Headache presentations increased from 15,643 in 2011 to 21,636 in 2015. The median age was 38 years (IQR: 29, 51 years); more patients were female (69.3%), had a CTAS score of 3 (55%) and arrived at the ED without ambulance (90.3%). The majority of patients had a primary ED diagnosis of headache (88%) and the most common co-diagnosis was benign hypertension (2.8%). Additional diagnoses indicating severe or pathological headaches, included: stroke (0.63%), subarachnoid hemorrhage (0.43%), infection (i.e., meningitis) (0.11%), and other brain hemorrhages (0.08%). Overall, the ED management of approximately 25% of presentations involved a head CT. Most patients were discharged from the ED (89.4%) after a median length of stay of 3.5 hours (IQR: 2.1, 5.2 hours). **Conclusion:** Headache-related ED presentations are increasing in Alberta, yet few severe/pathological diagnoses are being identified. Efforts to ensure appropriateness of head CT ordering could reduce exposure to ionizing radiation, improve patient flow and reduce health care costs; this imaging represents a target for future interventions.

Keywords: emergency department, headache, epidemiology

LO51

Incidence of clinically relevant medication errors after implementation of an electronic medication reconciliation process

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Introduction: Medication discrepancies are unintended differences between a patient's outpatient and inpatient medication regimens, and occur in up to 60% of hospital admissions. Canadian emergency departments (EDs) have implemented medication reconciliation forms that are pre-populated with outpatient medication dispensing data in order to reduce medication discrepancies and resultant adverse drug events. However, these forms may introduce errors of commission by prompting prescribers to reorder discontinued or potentially harmful medications. Our objective was to evaluate the incidence of medication discrepancies and errors of commission after the implementation of pre-populated medication reconciliation forms. **Methods:** This chart review included admitted patients who were enrolled in a parent study in which a research pharmacist prospectively collected best-possible medication histories (BPMHs) in the ED using all available information sources. Following discharge, research assistants uninvolved with the parent study compared medication orders documented within 48 h of admission with the BPMH to identify medication discrepancies and errors of commission. Errors of commission were defined as inappropriate continuations of medications and reordering discontinued medications. An independent panel adjudicated the clinical significance of the errors. We used regression methods to identify factors associated with errors. The sample size was limited by enrolment into the parent study. **Results:** Of 151 patients, 71 (47%; 95%CI 39.2-54.9) were exposed to 112 medication errors. Of these errors, 75.9% (85/112; 95% CI 67.1-82.9) were discrepancies, of which 18.8% (16/85; 95%CI 12.0-28.4) were clinically significant. Errors of commission made up 24.1% (27/112; 95%CI 17.3-32.8) of all errors, of which 37.0% (10/27; 95%CI 18.8-55.2) were clinically significant. Taking 8 or more medications was associated with a 5-fold greater odds of experiencing a medication error after controlling for confounders (OR 5.00; 95%CI 2.45-10.17; $p < 0.001$). **Conclusion:** Clinically significant medication discrepancies and errors of commission remain common despite the implementation of electronically pre-populated medication reconciliation forms. Prospective studies are needed to evaluate whether using pre-populated medication reconciliation forms increases the risk of introducing errors of commission.

Keywords: medication reconciliation, patient safety, adverse drug events

LO52

Combination of easily measurable real time variables to predict ED crowding

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Introduction: Almost every domain of quality is reduced in crowded emergency departments (ED), with significant challenges around the definition, measurement and interventions for ED crowding. We wished to determine if a combination of 3 easily measurable variables could perform as well as standard tools (NEDOCS score and a NEDOCS-derived LOCAL tool) in predicting ED crowding at a tertiary hospital with 57,000 visits per year. **Methods:** Over a 2-week period, we recorded ED crowding predictor variables and calculated NEDOCS and LOCAL scores. These were compared every 2 hours to a reference standard Physician Visual Analog Scale (range 0 to 10) impression of crowding to determine if any combination of variables outperformed NEDOCS and LOCAL (crowded = 5 or greater). Five numeric variables performed well under univariate analysis: i) Total ED Patients; ii) Patients in ED beds + Waiting Room; iii) Boarded Patients; iv) Waiting Room Patients; v) Patients in beds To Be Seen. These underwent multivariate, log regression with stratification and

bootstrapping to account for incomplete data and seasonal and daily effect. **Results:** 143 out of a possible 168 observations were completed. Two different combinations of 3 variables outperformed NEDOCS and LOCAL. The most powerful combination was: Boarded Patients; plus Waiting Room Patients; plus Patients in beds To Be Seen, with Sensitivity 81% and Specificity 76% ($r = 0.844$, $\beta = 0.712$, $p < 0.0001$, strong positive correlation). This compared favourably with NEDOCS and LOCAL, each with Sensitivity 71% and Specificity 64%[PA1] ($r = 0.545$ and $r = 0.640$ respectively). We will also present a sensitivity and specificity analysis of all combinations of predictor variables, using various reference standard cut-offs for crowding. **Conclusion:** A combination of 3 easily measurable ED variables (Boarded Patients; plus Waiting Room Patients; plus Patients in beds To Be Seen) performed better than the validated NEDOCS tool and a NEDOCS-derived LOCAL score at predicting ED crowding. Work is on going to design a simple tool that can predict crowding in real time and facilitate early interventions. Correlation with ED system and clinical outcomes should be studied in different ED environments.
Keywords: emergency department, crowding, overcapacity

LO53

Resuscitation status documentation availability among emergency patients with advanced disease

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Introduction: Patients with advanced malignant and non-malignant disease (advanced disease—AD) who do not want or benefit from aggressive resuscitation may unfortunately receive such treatments if unable to communicate in an emergency. Timely access to patients' resuscitation wishes is imperative for treating physicians and for medical information systems. Our aim was to determine what proportion of emergency department (ED) patients with AD have accurate, readily accessible resuscitation status documentation. **Methods:** This cross-sectional, prospective study was conducted at a tertiary care ED during purposefully sampled random accrual times in summer 2016. We enrolled all patients with: 1) palliative care consultation, 2) metastatic malignancy, 3) COPD or CHF on home oxygen, 4) hemodialysis, or 5) advanced neurodegenerative disease/dementia. The primary outcome was the retrieval of any existing resuscitation status documents. Documentation was obtained from a standardized review of forms accompanying the patient ("arrival documents") and electronic medical record ("EMR"). We measured the time to retrieve this documentation, and interviewed consenting patients to corroborate documentation with their current wishes. **Results:** Of 85 enrolled patients, only 33 (39%) had any documentation of resuscitation status: 28 (33%) had goals of care retrieved from the hospital EMR, and 11 (15%) from arrival documents (some had both). Patients from long-term care facilities were more likely to have documentation available (odds ratio 13 [95% CI 2.5-65] vs community-living). Of 32 patients who were able to be interviewed, 20 (63%) expressed "do not resuscitate" wishes. Ten of these 20 lacked any documents to support their expressed resuscitation wishes. Previously expressed resuscitation wishes took more than 5 minutes to be retrieved in 3 cases when not filed "one click deep" in our EMR. **Conclusion:** The majority of patients with AD, including half of those who would not wish resuscitation from cardiorespiratory arrest, did not have goals of care documents readily available upon arrival to the ED. Patients living in the community with AD appear to be at high risk for unwanted resuscitative treatments should they present to hospital *in extremis*. Having documentation of their goals of care that is easily retrievable from the EMR shows promise, though issues of retrieval, accuracy, and validity remain important considerations.
Keywords: documentation, resuscitation wishes, code status

LO54

A descriptive analysis of ED length of stay of admitted patients 'boarded' in the emergency department

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Introduction: Previous studies have shown a link between Emergency Department (ED) overcrowding and worse clinical outcomes, increased risk of in-hospital mortality, higher costs, and longer times to treatment. Prolonged ED Length of Stay (LoS) of admitted patients awaiting a bed on in-patient units has been identified as a major driver of ED overcrowding. The purpose of this study is to provide a descriptive analysis of ED LoS among admitted patients, and determine the impact of prolonged ED LoS on total hospital in-patient length of stay (IP LoS). **Methods:** We conducted a single-site retrospective study for the period between January 1-December 31, 2015 at a very high volume community hospital. All patients aged ≥18 years admitted from the ED to acute in-patient Medicine units were identified. We carried out overall descriptive analysis (including analysis of day-of-the-week variability) on ED LoS. The mean total IP LoS for those patients with ED LoS < 12 hours, 12-24 hours, and ≥24 hours were calculated and analyzed using ANOVA and Tukey HSD tests. **Results:** A total of 6,961 individuals were admitted to the medical units over the 12-month period. The median and mean ED LoS for admitted patients were 22.9 hrs (IQR: 13.9 hrs- 33.1 hrs) and 25.6 hrs respectively. Using ANOVA, there was a statistically significant difference in means of ED LoS as a function of the day of the week ($p < 0.0001$), with Mondays having the highest mean ED LoS (27.6 hrs), and Fridays having the lowest (23.1 hrs). The mean IP LoS for those with ED LoS < 12 hours, 12-24 hours, and ≥24 hours, were 6.8 days, 6.9 days, and 8.5 days respectively, with a statistically significant difference between group means ($p < 0.0001$). Multiple pairwise comparisons of group means showed a statistically significant ($p < 0.05$) difference between mean IP LOS of those with an EDLOS ≥ 24 hours and those with an EDLOS < 24 hours. **Conclusion:** Preliminary results indicate that ED LoS ≥ 24 hours among admitted patients was associated with an increase in total IP LoS.*In the next 1-2 months, we intend to explore the role of other independent variables (age, sex, comorbidity, isolation status, and telemetry) on total ED LoS, and its association with IP LoS.
Keywords: overcrowding, quality improvement, adverse events

LO55

A pilot evaluation of medical scribes in a Canadian emergency department

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Introduction: Improving emergency department productivity has been a priority across Canada. In the United States, medical scribes have been utilized to increase the number of patients seen per hour (PPH) per physician; however, it is not well known if these outcomes can be translated to Canada. The purpose of this pilot evaluation was to (a) establish proof-of-concept of medical scribes in Canada and (b) gain experience in scribe implementation so as to inform future directions for the use of scribes in Canada. It was hypothesized that use of medical scribes would result in a greater PPH per physician. **Methods:** We conducted a

four-month pilot evaluation of medical scribes in the emergency department of the Queensway-Carleton Hospital in Ottawa, Ontario. Eleven scribes were utilized in the study ranging in age from 18 to 23 years old. Following scribe training and an initial two-month acclimation period for both scribes and physicians, data collection began January 2015. Twenty-two full or part time emergency physicians were followed in this study, who received shifts with and without a scribe over the next four months. Physician work hours as well as the number of patients seen by each physician on each shift was documented. From these metrics, PPH per physician was calculated for each shift. Across the four months, the average PPH was determined for each physician during shifts with a scribe and shifts without a scribe. Two-tailed paired-samples t-tests ($\alpha = 0.05$) were used to compare mean (SD) PPH within physicians based on presence or absence of a scribe. **Results:** A total of 463 physician hours were documented without use of a scribe and 693.75 physician hours were documented with use of a scribe. Across all 22 physicians in the study, 18 (81.8%) demonstrated a greater PPH with use of a scribe. Overall, PPH per physician was significantly greater (12.9%) during shifts with a scribe (mean 2.81, SD 0.78) compared to shifts without a scribe (mean 2.49, SD 0.60) ($p = 0.006$). Sensitivity analyses revealed that PPH per physician during shifts without a scribe during the study period were similar to the year prior, before scribes were introduced to the hospital ($p = 0.315$). **Conclusion:** Use of medical scribes resulted in an increased PPH per physician in our hospital. While these results were from an evaluation at a single centre, they support broader implementation and evaluation of scribes in more centres across Canada.

Keywords: health systems, productivity, wait times

LO56

Novel role of physician navigators on performance indicators in the emergency department

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Introduction: Burnout rates for emergency physicians (EP) continue to be amongst the highest in medicine. One of the commonly cited sources of stress contributing to disillusionment is bureaucratic tasks that distract EPs from direct patient care in the emergency department (ED). The novel position of Physician Navigator was created to help EPs decrease their non-clinical workload during shifts, and improve productivity. Physician Navigators are non-licensed healthcare team members that assist in activities which are often clerical in nature, but directly impact patient care. This program was implemented at no net-cost to the hospital or healthcare system. **Methods:** In this retrospective study, 6845 clinical shifts worked by 20 EPs over 39 months from January 1, 2012 to March 31, 2015 were evaluated. The program was implemented on April 1, 2013. The primary objective was to quantify the effect of Physician Navigators on measures of EP productivity: patient seen per hour (Pt/hr), and turn-around-time (TAT) to discharge. Secondary objectives included examining the impact of Physician Navigators on measures of ED throughput for non-resuscitative patients: emergency department length of stay (LOS), physician-initial-assessment times (PIA), and left-without-being-seen rates (LWBS). A mixed linear model was used to evaluate changes in productivity measures between shifts with and without Physician Navigators in a clustered design, by EP. Autoregressive modelling was performed to compare ED throughput metrics before and after the implementation of Physician Navigators for non-resuscitative patients. **Results:** Across 20 EPs, 2469 shifts before, and 4376 shifts after April 1, 2013 were analyzed. Daily patient volumes increased 8.7% during the period with Physician Navigators. For the EPs who used Physician Navigators, Pt/hr increased by 1.07 patients per hour (0.98 to 1.16, $p < 0.001$), and TAT to discharge decreased by 10.6 minutes (-13.2 to -8.0, $p < 0.001$). After the implementation of the Physician Navigators, overall LOS for non-resuscitative patients decreased by 2.6 minutes (1.0%, $p = 0.007$), and average PIA decreased by 7.4 minutes (12.0%, $p < 0.001$). LBWS rates decreased by 43.9% (0.50% of daily patient volume, $p < 0.001$). **Conclusion:** The use of a Physician Navigator was associated with increased EP productivity as measured by Pt/hr, and TAT to discharge, and reductions in ED throughput metrics for non-resuscitative patients.

Keywords: performance, physician productivity, efficiency

LO57

Validation of the Ottawa 3DY in community seniors in the ED

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Introduction: Cognitive dysfunction is getting more common in geriatric emergency department (ED) patients, as the number of seniors visiting our EDs is increasing. ED guidelines recommend a systematic mental status screening for seniors presenting to the ED. As the existing tools are not suitable for the busy ED environment, we need quicker and easier ways to assess altered mental status, such as the O3DY. The purpose of this study is to assess the effectiveness of the French version of the O3DY to screen for cognitive dysfunction in seniors presenting to the ED. **Methods:** This is a planned sub-study of the INDEED project, which was conducted between February and May 2016 in 4 hospitals across the province of Québec. Inclusion criteria were: patients aged ≥65, with an 8-hour ED stay, admitted on a care unit, independent or semi-independent in their activities of daily living. Exclusion criteria were: patient living in a long-term nursing facility, with an unstable medical condition, pre-existing psychiatric condition or severe dementia, a delirium within the 8-hour exposure to the ED. A trained research assistant collected the following data upon initial interview: socio-demographic information, cognitive assessment (TICS-m), functional assessment (OARS) and delirium screening (CAM). The O3DY was also administered at initial interview and during patient follow-ups, as well as the CAM. **Results:** This study population was composed of 305 participants, of which 47.7% were men. Mean age was 76 years old (SD: 10.8). Nine of these participants had a previous history of dementia. 151 of these participants (47,04%) had a negative O3DY and 154 (47,98%) a positive O3DY at the initial encounter. When compared to the CAM, the O3DY presents a sensitivity of 85.0% (95% CI [62.1, 96.8]) and a specificity of 57.7% (95% CI [51.8, 63.6]) for prevalent delirium. When compared to the TICS, the O3DY presents a sensitivity of 76.7% (95% CI [66.4, 85.2]) and a specificity of 68.1% (95% CI [61.3, 74.3]) for cognitive impairment. The **combined measure** presents a sensitivity of 76.7% (95% CI [66.6, 84.9]) and a specificity of 68.4% (95% CI [61.7, 74.5]). **Conclusion:** A negative result to the O3DY indicates the absence of prevalent delirium or undetected cognitive impairment. The O3DY could be a useful tool for the triage nurses in the ED.

Keywords: validation, Ottawa 3DY, seniors

LO58

Risk factors associated with acute in-hospital delirium for patients diagnosed with a hip fracture in the emergency department

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Introduction: Hip fractures affect over 35,000 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. The primary objective of this study was to identify risk factors independently associated with acute in-hospital delirium within 72 hours of emergency department (ED) arrival for patients diagnosed with a hip fracture. **Methods:** This was a retrospective chart review of patients aged 65 years and older presenting to one of two academic EDs with a discharge diagnosis of hip fracture from January 1st 2014 to December 31st 2015. Multivariable logistic regression analysis was used to determine variables independently associated with the development of acute in-hospital delirium within 72 hours of ED arrival. **Results:** Of the 668 included patients, mean (SD) age was 84.1 (8.0) years and 501 (75%) were female. 521 (78.0%) patients received an opioid analgesic and/or femoral nerve block in the ED. The most common analgesics used in the ED were intravenous (IV) morphine (35.8%), IV hydromorphone (35.2%), or dual therapy with both IV hydromorphone and IV morphine (2.2%). Femoral nerve blocks were initiated for 36 (5.4%) patients and successfully completed in 35 (5.2%) patients in the ED. 181 (27.1%) patients developed delirium within 72 hours of ED arrival. History of neurodegenerative disease or dementia (OR: 5.7, 95% CI: 3.9, 8.4), age >75 (OR: 2.8, 95% CI: 1.4, 5.6) and absence of analgesia in the ED (OR: 2.1, 95% CI: 1.3, 3.2) were independently associated with acute in-hospital delirium. **Conclusion:** The development of in-hospital delirium is common in patients diagnosed with a hip fracture. We have identified modifiable and non-modifiable risk factors independently associated with acute in-hospital delirium, which can be identified in the ED. Clinicians should be aware of these risk factors in order to implement strategies directed at reducing the development of acute delirium. Additionally, further research is needed in order to understand the relationship between analgesia delivered in the ED and the development of delirium for patients diagnosed with a hip fracture.
Keywords: delirium, hip fracture, risk factors

LO59

Police use of force and subsequent emergency department assessment-mental health concerns are the driving force behind ED use and choice of transport mode

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Introduction: We examined persons transported to hospital after police use of force to determine whether Emergency Department (ED) assessment and/or mode of transport could be predicted. **Methods:** A multi-site prospective consecutive cohort study of police use of force with data on ED assessment for individuals ≥18 yrs was conducted over 36 months (Jan 2010-Dec 2012) in 4 cities in Canada. Police, EMS and hospital data were linked by study ID. Stepwise logistic regression examined the relationship between the police call for service and subject characteristics on subsequent ED assessment and mode of transport. **Results:** In 3310 use of force events, 86.7% of subjects were male, median age 29 yrs. ED transport occurred in 26% (n = 726). Odds of ED assessment increased by 1.2 (CI 1.1, 1.3) for each force modality >1. Other predictors of ED use: if the nature of police call was for Mental Health Act (MHA) (Odds 14.3, CI 10.6, 19.2), features of excited delirium (ExD) (Odds 2.7, CI 1.9, 3.7), police-assessed emotional distress (EDP) not an MHA (Odds 2.1, CI 1.5, 3.0) and combined drugs, alcohol and EDP (Odds 1.7, CI 1.9, 3.7). Those with alcohol impairment alone were less likely to go to ED from the scene: OR 0.6 (CI 0.5, 0.7). EMS transported 55% of all patients (n = 401), although police transported ~100 people who EMS attended at the scene but did not subsequently transport. For patients brought to the ED, 70% had a retrievable chart (512/726) with a discernible primary diagnosis: 25% for physical injury, 32% for psychiatric and 43% for drug and/or alcohol intoxication. For use of force events that began as MHA calls, patient transport was more often by police car than ambulance OR 1.8 (CI 1.2, 2.5), while those with drug intoxication or ≥3 ExD features were more often brought by ambulance: odds of police transport 0.5 (CI 0.3, 0.9) and 0.4 (CI 0.3, 0.7). Violence or aggression did not predict mode of transport in our study. **Conclusion:** About one quarter of police use of force events lead to ED assessment; 1 in 4 patients transported had a physical injury of some description. Calls including the Mental Health Act or individuals with drug intoxication or excited delirium features are most predictive of ED use following police use of force. In MHA calls with use of force, persons are nearly twice as likely to go to ED by police car than by ambulance.
Keywords: emergency medical services, mental health, police

LO60

Validation of the PHQ-9 as a screen for depression in the emergency department

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Introduction: Screening for depression in the emergency department (ED) has been recommended for the last two decades. It is estimated that 1 in 5 adults presenting to the ED meet the criteria for depression, making this setting an ideal point of care for proper and early referral to general practitioners and/or specialist mental health services. One of the barriers to assessment of depression in the ED is a lack of validated tools to screen for depression in this context of use. The purpose of this study is to test the extent to which the commonly used Patient Health Questionnaire (PHQ-9) is valid and reliable to screen for depression in adults presenting to the ED. **Methods:** Adults, aged 19 years and over, presenting to an inner-city, academic ED with an acute mental health complaint (AMHC) completed a questionnaire package that included demographic questions, the PHQ-9, and 5 other questionnaires for validation purposes. Traditional and Rasch Measurement (RM) methods were applied to the data to examine how well the items: captured the 95% range (±2 logits) of the concept of interest, were reliable and valid, and met the criteria for unidimensional and invariant measurement. **Results:** Preliminary prospective data from 108/200 adults (mean age 39.7 ± 13.6 years; 65% male) completed the questionnaire package. A total of 58.9% of the sample met the criteria for moderate-severe depression (PHQ-9 ≥ 15), with 37% reporting thoughts of suicide and/or self-harm nearly every day for the past two weeks. Analysis of these items showed good overall fit to the Rasch model ($\chi^2 = 28.3$, $df = 18$, $p = .06$), good reliability ($r_p = 0.84$), an ordered 4-point response scale structure, excellent individual item fit, and no item bias for gender, age, level of education, or employment status. Items covered between -1.45 to 1.52 logits, spanning 74% of the targeted theoretical continuum, with gaps at each end of the range. Item #3 (trouble falling or staying asleep) was the easiest item (indicating lower depression) and Items #8 and #9 (moving slowly and thoughts of harm/suicide) were the more difficult items (indicating more severe depression). **Conclusion:** This study supports the PHQ-9 as a reliable and valid screen for depression in the ED. Incorporating standardized and uniform assessment in Canadian EDs will begin the process of advancing the role of the ED to initiate evidence-based care to optimize the outcomes of Canadians with an AMHC.
Keywords: depression, screening, Rasch measurement

LO61

Geographic variation in Transient Ischemic Attack (TIA)/minor stroke care in Alberta emergency departments (EDs)

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Introduction: The risk of recurrent stroke following a transient ischemic attack (TIA) has been estimated to be as much as 5 percent in the first 48 hours and ten percent in the first week following initial TIA symptoms, but can be modified as a result of intensive risk factor management. Care pathways for these patients vary between different regions within Alberta with Edmonton admitting more TIA patients and Calgary using computed tomography angiography (CTA) based triage. To examine regional differences in the quality of care, the rate of admission for stroke within 90 days of an index ED visit for TIA/minor stroke was investigated. **Methods:** Data analysts from the Data Integration, Measurement and Reporting (DIMR) branch of Alberta Health Services (AHS) used the National Ambulatory Care Reporting System (NACRS) to identify patients in Alberta who were admitted for stroke within 90-days of an index emergency department (ED) visit for TIA/minor stroke from April 2010 to March 2016. Information extracted included patient demographics, region of residence (Edmonton, Calgary or non-major urban [NMU]), return diagnosis and timing of return ED visit. Analysis included descriptive summaries and proportions were compared using a χ^2 test. **Results:** During the study period, there were 26,232 index visits to Alberta EDs for TIA/minor stroke. 5426 (26.1%) of patients were admitted on their index visit. Calgary (22.5%) had lower rates of admission on index visit followed by Edmonton (31.4%) and the NMU (46%). 20,806 (79.3%) were discharged home following their index visit. Of the patients discharged on their index visit 729 (3.5%) had an admission for stroke within 90-days of their index ED visit with rates in Edmonton (3.8%) and the NMU regions (3.8%) being significantly higher than Calgary (2.8%, $p < 0.01$). **Conclusion:** Our study demonstrates significantly lower rates of admission for stroke within 90-days of ED visit for minor stroke/TIA in Calgary compared to Edmonton and the NMU. Further work should focus on validating this result and consideration of standardized care pathways that promote effective resource utilization and quality of care.

Keywords: transient ischemic attack, minor stroke, epidemiology

LO62

Systolic blood pressure is a strong predictive marker for TIA and mild stroke in younger patients

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Introduction: Age and systolic blood pressure (SBP) are important predictors of Acute Cerebrovascular Syndrome (ACVS). Yet, the effect of SBP is confounded by age, making its independent contribution to ACVS risk difficult to quantify. Here we use logistic regression to explore the role of SBP in younger and older ED patients. **Methods:** Data comprised 1019 ED patients (ACVS 70%, 30% non-ACVS) enrolled during a 28-month period of an ongoing prospective, observational, multi-site stroke biomarker study (SpecTRA). We used logistic regression to examine the effects of age, sex, and the age:SBP interaction as predictive markers of the diagnosis of ACVS. **Results:** Participants (53% male) ranged in age from 18 to 97 years (Q1 = 58, median = 70, Q3 = 80). SBP ranged from 84 to 248 mmHg (Q1 = 137, median = 154, Q3 = 174). In our initial regression model, age, sex, SBP and the age:SBP interaction were all significant ($p < 0.01$). Using cubic regression splines for age, sbp and their interaction yields the same conclusion ($p < 0.01$). To better understand the role of SBP in younger vs. older patients, we stratified the sample at the median age (70 years of age). In the younger group (n = 510), participants were 55% male, 60% ACVS, and had SBP ranging from 91 to 236 mmHg (Q1 = 133, median = 148, Q3 = 165). In the older group (n = 509), participants were 51% male, 82% ACVS and had SBP ranging from 84 to 248 mmHg (Q1 = 143, median = 159, Q3 = 179), a shift of approximately 10 mmHg between the groups. The logistic regression model was then fit separately to each group without the age:SBP interaction term. In the younger group, we found SBP to be highly significant ($p < 0.001$), with an odds-ratio (OR) of 1.18 per 10 mmHg (95% CI: 1.10-1.29). In the older group, we found that SBP was not significant ($p = 0.91$), with an OR of 1.00 per 10 mmHg (95% CI: 0.91-1.08). Age and sex were also significant risk factors in the younger group (each $p < 0.01$), though not in the older group (both $p > 0.07$). **Conclusion:** Our findings suggest that for ED patients suspected of ACVS, SBP is a clinically relevant predictor for younger patients, with higher SBP associated with an increased risk of ACVS, regardless of patient age and sex. SBP does not appear to be a strong predictor for patients over 70. ED physicians can leverage this finding by attributing greater importance to elevated SBP in younger patients than older patients when working toward a clinical suspicion of ACVS.

Keywords: acute cerebrovascular syndrome, blood pressure, clinical decision support

LO63

External validation of the BIG score to predict mortality in pediatric blunt trauma

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Introduction: The BIG score is a new pediatric trauma score composed of the admission base deficit (BD), the international normalized ratio (INR) and the Glasgow Coma Scale (GCS). A score < 16 identifies children with a high probability of survival following blunt trauma.The objective of this study was to measure the criterion validity of the BIG score to predict in-hospital mortality among children visiting an emergency department with blunt trauma requiring an admission to the intensive care unit. **Methods:** This was a retrospective cohort study performed in a single tertiary care pediatric hospital between 2008 and 2016. Participants were all children (<18 years) visiting the emergency department for a blunt trauma requiring intensive care unit admission or who died at the emergency department. All charts were reviewed by a member of the research team using a standardized report form. To insure quality of data abstraction, 10% of the charts were reviewed in duplicate by a second rater blinded to the first evaluation. The primary outcome was in-hospital mortality. Baseline demographics, initial components of the BIG score, Injury Severity Score (ISS) and disposition were extracted. The primary analysis was the association between a BIG score ≥16 and in-hospital mortality. It was calculated that the inclusion of at least 25 deaths would provide confidence intervals of +/- 0.20 for proportions in the worst-case scenario. **Results:** Twenty-eight children died among the 336 who met the inclusion criteria. The inter-rater agreement for data abstraction was excellent with kappa scores or intraclass correlation coefficients higher than 0.8 for all variables. Two hundred eighty-four children had information on the three components of the BIG score and they were included in the primary analysis. A BIG score ≥16 demonstrated a sensitivity of 0.93 (95%CI: 0.76-0.98) and specificity of 0.83 (95%CI 0.78-0.87) to identify mortality. Using ROC curves, the area under the curve was higher for the BIG score

(0.97; 95%IC: 0.95-0.99) in comparison to the ISS (0.78; 95%IC: 0.71-0.85). **Conclusion:** The BIG score is an excellent predictor of survival for children visiting the emergency department following a blunt trauma.
Keywords: children, blunt trauma, mortality

LO64

Emergency department directed multifaceted interventions to improve outcomes after asthma exacerbations: a 3-armed randomized controlled trial

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Introduction: Approximately 20% of Canadians who present to emergency departments (EDs) with acute asthma relapse within 4 weeks of discharge. The reasons are likely multi-factorial; however, the lack of timely primary care provider (PCP) follow-up and inadequate patient self-management are thought to be important variables. Therefore, we tested the effectiveness of ED-directed multifaceted interventions that targeted PCPs and enhanced patient self-management to reduce asthma relapse following ED discharge. **Methods:** Adults with acute asthma discharged from 6 Alberta EDs were randomly allocated, in a centralized and concealed manner, to receive usual care (UC), opinion leader [OL] guidance to their PCPs, or OL guidance + nurse case-management [OL + CM] for patients (NCT01079000). The main outcome was asthma relapse within 90-days of ED discharge. Secondary outcomes included PCP visits, time to relapse, hospitalizations and asthma-related quality of life (QoL). Outcomes were collected independently and assessors were masked to intervention assignment. **Results:** From 943 screened patients, 367 patients were allocated to the study arms (UC = 146; OL = 110; OL + CM = 111). Median age was 28 years, 64% were women, median peak flow at discharge was 350 L/min; 77% were discharged home on prednisone and 85% on either inhaled corticosteroids (ICS) or ICS/long-acting β_2-agonists. Compared with UC, both interventions significantly ***increased*** rates of relapse at 90-days: UC = 12%, OL = 28%, OL + CM = 19%; p = 0.006. Based on an absolute increased risk of 0.16 (95% CI: 0.05, 0.25), the number needed to treat for harm was 6 (95% CI: 3.9, 19.0) for the OL arm. Across study differences in PCP follow-up visits, time to relapse, hospitalizations or asthma-related QoL were not identified. **Conclusion:** Two different theory-informed and evidenced-based interventions intended to decrease asthma relapse robustly and significantly increased rates of relapse compared with UC. While the reasons for these unintended consequences require further study, we caution against the adoption of similar interventions by other EDs.
Keywords: asthma, education

LO65

Outpatient care gaps in subjects presenting to emergency departments with acute asthma

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Introduction: Many patients presenting to Emergency Departments (EDs) with acute asthma have limited or no access to health care providers, medications and preventive resources. This study explored outpatient care gaps among subjects presenting to the ED for acute asthma, before being discharged. **Methods:** Cross-sectional analysis of data obtained in a comparative effectiveness trial conducted in six EDs in Alberta (NCT01079000). Data were collected through patient interviews and chart reviews at ED presentation. Two clinician-investigators independently reviewed and adjudicated the following preventive actions: use of spacer devices, written asthma action plans (AAPs) and asthma medication; influenza immunization, cigarette smoking, and referral to asthma education. Agreement between adjudicators was calculated based on kappa (k) statistics. **Results:** The median age of the study population (n = 367) was 28 years and 64% were women. Overall, 26% of patients reported not having a regular family physician. Agreement between reviewers was excellent (k = 0.96). More than half (59%) reported not using spacer devices despite being indicated and 3% reported having a written AAP. Following the recommendations of the current asthma guidelines, 38% of the patients required the initiation of inhaled corticosteroids (ICS), 11% required the addition of ICS/long-acting β-agonists combination agents and 39% required reinforcement of adherence with preventer medications. Finally, 37% reported receiving influenza vaccination in the past year, 7% had been referred to asthma education in the last 10 years, and 31% were still smoking, suggesting that cessation counselling was indicated. **Conclusion:** The ED encounter for patients with acute asthma represents a unique opportunity to establish important partnerships across the continuum of asthma care (e.g., link them with a family doctor). This study provided a robust assessment of the outpatient care gaps in this patient population, which identified many areas for targeted interventions. The method of delivery and type of messaging needs further study.
Keywords: asthma, education

LO66

Did the Choosing Wisely Canada campaign work? A retrospective analysis of its impact on emergency department imaging utilization for head injuries

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Introduction: Head injuries are a commonly encountered presentation in emergency departments (ED) and the Choosing Wisely Canada (CWC) campaign was released in June 2015 in an attempt to decrease imaging utilization for patients with minor head injuries. The impact of the CWC campaign on imaging utilization for head injuries has not been explored in the ED setting. In our study, we describe the characteristics of patients with head injuries presenting to a tertiary care academic ED and the impact of the CWC campaign on CT head utilization. **Methods:** This retrospective cohort study used linked databases from the province of Ontario, Canada to assess emergency department visits with a primary diagnosis of head injury made between June 1, 2014 and Aug 31, 2016 at the University Health Network in Toronto, Canada. We examined the number of visits during the study period, the proportion of patients that had a CT head performed before and after the release of the CWC campaign, as well as mode of arrival, and disposition. **Results:** There were 4,322 qualifying visits at our site during the study period. The median presenting age was 44.12 years (IQR 27.83,67.45), the median GCS was 15 (IQR 15,15) and the majority of patients presenting had intermediate acuity (CTAS 3). Overall, 43.17% of patients arrived via ambulance, 49.24 % of patients received a CT head and 10.46% of patients were admitted. Compared to patients presenting before the CWC campaign release, there was no significant difference in the rate of CT heads after the CWC (50.41% vs 47.68%, P = 0.07). There were also no significant differences between the two groups in mode of arrival (ambulance vs ambulatory) (42.94% vs 43.48%, P = 0.72) or admission rates (9.85% vs 11.26%, P = 0.15). However, more patients belonged to the high acuity groups (CTAS 1 or 2) in the post CWC campaign release group (12.98% vs 8.11% P < 0.001). **Conclusion:** Visits for head

injuries make up a significant proportion of total ED visits and approximately half of these patients receive CT imaging in the ED. The CWC campaign did not seem to impact imaging utilization for head injuries in the 14 months following its launch. Further efforts, including local quality improvement initiatives, are likely needed to increase adherence to its recommendation and reduce imaging utilization for head injuries.
Keywords: Choosing Wisely, head injury, emergency department

LO67

The impact of CPR quality during entire resuscitation episode on survival from cardiac arrest

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Introduction: High-quality cardiopulmonary resuscitation (CPR) is essential for patient survival. Typically, CPR quality is only measured during the first 10 minutes of resuscitation. There is limited research examining the quality of CPR over the entire duration of resuscitation. **Objective**: To examine the quality of CPR over the entire duration of resuscitation and correlate the quality of CPR to patient survival. **Methods:** This was a retrospective observational study using data from the Toronto RescuNET Epistry-Cardiac Arrest database. We included consecutive, adult (>18) OHCA treated by EMS between January 1, 2014 and September 30, 2015. High-quality CPR was defined, in accordance with 2015 AHA Guidelines, as a chest compression rate of 100-120/min, depth of 5.0-6.0 cm and chest compression fraction (ccf) of >0.80. We further categorized high-quality resuscitation as meeting benchmarks >80% of the time, moderate-quality between 50-80% and low-quality meeting benchmarks <50% of the resuscitation. We used multivariable logistic regression to determine association between variables of interest, including CPR quality metrics, and survival to hospital discharge. **Results:** A total of 5,208 OHCA met our inclusion criteria with a survival rate of 8%. The median (IQR) duration of resuscitation was 23.0 min (15.0,32.7). Overall CPR quality was considered high-quality for ccf in 81% of resuscitation episodes, 41% for rate, and 7% for depth. The percentage of resuscitations meeting the quality benchmarks differed between survivors and non-survivors for both depth (15% vs 6%) and ccf (61% vs 83%) (P value <0.001). After controlling for Utstein variables maintaining a chest compression depth within recommendations for >80% showed a trend towards improved survival (OR 1.68, 95% CI 0.96, 2.92). Other variables associated with survival were public location, initial CPR by EMS providers or bystanders, witnessed cardiac arrest (EMS or bystander), and initial shockable rhythm. Increasing age and longer duration of resuscitation were associated with decreased survival. **Conclusion:** Overall, EMS providers were not able to maintain rate or depth within guideline recommendations for the majority of the duration of resuscitation. Maintaining chest compression depth for greater than 80% of the resuscitation showed a trend towards increased survival from OHCA.
Keywords: cardiac arrest, cardiopulmonary resuscitation, emergency medical services

LO68

Extracorporeal membrane oxygenation in the emergency department for resuscitation of out-of-hospital cardiac arrest patients: a systematic review

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Introduction: With one person in Canada suffering an out-of-hospital cardiac arrest (OHCA) every 12 minutes and an estimated survival to hospital discharge with good neurologic function ranging from 3 to 16%, OHCA represents a major source of morbidity and mortality. An evolving adjunct for resuscitation of OHCA patients is the use of extracorporeal membrane oxygenation-assisted CPR (ECPR). The purpose of this systematic review is to investigate the survival to hospital discharge with good neurologic recovery in patients suffering from OHCA treated with ECPR compared to those who received standard advanced cardiac life support with conventional CPR (CCPR) alone. **Methods:** A systematic database search of both MEDLINE & EMBASE was performed up until September 2016 to identify studies with ≥5 patients reporting ECPR use in adults (age ≥16 years) with OHCA. Only studies reporting survival to hospital discharge were included. All identified studies were assessed independently using predetermined inclusion criteria by two reviewers. Study quality and risk of bias were evaluated using the Newcastle Ottawa regulations assessment scale. **Results:** Of the 1065 records identified, 54 studies met all inclusion criteria. Inter-rater reliability was high with a kappa statistic of 0.85. The majority of studies were comprised of case series (n = 45) of ECPR with 5 to 83 patients/study. Out of the 45 case series, 37 presented neurologic data at hospital discharge and demonstrated a broad range of patients surviving with good neurologic outcome (0 to 71.4%). Only 9 cohort studies with relevant control group (CCPR) were identified (38 to 21750 patients/study). Preliminary analysis demonstrated that 6 cohort studies were sufficient quality to compare ECPR to CCPR. All 6 studies showed significantly increased survival to hospital discharge with good neurologic recovery (ECPR 10.6 to 41.6% vs CCPR 1.5 to 7.7%, respectively). **Conclusion:** Given the paucity of studies using appropriate comparators to evaluate the impact of ECMO, our confidence in a clinically relevant difference in outcomes compared to current standards of care for OHCA remains weak. Interestingly, a limited number of studies with suitable controls demonstrated a potential benefit associated with ECPR in the management of OHCA in selected patients. In this state of equipoise, high quality RCT data is urgently needed.
Keywords: cardiac arrest, extracorporeal cardiopulmonary resuscitation, survival with good neurologic outcome

LO69

Evaluating the impact of night shifts on emergency medicine resident competence in simulated resuscitations

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Introduction: Sleep deprivation negatively affects cognitive and behavioural performance. Emergency Medicine (EM) residents commonly work night shifts and are then expected to perform with competence. This study examines the impact of night shifts on EM resident performance in simulated resuscitation scenarios. **Methods:** A retrospective cohort study was completed at a single Canadian academic centre where residents participate in twice-annual simulation-based resuscitation objective structured clinical examinations (OSCEs). OSCE scores for all EM residents between 2010-2016 were collected, as well as post-graduate year (PGY1-5), gender, and shift schedules. OSCEs were scored using the Queen's Simulation Assessment Tool (QSAT) evaluating four domains: primary assessment, diagnostic actions, therapeutic actions and communication, and an overall global assessment score (GAS). A night shift was defined as a late evening (beyond 23:00) or overnight shift within the three days before an OSCE. A mixed effects linear regression model was used to model the

association between night shifts and OSCE scores while adjusting for gender and PGY. **Results:** A total of 136 OSCE scores were collected from 56 residents. PGY-5 residents had 37.1% (31.3 to 34.0%; $p < 0.01$) higher OSCE scores than those in PGY-1 with an average increase of 8.8% (7.5 to 10.1%; $p < 0.01$) per year. Working one or more night shifts in the three days before an OSCE reduced the total and communication scores by an average of 3.8% ($p = 0.04$) and 4.5% ($p = 0.04$) respectively. We observed a significant gender difference in the effects of acute shift work ($p = 0.03$). Working a night shift one night prior to an OSCE was not associated with total score among male residents ($p = 0.33$) but was associated with a 6.1% (-11.9 to -0.2; $p = 0.04$) decrease in total score among female residents. This difference was consistent across PGY and was primarily due to an 8.5% (-15.5 to -1.6%; $p = 0.02$) decrease in communication scores and a 6.7% (-13.1 to -0.3%; $p = 0.04$) reduction in GAS. **Conclusion:** Proximity to night shifts significantly impaired the performance of EM trainees in simulated resuscitation scenarios, particularly in the domain of communication. For female residents, the magnitude of difference in total scores after working such shifts one night prior to a resuscitation OSCE was approximately equal to the difference seen between residents one year apart in training.
Keywords: shiftwork, simulation, sleep deprivation

LO70

Do automatic external defibrillators improve rates of return of spontaneous circulation, survival to hospital discharge and favourable neurological survival in Canada?

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Introduction: Survival for victims of out-of-hospital cardiac arrest (OHCA) is typically 8-12%. Recent evidence has shown that public access automatic external defibrillators (AED) may improve survival. The objectives of this study were to determine whether AEDs improve rates of return of spontaneous circulation (ROSC), overall survival, and favourable neurological survival (FNS) in Canada. **Methods:** The BC Resuscitation Outcomes Consortium prospectively collected detailed prehospital and hospital data on consecutive non-traumatic OHCAs from 2011-2015 within BC's four metropolitan areas. We included all EMS-treated adult patients. Data were collected in accordance with recognized Utstein criteria. We described frequencies with counts, means and medians where appropriate, and the Z-test was used to compare population proportions. **Results:** We examined 7577 OHCAs from 2011-2015. AEDs were deployed on 223 patients in this period (mean age 60.4 yrs [95% CI 45.7-75.1] and 83.9% male; non-AED OHCAs mean age 66.2 yrs [48.4-83.8] and 67.3% male). Seventy seven percent of AED deployments occurred in public locations, 69.1% were witnessed by bystanders and CPR was initiated in 98.7% of these cases. Fifteen percent of non-AED OHCAs occurred in public locations, 38.3% were bystander witnessed, and 45.4% received bystander CPR. AEDs delivered shocks to 61.4% of patients, and EMS crews found an initial shockable rhythm upon scene arrival in 60.5% of AED deployments (22.9% for non-AED cases). AED OHCA patients had higher rates of ROSC at any time (67.2% vs 47.6%; difference of 19.6% [12.9-26.2 $p < 0.01$]), and ROSC at ED arrival (61% vs 35.4%; difference of 25.6% [19.2-32.0 $p < 0.01$]). AED OHCA patients had higher rates of survival to hospital discharge (23.8% vs 8.5%; difference 15.3% [11.5-19.1 $p < 0.01$]). Detailed neurologic outcome data was not available for all patients, yet for those which it was available AED OHCA patients had improved outcomes (modified Rankin score < 2) compared to non-AED OHCA patients (9.0% vs 5.4%; difference 3.6% [0.6-6.6 $p < 0.02$]. **Conclusion:** Automatic external defibrillators markedly improve rates of ROSC at any time, sustained ROSC at ED arrival, survival to hospital discharge, and FNS in Canada. Continued support for public access AED programs is essential to improve patient outcomes.
Keywords: cardiac arrest, automatic external defibrillator, survival

LO71

For patients suffering from out-of-hospital cardiac arrest, is survival influenced by the capabilities of the receiving hospital?

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Introduction: Patients suffering from out-of-hospital cardiac arrest (OHCA) are frequently transported to the closest hospital after return of spontaneous circulation (ROSC). Percutaneous coronary intervention (PCI) is often indicated as a diagnostic and therapeutic procedure following OHCA. This study aimed to determine the association between the type of destination hospital (PCI-capable or not) and survival to discharge for patients with OHCA and prehospital ROSC. We hypothesized that being transported to a PCI-capable hospital would be associated with a higher survival to discharge. **Methods:** The present study used a registry of adult OHCA between 2010 and 2015 in Montréal, Canada. We included adult patients with non-traumatic OHCA and prehospital ROSC. The association of interest was evaluated with a multivariate logistic regression model to control for demographic and clinical variables (age, gender, time of day, initial rhythm, witnessed arrest, bystander CPR, presence of first responders or advanced care paramedics, prehospital supraglottic airway placement, delay before paramedics' arrival). Assuming a survival rate of 40% and 75% of the variability explained by other factors included in the model, more than 1200 patients needed to be included to detect an absolute difference of 10% in survival between both groups with a power of more than 90%. **Results:** A total of 1691 patients (1140 men and 551 women) with a mean age of 64 years (standard deviation 17) were included, of which 1071 (63%) were transported to a PCI-capable hospital. Among all patients, 704 patients (42%) survived to hospital discharge. We observed a significant independent association between survival to discharge and being transported to a PCI-capable hospital (adjusted odds ratio [AOR] 1.46 [95% confidence interval 1.09-1.96]) after controlling for confounding variables. Having an initial shockable rhythm and presence of first responders also increased survival to discharge (AORs 3.67 [95% confidence interval 2.75-4.88] and 1.53 [95% confidence interval 1.12-2.09], respectively). **Conclusion:** Patients experiencing ROSC after OHCA could benefit from a direct transport to a PCI-capable hospital. This benefit might also be related to unmeasured interventions other than PCI these hospitals can provide (e.g. high-level intensive care or cardiovascular surgery).
Keywords: out-of-hospital cardiac arrest, percutaneous coronary intervention, survival

LO72

Implementation of an educational program to improve the cardiac arrest diagnostic accuracy of ambulance communication officers: a concurrent control before-after study

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Introduction: Most ambulance communication officers receive minimal education on agonal breathing, often leading to unrecognized out-of-hospital cardiac arrest (OHCA). We sought to evaluate the impact of an educational program on cardiac arrest recognition, and on bystander CPR and survival rates. **Methods:** Ambulance communication officers in Ottawa, Canada received additional training on agonal breathing, while the control site (Windsor, Canada) did not. Sites were compared to their pre-study performance (before-after design), and to each other (concurrent control). Trained investigators used a piloted-standardized data collection tool when reviewing the recordings for all potential OHCA cases submitted. OHCA was confirmed using our local OHCA registry, and we requested 9-1-1 recordings for OHCA cases not initially suspected. Two independent investigators reviewed medical records for non-OHCA cases receiving telephone-assisted CPR in Ottawa. We present descriptive and chi-square statistics. **Results:** There were 988 confirmed and suspected OHCA in the "before" (540 Ottawa; 448 Windsor), and 1,076 in the "after" group (689 Ottawa; 387 Windsor). Characteristics of "after" group OHCA patients were: mean age (68.1 Ottawa, 68.2 Windsor); Male (68.5% Ottawa, 64.8% Windsor); witnessed (45.0% Ottawa, 41.9% Windsor); and initial rhythm VF/VT (Ottawa 28.9, Windsor 22.5%). Before-after comparisons were: for cardiac arrest recognition (from 65.4% to 71.9% in Ottawa $p = 0.03$; from 70.9% to 74.1% in Windsor $p = 0.37$); for bystander CPR rates (from 23.0% to 35.9% in Ottawa $p = 0.0001$; from 28.2% to 39.4% in Windsor $p = 0.001$); and for survival to hospital discharge (from 4.1% to 12.5% in Ottawa $p = 0.001$; from 3.9% to 6.9% in Windsor $p = 0.03$). "After" group comparisons between Ottawa and Windsor (control) were not statistically different, except survival ($p = 0.02$). Agonal breathing was common (25.6% Ottawa, 22.4% Windsor) and present in 18.5% of missed cases (15.8% Ottawa, 22.2% Windsor $p = 0.27$). In Ottawa, 31 patients not in OHCA received chest compressions resulting from telephone-assisted CPR instructions. None suffered injury or adverse effects. **Conclusion:** While all OHCA outcomes improved over time, the educational intervention significantly improved OHCA recognition in Ottawa, and appeared to mitigate the impact of agonal breathing.

Keywords: dispatch communications, cardiac arrest, agonal breathing

LO73

Long-term functional outcome and health-related quality of life of elderly out-of-hospital cardiac arrest survivors

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Introduction: This study aims to describe the long-term functional outcome and health-related quality of life of elderly (≥65 years old) out-of-hospital cardiac arrest (OHCA) survivors in Victoria, Australia. **Methods:** Elderly OHCA patients who arrested between January 1st, 2010 and December 31st, 2014 were identified from the Victorian Ambulance Cardiac Arrest Registry (VACAR). Living status, Glasgow Outcome Scale-Extended (GOS-E), Euro-QoL (EQ-5D) and Twelve-item Short Form (SF-12) Health Survey were collected by telephone 12 months following the OHCA. **Results:** Emergency medical services attended on 14,678 elderly OHCA during the study period, 6,851 (46.7%) of which received a resuscitation attempt. Of these, 668 patients (9.8%) survived to hospital discharge. The mean age of the survivors was 75 (standard deviation (SD) 7.4) years and 504 (75.4%) were male. Eighty-five patients subsequently died within 12 months of their OHCA. A total of 483 patients were interviewed (response rate 82.9%). At 12 months, 313 responders (64.9%) were living at home without care. Most responders ($n = 324$ (67.2%)) had a good long-term functional recovery with a GOS-E ≥7. The proportion of patients with a GOS-E ≥ 7 progressively decreased with increasing age (65-74 years: 66.1%, 75-84 years: 53.0%, ≥ 85 years: 27.3%). On the EQ-5D, the majority of survivors reported no problem with mobility ($n = 266$ (55.1%)), self-care ($n = 403$ (83.4%)), activity ($n = 293$ (60.6%)), pain ($n = 335$ (69.3%)) and anxiety ($n = 358$ (74.1%)). On the SF-12, the mean mental component summary was 56.3 (SD 6.6) while the mean physical component summary was 44.7 (SD 11.4) (both measures range from 0-100). Among the 1,951 patients who arrested in a supported accommodation, 849 (43.5%) had a resuscitation attempt, and of these, 21 survived to hospital discharge (2.5%). Only eight (1.0%) of these patients were still alive 12 months after the OHCA and one survivor (0.12%) had a good functional outcome (GOS-E ≥ 7). **Conclusion:** Most elderly OHCA survivors have an adequate long-term functional status and health-related quality of life. However, the likelihood of having a good functional recovery decreases with increasing age, and is rare for patients arresting in a supported accommodation.

Keywords: cardiac arrest, geriatric, quality of life

LO74

Prehospital sodium bicarbonate use was associated with worse neurological outcomes among patients with out-of-hospital non-traumatic cardiac arrest

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Introduction: Sodium bicarbonate (SB) is still widely used for resuscitation in out-of- hospital cardiac arrest (OHCA) despite limited clinical indications but the effect on neurological recovery is unclear. **Methods:** From 2006 to 2016, we prospectively conducted a province-wide population-based observational study of adult non-traumatic OHCA patients managed by EMS. According to provincial guidelines, paramedics administered SB to OHCA patients based on their clinical assessment. Outcome of interest was favorable neurological outcome at hospital discharge, defined as CPC of 1 and 2 or modified Rankin scale of 3 or less. We performed multivariable logistic regression, comparing the proportion of outcome between SB and non-SB groups, further stratified by the median of the length of resuscitation. We also applied propensity score matching technique adjusting for baseline characters to the same model to reduce potential selection bias. **Results:** Of 13,008 OHCA patients, 4,699 (36.1%) were managed with SB. In the SB treated group, 64 / 4,699 (1.3%) patients had favorable neurological outcomes, compared to 823 / 8,309 (9.9%) in the non-SB treated group (crude odds ratio [OR] 0.12, 95% CI 0.09 to 0.16). In logistic regression model, SB was associated with decreased probability of favorable outcomes (adjusted OR 0.63, 95% CI 0.45 to 0.89). Similarly, with stratification by length of resuscitation, the SB group had a lower probability of favorable outcomes (≦24 min: adjusted OR 0.68, 95% CI 0.46 to 1.02, >24 min: adjusted OR 0.47, 95% CI 0.23 to 0.97). In 1:1 propensity matched cohort including 5,126 OHCA patients, the adjusted association also persisted (adjusted OR 0.59, 95% CI 0.39 to 0.89). **Conclusion:** Prehospital administration of SB to OHCA patients was associated with worse neurological outcomes and the trend persisted even after stratification by resuscitation length.

Keywords: cardiac arrest, out-of-hospital, sodium bicarbonate

LO75

Interrater agreement and time it takes to assign a Canadian Triage and Acuity Scale score in 7 emergency departments

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Introduction: The Canadian Triage and Acuity Scale (CTAS) is the standard used in all Canadian (and many international) emergency departments (EDs) for establishing the priority by which patients should be assessed. In addition to its clinical utility, CTAS has become an important administrative metric used by governments to estimate patient care requirements, ED funding and workload models. Despite its importance, the process by which CTAS scores are derived is highly variable. Emphasis on ED wait times has also drawn attention to the length of time the triage process takes. The primary objective of this study was to determine the interrater agreement of CTAS in current clinical practice. The secondary objective was to determine the time it takes to triage in a variety of ED settings. **Methods:** This was a prospective, observational study conducted in 7 hospital EDs, selected to represent a mix of triage processes (electronic vs. manual), documentation practices (electronic vs. paper), hospital types (rural, community and teaching) and patient volumes (annual ED census ranged from 38,000 to 136,000). An expert CTAS auditor observed on-duty triage nurses in the ED and assigned independent CTAS in real time. Research assistants not involved in the triage process independently recorded the triage time. Interrater agreement was estimated using unweighted and quadratic-weighted kappa statistics with 95% confidence intervals (CIs). **Results:** 738 consecutive patient CTAS assessments were audited over 21 seven-hour triage shifts. Exact modal agreement was achieved for 554 (75.0%) patients. Using the auditor's CTAS score as the reference standard, on-duty triage nurses over-triaged 89 (12.1%) and under-triaged 95 (12.9%) patients. Interrater agreement was "good" with an unweighted kappa of 0.63 (95% CI: 0.58, 0.67) and quadratic-weighted kappa of 0.79 (95% CI: 0.67, 0.90). Research assistants captured triage time for 3808 patients over 69 shifts at 7 different EDs. Median (IQR) triage time was 5.2 (3.8, 7.3) minutes and ranged from 3.9 (3.1, 4.8) minutes to 7.5 (5.8, 10.8) minutes. **Conclusion:** Variability in the accuracy, and length of time taken to perform CTAS assessments suggest that a standardized approach to performing CTAS assessments would improve both clinical decision making, and administrative data accuracy.

Keywords: triage, interrater agreement, reliability

LO76

Emergency department procedural sedation in elderly patients

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Introduction: The use of procedural sedation and analgesia (PSA) for the performance of Emergency Department (ED) procedures has been reported to be safe and effective. However, few studies have evaluated the safety of PSA in the elderly, with conflicting results. Our primary objective was to determine if elderly patients undergoing PSA for the management of an orthopedic injury had an increased risk of adverse events (AEs) during the procedure. **Methods:** This retrospective review of prospectively recorded data between 2006 and 2016 included patients aged ≥16 years undergoing PSA at a single institution to facilitate treatment of a fracture or dislocation. Patients were separated into 3 age groups for analysis: young (18-40), middle-aged (41-64) and elderly (≥65). Elderly patients were divided into 3 subgroups. The primary AEs studied include hypoxia ($S_pO_2 < 90$ %) and hypotension (systolic blood pressure <100 mmHg, or >15% reduction from baseline if initial <100 mmHg). Logistic regression (LR) models tested for associations between age and outcome measurements. Effect sizes were described as odds ratios (OR) and 95% confidence intervals. **Results:** 4171 patients were studied, including 1125 patients ≥65 years of age. More than 90% of the time, propofol was used as a single agent sedative. Fentanyl was given as an analgesic adjunct in 88% of patients. Medication dosing declined as patients aged. In the young group, the average total propofol dose was 2.34 mg/kg compared to 1.42 mg/kg in the elderly (≥85 years subgroup: 1.07 mg/kg). Despite this, hypoxia was more likely to occur in elderly patients (2.3%) compared to younger patients (0.4%). LR models demonstrated that hypoxia was more likely to occur in: the elderly [OR 4.29 (1.58,11.70)], patients with an ASA classification score of 3 or higher [OR 4.71 (1.89,11.70)], and higher dosing of fentanyl in the elderly [OR 2.35 (1.21,4.57)]. Oral or nasal airway, assisted ventilation, and suctioning were required in less than 1% of all patients. Endotracheal intubation was never required. Hypotension was more likely in elderly patients (11.6%) than younger patients (8.3%). **Conclusion:** When performing PSA, clinicians should be aware of the increased risk of AEs in the elderly, particularly hypoxia, and modify selection, dosing, and administration of the PSA medication(s) appropriately. Future study should examine the intermediate and long-term outcomes of elderly patients following ED PSA.

Keywords: procedural sedation, geriatric, fracture

LO77

Compliance of older emergency department patients to community-based specialized geriatric services

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Introduction: The Geriatric Emergency Management (GEM) model has been developed to facilitate identification of older patients that are at higher risk of functional decline, repeat Emergency Department (ED) visits and future hospitalization. Those identified at risk, are referred for more in-depth evaluation and management in community-based specialized geriatric services. Our objective was to: 1) determine the compliance rate to outpatient evaluation following ED recommendation; and 2) identify barriers and facilitators to attendance. **Methods:** We conducted a prospective cohort study at two sites of an academic, tertiary level hospital ED between July and December 2016. We enrolled a convenience sample of ED patients, 65 years and older who were seen by a GEM nurse, referred to outpatient specialized geriatric services and consented to study participation. The GEM nurses conducted targeted geriatric assessments, identifying those who would benefit from further community management. We conducted a chart review and a structured telephone follow-up at 6 weeks. Descriptive statistics were used. **Results:** A total of 101 patients were prospectively enrolled, with 30.4% of eligible participants declining outpatient referral. Enrolled subjects had a mean age of 83.3 years, 58.4% female and 62.0% cognitively impaired. Reasons for referral to specialized geriatric services included: mobility (86.1%), cognition (57.4%), pain (38.6%), mood (34.7%), medication management (33.6%) and nutrition (30.7%). Outpatient referrals were to: geriatric day hospital (51.5%), geriatric outreach (22.7%), falls clinic (11.8%) and geriatric psychiatry (9.9%). Compliance with follow-up within 6 weeks was 64.4%. Barriers to attendance included: patient did not feel specialized geriatric services was needed (52.6%); admitted to hospital (10.5%); reported not called for appointment (15.8%); forgot appointment (5.3%) and transportation (5.3%). Family support with scheduling and transportation to

appointments, reported by 68.6%, was the most common enabler to compliance. **Conclusion:** Over one third of older ED patients referred by GEM for further specialized geriatric services are non-compliant with their community-based evaluation, while one in four older ED patients decline referral to these evaluations while in the ED. Future work should focus on interventions that promote increased referral acceptance and address barriers to attendance.
Keywords: geriatrics, elderly, out-patient referrals

LO78

Frailty Assessments of Older Canadians Using Emergency Health Services: The FOCUS Study

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Introduction: The Clinical Frailty Scale (CFS) has been validated internationally to predict adverse outcomes and mortality. Frailty assessments in the Emergency Departments (ED) are challenging to due to a lack of training and time. We studied the use of a tablet-based CFS that used graphics and short descriptors to assist choice of the 9 frailty categories. **Methods:** We conducted a prospective observational cohort study of people >65 years seen in the ED of 3 Canadian academic centers. We excluded critically ill patients, and those with significant visual impairment or inability to communicate in English or French. We compared agreement on the tablet-based CFS between 4 categories of assessors: Patients, ED Physicians, trained Research Assistance and Caregivers using the kappa statistic. **Results:** We enrolled 274/380 eligible patients who provided complete data (72.1%). Their average age was 75.8 years, and 48.9% were female. Their median MOCA score was 23/30 (IQR = 17-26) and their median OARS was 26/28 (IQR 22-28). Agreement between physicians and research assistants was good ($\kappa = 0.60$, 95% CI 0.50-0.70), as was physician-caregiver agreement and patient-caregiver agreement ($\kappa = 0.66$, 95% CI 0.40-0.93). Agreement between physicians and patients was only moderate ($\kappa = 0.47$, 95% CI 0.36-0.58). **Conclusion:** There was less agreement between physicians and patient self-assessments for the CFS compared to physicians-research assistant agreement and care-giver patient assessments of frailty. Future research should validate whether MD, patient, or caregiver rated CFS have higher predictive validity.
Keywords: frailty, emergency medicine, computer assisted assessments

LO79

Patient-centred outcomes with use of CT angiography in patients presenting with acute stroke and TIA: a systematic review and meta-analysis

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Introduction: It remains unclear whether widespread use of computed tomography angiography (CTA) in acute strokes and transient ischemic attacks (TIAs) has tangible benefits for patient outcomes or management. We conducted a systematic review and meta-analysis of observational studies and randomized controlled trials (RCTs) investigating the use of CTA and patient-important outcomes (recurrent stroke, mortality, disability, and emergency department (ED) revisits) or changes in management in patients presenting with acute stroke or TIA. PROSPERO: 349590 **Methods:** MEDLINE, EMBASE, and the Cochrane Registry were searched through May 24, 2016 for eligible trials. We included observational cohort studies and RCTs evaluating use of CTA against a control group for outcomes of interest in patients presenting acutely with suspected stroke or TIA. Two independent reviewers extracted data and assessed study quality using the Newcastle Ottawa Scale. Data for mortality and stroke rate were pooled by the generic inverse variance method and expressed as risk ratios (RRs) with 95% confidence intervals (95% CI). Data for disability were reported as the mean difference (MD) and 95% CI. Heterogeneity was assessed using the Cochran's Q statistic and quantified by the I^2 statistic. Overall strength of the evidence was assessed by the GRADE approach. **Results:** Three observational cohort studies involving 979 patients over an average of 1 year follow up met inclusion criteria; there were no eligible RCTs. CTA use in acute stroke or TIA patients was associated with a decreased mortality rate (RR = 0.55, 95% CI 0.33 to 0.91, P = 0.02; $P_{het} = 0.88$, $I^2 = 0\%$). No changes were detected in stroke rate (RR = 0.84, 95% CI 0.40 to 1.73, P = 0.63; $P_{het} = 0.79$, $I^2 = 0\%$). One study with data for disability showed no changes in mRS (MD = 0.01, 95% CI -0.70 to 0.73, P = 0.97). There were no eligible studies with data for ED revisits or changes in management. The strength of the evidence was assessed as very low quality due to imprecision for mortality, stroke rate, and disability. **Conclusion:** CTA use was associated with significantly reduced mortality in acute stroke and TIA patients, possibly due to confounding from poor baseline status of patients not receiving CTA. No significant changes were found for stroke rate or disability. There is a need for RCTs to confirm the effects of CTA use on patient outcomes and management.
Keywords: stroke, transient ischemic attack, computed tomography angiography

LO80

Chest radiograph ordering for acute asthma presentations to emergency departments in Alberta: regional, site, and physician level variation

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Introduction: Most acute asthma presentations to the emergency department (ED) are uncomplicated and do not require chest radiographs (CXR). Evidence suggests that the proportion of acute asthma patients receiving CXRs in the ED is high and varies substantially within and across sites and studies. This study explored CXR ordering and variation in acute asthma presentations to Alberta's EDs. **Methods:** Administrative health data for Alberta was obtained from the National Ambulatory Care Reporting System (NACRS) for all adult (>17 years) acute asthma (ICD-10-CA: J45) ED visits from 2011-2015. Patients with a primary or secondary diagnosis of asthma were included, provided they had a Canadian Triage and Acuity Scale score of 2-5. NACRS data were linked with Alberta Health Services' (AHS) diagnostic imaging database. Preliminary analysis on variation in imaging at the zone, ED site, and physician level was completed using SAS (v.9.4). Physicians who saw less than an average of 10 asthma patients per year were excluded. **Results:** Overall, 51,511 acute asthma ED presentations occurred (~10,000/year). The average proportion of CXRs among presentations was 39.5% (2011-2015) with an average annual increase of 6.7%. From 2011-2015, CXR ordering varied across the five AHS zones (variation [V]: 25%; range: 26.0%-51.0%). Substantial variation was observed across ED sites V: 60%; range: 5.9-66.4%) and physicians (V: 89%; range: 1.4-90.6%). The mean CXR ordering among physicians was 44%. **Conclusion:** From 2011-2015, CXR use among acute asthma ED presentations has increased. Substantial variation in CXR use suggests that evidence-based interventions are needed to improve imaging appropriateness.
Keywords: diagnostic imaging, asthma, emergency department

LO81

Optimizing the use of CT scanning for pulmonary embolism in the emergency department

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Introduction: Diagnosing pulmonary embolism (PE) can be challenging because the signs and symptoms are often non-specific. Studies have shown that evidence-based diagnostic algorithms are not always adhered to in the Emergency Department (ED), which leads to unnecessary CT scanning. In 2013, the American College of Chest Physicians identified CT pulmonary angiography as one of the top five avoidable tests. One solution is to use a clinical prediction rule combined with the D-dimer, which safely reduces the use of CT scanning. The objective of this study was to compare the proportion of patients tested for PE in two emergency departments, who 1) had a CT-PE and 2) whose diagnosis of PE was missed. We compared these rates to those if the Wells rule and D-dimer had been applied as standard. **Methods:** This was a retrospective chart review of ED patients investigated for PE at two hospitals from April 2013 to March 2015 (24 months). Inclusion criteria were the ED physician ordered CT-PE, Ventilation-Perfusion (VQ) scan or D-dimer for investigation of PE. Patients under the age of 18 were excluded. PE was defined as CT/VQ diagnosis of acute PE or acute PE/DVT in 30-day follow-up. Trained researchers extracted anonymized data. The rate of CT/VQ imaging and the false-negative rates were calculated. The false-negative rate was calculated as the number of patients diagnosed with PE within 30 days as a proportion of those patients who did not have a CT/VQ scan at initial presentation. **Results:** There were 1,189 patients included in this study. 55/1,189 patients (4.6%; 95%CI 3.6-6.0%) were ultimately diagnosed with PE within 30 days. 397/1,189 patients (33.4%; 95%CI 30.8-36.1%) had CT/VQ scans for PE. 3 out of 792 who were not scanned had a missed PE resulting in a false-negative rate of 0.4% (95% CI 0.1-1.1%). 80 patients had an elevated D-dimer or high Wells score but were not imaged. Furthermore, 75 patients who did not have an elevated D-dimer nor a high Wells score were imaged. Had Wells rule/D-dimer been adhered to, 402/1,189 patients (33.8%; 95%CI 31.9-36.6%) would have undergone imaging and the false negative rate would be 0/727, 0% (95%CI 0.0-0.5%). **Conclusion:** If the Wells rule and D-dimer was used in all patients tested for PE, a similar proportion would have a CT scan but fewer PEs would be missed.

Keywords: pulmonary embolism, D-dimer, diagnosis

LO82

The accuracy and prognostic value of point-of-care ultrasound for renal colic: a systematic review

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Introduction: Point-of-care ultrasound (POCUS) has been suggested as an initial investigation in the management of renal colic. Our objectives were: 1) to determine the accuracy of POCUS for the diagnosis of nephrolithiasis, and 2) to assess its prognostic value in the management of renal colic (PROSPERO: 42016035331). **Methods:** An electronic database search of MEDLINE, EMBASE, and PubMed was conducted utilizing subject headings, keywords, and synonyms that address our research question. Bibliographies of included studies and narrative reviews were manually examined. Studies of adult emergency department patients with renal colic symptoms were included. Any degree of hydronephrosis was considered a positive POCUS finding. Accepted criterion standards were CT evidence of renal stone or hydronephrosis, direct stone visualization, or surgical findings. Screening of abstracts, quality assessment with the QUADAS-2 instrument, and data extraction were performed by two reviewers, with discrepancies resolved by conference with a third reviewer.Test performance was assessed by pooled sensitivity and specificity, calculated likelihood ratios, and a summary receiver operator curve (SROC). The secondary outcome of prognostic value was reported as a narrative summary. **Results:** The electronic search yielded 627 unique titles. After relevance screening, 25 papers underwent full-text review, and 8 articles met all inclusion criteria. Of these, 5 high-quality studies (N = 1773) were included in the meta-analysis for diagnostic accuracy, and three yielded data on prognostic value. The pooled results for sensitivity and specificity were 70.2% (95% CI = 67.1% to 73.2%) and 75.4% (95% CI = 72.5% to 78.2%), respectively. The calculated positive and negative likelihood ratios were 2.85 and 0.39. The SROC generated did not show evidence of a threshold effect.Three studies examining prognostic value noted a higher likelihood of a large stone or surgical intervention with positive POCUS findings. The largest randomized trial showed lower cumulative radiation exposure and no increase in adverse events in those who received POCUS investigation as the initial renal colic investigation. **Conclusion:** Point-of-care ultrasound is of modest accuracy for the diagnosis of nephrolithiasis. While positive POCUS findings are associated with larger stones and greater likelihood for intervention, the clinical importance of this is unclear.

Keywords: point-of-care ultrasound, nephrolithiasis

LO83

Effectiveness of implementing evidence based interventions to reduce C-spine imaging in the emergency department: a systematic review

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Introduction: Unnecessary imaging of adult cervical spine (C-spine) injury patients in the Emergency Department (ED) is a concern. Guidance for C-spine image ordering exists; however, the effectiveness and safety of their implementation in the ED is not well studied. This review examines their implementation and effectiveness at reducing C-spine imaging in adults presenting to the ED with stable neck trauma. **Methods:** Six electronic databases and the grey literature were searched. Comparative studies examining interventions to reduce C-spine imaging were eligible for inclusion. Two independent reviewers screened for study eligibility, assessed study quality, and extracted data. Data were analyzed using RevMan (Version 5.3) to explore the effectiveness of these interventions in safely reducing C-Spine radiography. **Results:** A total of 848 unique citations were screened of which six before-after studies and one randomized controlled trial were included. The study population varied with respect to injury severity (i.e., stability status). None of the studies were assessed as high quality. The interventions employed included locally developed guidelines and clinical decision rules, specifically the National X-radiography Utilization Study (NEXUS) criteria and the Canadian C-Spine Rule (CCR). Various implementation strategies, such as teaching sessions, pocket reminder cards, posters and computerized decision support were used. Several studies used multi-faceted interventions. Overall, of the five study groups that examined change in x-ray ordering, three groups reported a significant reduction in c-spine radiography. The remaining two showed no change in imaging. A pooled estimate of the effectiveness of the interventions was prohibited by significant heterogeneity.

Conclusion: The evidence regarding the effectiveness of interventions to reduce C-spine imaging in adult ED patients with stable neck trauma is inconclusive. Given the national and international focus on improving appropriateness and reducing unnecessary imaging through campaigns such as Choosing Wisely®, additional interventional research in this field is warranted.
Keywords: diagnostic imaging, cervical spine, intervention

LO84

Computed tomography use for headache presentations to emergency departments in Alberta: regional, site and physician level variation

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Introduction: Headaches are a common emergency department (ED) presentation. Evidence demonstrates that computed tomography (CT) imaging varies significantly within and across sites. This study explored CT ordering and variation among headache presentations across Alberta EDs. **Methods:** Administrative health data for Alberta were obtained from the National Ambulatory Care Reporting System (NACRS) for all adult (>17 years) headache (ICD-10-CA: G44, G43, R51) ED visits from 2011-2015. Patients with a primary or secondary diagnosis code of headache were included. Exclusions were: sites without CT scanners, Canadian Triage and Acuity Scale score of 1, patients with trauma or external mechanism of injury (e.g., ICD-10-CA S,T,V,W,X,Y), or enhanced/contrast CTs. NACRS data were linked with Alberta Health Services' (AHS) diagnostic imaging data. Preliminary analysis on imaging variation at the zone, ED site, and physician level was completed using SAS (v.9.4). Physicians who saw less than an average of 10 headache patients per year were excluded. **Results:** Overall, 98,804 headache presentations were recorded (~20,000/year; 8.5% average annual increase) in 30 EDs. The average proportion of visits receiving CT was 25.1% with an average 6.2% increase per year. CT ordering varied across AHS zones (Variation [V]:23%; range:9.6-32.7%). Site ordering variation was more dramatic (V:45%; range:1.4-46.5%). The greatest variation was observed among physicians (V:84 %; range: 0.0-83.7%) with mean ordering proportion of 28.7%. **Conclusion:** From 2011-2015, headache presentations and CT imaging for these patients in the ED increased. Substantial variation in CT ordering exists at multiple levels in Alberta. Further exploration of CT appropriateness is urgently needed.
Keywords: diagnostic imaging, headache, emergency department

LO85

Substantial variation in CTPE ordering patterns and diagnostic yield in a large group of specialty-trained emergency physicians

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Introduction: Computerized tomography for pulmonary embolism (CTPE) has come under increased scrutiny with recommendations for evidence-based use found on Choosing Wisely lists in both Canada and the US. However practice variation in ordering patterns and diagnostic yield have not been well-reported for the Canadian context. Our objective was to investigate practice variation in CTPE ordering and rule-in rates within a large group of specialty-trained emergency physicians. **Methods:** We undertook an analysis of a computerized physician order entry database from four tertiary care EDs covering a 12-month period from August 1, 2016 to July 30, 2016 with 31 419 visits for potential pulmonary embolism (PE) as determined by a previously validated algorithm based on presenting complaints. CTPE utilization and diagnostic yield were determined for 149 physicians who ordered at least 10 studies over that time period. Outcomes of interest included CT utilization as determined by electronic order entry and a confirmed diagnosis of PE based on ICD-10 coding of the emergency visit. Descriptive statistics using medians, IQR and 95% confidence intervals are reported. This study is approved through REB14-0650 and is a component of a larger cluster RCT to improve CTPE utilization. **Results:** During the study period 2670 CTPE studies were ordered for potential PE patients representing 8.5% of the total with relevant complaints. We observed a 10-fold variation in CTPE ordering among physicians with rates as low as 2.7% and as high as 25%. The median rate of CTPE ordering for potential PE was 8.8% with an IQR of 6.0% to 11.7%. A total of 4146 CTPE studies were ordered during the study period with physicians ordering an average of 28 CTPE studies each; range 10-90. In terms of diagnostic yield, 591/4146 studies, or 14.3% (95% CI 13.2-15.3%) were associated with a diagnosis of PE. Diagnostic yield per physician ranged from 0 to 50%, with a median of 13.5% and an IQR of 7.6% to 21.4%. **Conclusion:** In this large, robust administrative dataset from four Canadian urban EDs, threshold for CTPE ordering varies widely among physicians as does diagnostic yield. Efforts to improve appropriate utilization are justified with an eye to reducing unnecessary radiation, costs and incidental findings.
Keywords: computerized tomography, Choosing Wisely, pulmonary embolism

LO86

Overutilization of computed tomography as a first-line investigation for patients presenting with suspected recurrent nephrolithiasis in the emergency department: a retrospective cohort study

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Introduction: Computed tomography (CT) has increasingly been used as a standard initial investigation for patients presenting to the Emergency Department (ED) with suspected nephrolithiasis. Compared to ultrasound, CT has increased system-level costs, ionizing radiation exposure and frequently does not alter management. For these reasons, Choosing Wisely (CW) recommends avoiding CT imaging of otherwise healthy patients younger than age 50 years presenting with symptoms of uncomplicated renal colic that have a known history of nephrolithiasis or ureterolithiasis. We aimed to evaluate the degree of utilization of CT imaging for this subgroup of patients in a tertiary care centre ED. **Methods:** A retrospective chart review was performed for all patients younger than 50 years who visited Sunnybrook Health Sciences Centre ED for six months between December 2015 and May 2016 with renal colic symptoms and a history of nephrolithiasis. Demographic data, relevant past medical history, clinical presentation, lab values, urology consultation, ED treatments administered, diagnostic imaging orders and dispositions were recorded for each eligible patient. **Results:** Out of 130 reviewed patient charts, 73 patients were identified with a previous history of nephrolithiasis and a presentation consistent with uncomplicated renal colic. 54 patients received ultrasound, KUB x-ray, or no imaging. The other 19 (26.0%) of these patients received an abdominal/pelvic CT with an indication of looking for renal or ureteral stones. Of the patients that received CT, none demonstrated significant findings warranting hospital admission or leading to identifiable changes in ED management. Five (26.3%) of these 19 patients had received a total of three to four CTs for renal colic during past Sunnybrook ED visits, while one had previously received 13 CTs. **Conclusion:** CT scans are often used as an initial diagnostic modality for suspected renal colic

despite a Choosing Wisely recommendation to restrict the use of CT scans in a target population and infrequent changes in management after obtaining a CT. These findings highlight the need for quality improvement strategies to decrease CT utilization in this patient population with suspected renal colic.
Keywords: renal colic, Choosing Wisely, computed tomography

LO87

Use of a clinical prediction rule would lead to more effective CTA utilization for urgent brain imaging of suspected TIA/mild stroke in the emergency department

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Introduction: Canadian stroke best practice guidelines recommend patients suspected of Acute Cerebrovascular Syndrome (ACVS) receive urgent brain imaging, preferably CTA. Yet, high requisition rates for non-ACVS patients overburdens limited radiological resources. We hypothesize that our clinical prediction rule (CPR) previously developed for diagnosis of ACVS in the emergency department (ED), and which incorporates Canadian guidelines, could improve CTA utilization. **Methods:** Our data consists of records for 1978 ED-referred patients to our TIA clinic in Victoria, BC from 2015-2016. Clinic referral forms captured all data needed for the CPR. For patients who received CTA, orders were placed in the ED or at the TIA clinic upon arrival. We use McNemar's test to compare the sensitivity (sens) and specificity (spec) of our CPR vs. the baseline CTA orders for identifying ACVS. **Results:** Our sample (49.5% male, 60.6% ACVS) has a mean age of 70.9 ± 13.6 yrs. Clinicians ordered 1190 CTAs (baseline) for these patients (60%). Where CTA was ordered, 65% of patients (n = 768) were diagnosed as ACVS. To evaluate our CPR, predicted probabilities of ACVS were computed using the ED referral data. Those patients with probabilities greater than the decision threshold and presenting with at least one focal neurological deficit clinically symptomatic of ACVS were flagged as *would have received a CTA*. Our CPR would have ordered 1208 CTAs (vs. 1190 baseline). Where CTA would have been ordered, 74% of patients (n = 893) had an ACVS diagnosis. This is a significantly improved performance over baseline (sens 74.5% vs. 64.1%, $p < 0.001$; spec 59.6% vs. 45.9%, $p < 0.001$). Specifically, the CPR would have ordered an additional 18 CTAs over the 2-yr period, while simultaneously increasing the number of imaged-ACVS patients by 125 with imaging 107 fewer non-ACVS patients. **Conclusion:** Using ED physician referral data, our CPR demonstrates significantly higher sensitivity and specificity for CTA imaging of ACVS patients than baseline CTA utilization. Moreover, our CPR would assist ED physicians to apply and practice the Canadian stroke best practice guidelines. ED physician use of our CPR would increase the number of ACVS patients receiving CTA imaging before ED discharge (rather than later at TIA clinics), and ultimately reduce the burden of false-positives on radiological departments.
Keywords: transient ischemic attack, computed tomography angiography, decision support

LO88

Bedside sonography performed by emergency physicians to detect acute appendicitis in the pediatric emergency department

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Introduction: Previous studies have suggested that emergency physicians (EP) highly experienced in point-of-care ultrasound (POCUS) have similar performance to formal ultrasound to identify appendicitis in children. The aim of this study was to evaluate the ability of EP with various levels of POCUS experience to detect appendicitis with POCUS among children visiting a pediatric ED. **Methods:** A prospective cohort study was conducted in an urban, tertiary care pediatric ED. Children aged 2 to 18 years old who presented to the ED with acute abdominal pain suggesting appendicitis were included. Patients were excluded if they had a history of appendectomy, hemodynamic instability requiring resuscitation, or were transferred with proven diagnosis of appendicitis. Participating EP had various levels of POCUS experience. Four of the 22 physicians were experienced in bowel sonography (EDU 2 level and higher) while the others were inexperienced in bowel sonography (EDU 1). All the participants received a 1-hour didactical and practical training session on appendix ultrasound. The treating physician performed all POCUS following initial physical exam, before further radiological evaluation. Final outcomes were determined by pathology and/or operative reports for surgical cases, and telephone follow-up at 3 weeks for those who did not have surgery. The primary analysis was a simple proportion for sensitivity and specificity for POCUS. Expecting a sensitivity of 80% based on previous studies, we calculated that a sample size of 50 cases would provide a 95%CI ranging from 66 to 90%. **Results:** We approached 140 patients, of which 121 accepted to participate and were recruited. After excluding 4 patients for missing POCUS data, 117 patients were included in the primary analysis, of which 51 (44%) had appendicitis. Twenty-two EP performed between 1 and 20 POCUS. The POCUS identified 27 out of 51 appendicitis for a sensitivity of 0.53 (95%CI 0.40-0.66). A negative POCUS was reported for 54 out of 66 patients without appendicitis (specificity of 0.82; 95% CI 0.71-0.89). **Conclusion:** This study shows limited sensitivity and specificity of POCUS when performed by EP with various level of experience for appendicitis in children. While showing lower sensitivity and specificity than previous studies, the inclusion of a large number of physicians solidifies the external validity of our conclusion.
Keywords: point-of-care ultrasound (POCUS), appendicitis, pediatrics

LO89

Factors associated with delay in trauma team activation and impact on patient outcomes

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Introduction: Trauma code activation is initiated by emergency physicians using physiologic and anatomic criteria, mechanism of injury and patient demographic factors in conjunction with data obtained from emergency medical service personnel. This enables rapid definitive treatment of trauma patients. Our objective was to identify factors associated with delayed trauma team activation. **Methods:** We conducted a health records review to supplement data from a regional trauma center database. We assessed consecutive cases from the trauma database from January 2008 to March 2014 including all cases in which a trauma code was activated by an emergency physician. We defined a delay in trauma code activation as a time greater than 30 minutes from time to arrival to trauma team activation. Data were collected in Microsoft Excel and analyzed in Statistical Analysis System (SAS). We conducted univariate analysis for factors potentially influencing trauma team activation and we subsequently used multiple logistic regression analysis models for delayed activation in relation to mortality, length of stay and time to operative management. **Results:** 1020 patients were screened from which 174 patients were excluded, as they were seen directly by the trauma team. 846 patients were included for

our analysis. 4.1% (35/846) of trauma codes were activated after 30 minutes. Mean age was 40.8 years in the early group versus 49.2 in the delayed group p = 0.01. There was no significant difference in type of injury, injury severity or time from injury between the two groups. Patients were over 70 years in 7.6% in the early activation group vs 17.1% in the delayed group (p = 0.04). 77.7% of the early group were male vs 71.4% in the delayed group (p = 0.39). There was no significant difference in mortality (15.2% vs 11.4% p = 0.10), median length of stay (10 days in both groups p = 0.94) or median time to operative management (331 minutes vs 277 minutes p = 0.52). **Conclusion:** Delayed activation is linked with increasing age with no clear link with increased mortality. Given the severe injuries in the delayed cohort which required activation of the trauma team further emphasis on the older trauma patient and interventions to recognize this vulnerable population should be made. When assessing elderly trauma patients emergency physicians should have a low threshold to activate trauma teams.

Keywords: trauma team activation, triage

LO90

Trauma triage accuracy at a Canadian trauma centre

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Introduction: Trauma teams have been shown to improve outcomes in severely injured patients. The criteria used to mobilize trauma teams is highly variable and debated. This study was undertaken to define the triage accuracy at our level 1 trauma centre and identify the criteria predictive of appropriate activations. **Methods:** A 3-month prospective observational study was performed and all patients presenting to the ER who received a trauma flag were identified. Patient demographics, vital signs, trauma team activation and criteria for activation were documented. Trauma activations were deemed appropriate if the patient met any of the following; airway intervention, needle/tube thoracostomy, resuscitative thoracotomy, ED blood product transfusion, invasive hemodynamic monitoring, central line insertion, emergent OR (<8 hours), admission to ICU, and death within 72 hours. Over and undertriage rates were calculated and a multivariate logistic regression was performed to identify activation criteria predictive of appropraite activations. The activation criteria were then modified and the prospective study was repeated to assess the impact on triage accuracy. **Results:** Between September to December 2015, 188 patients received a trauma flag. 137 patients met the activation criteria, however only 78 received a trauma team activation. 57% of patients who had TTA met the definition of appropriate activation, while 45% who met criteria for activation met the definition of appropriate. The rates of under and overtriage were 30.4% and 30.3%, respectively. Logistic regression revealed the following criteria to be predictive of appropriate activation; hypotension (OR 10.2 95% CI 2.3,45.5), arrival by HEMS (OR 3.2, 95% CI 1.4,7.6), pedestrian struck (OR 3.5, 95% CI 1.4,8.5) and fall (OR 5.1, 95% CI 1.7, 15.1). Tachycardia (OR 1.1, 95% 0.3,4.6) and high energy MVC (OR 1.4, 95% CI 0.7,3.1) were not found to be predictive. The post-modification study occured between September to December 2016. Data analysis to assess the impact of criteria alteration are currently underway and will be presented at CAEP 2017. **Conclusion:** Triage accuracy for the mobilization of a multi-disciplinary trauma team is important, both to ensure optimal patient care as well as to reduce unnecessary resource strain. Our previous criteria lead to high rates of undertriage and subsequent modifications have been made. The impact of these changes will be ascertained and presented at CAEP 2017.

Keywords: trauma team, triage, activation criteria

LO91

Repeat exposures to culprit drugs contribute to adverse drug events in emergency department patients

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Introduction: Adverse drug events (ADEs), unintended and harmful events associated with medications, cause or contribute to 2 million annual emergency department (ED) visits in Canada. Australian data indicate that 27% of ADEs requiring admission are events caused by re-exposure to drugs that previously caused harm. Our **objective** was to estimate the frequency of repeat ADEs. **Methods:** We reviewed the charts of ADE patients who had been enrolled in 1 of 3 prospective studies conducted in 2 tertiary care and 1 urban community ED. In the parent studies, researchers enrolled patients by applying a systematic selection algorithm to minimize selection bias, and physicians and pharmacists evaluated patients prospectively to evaluate the causal association between the drug regimens and patient presentations. After completion of the parent studies, a research pharmacist and a physician independently reviewed the charts of ADE patients, abstracted data using electronic forms, and searched that hospital's records for previously recorded ADEs. The main outcome was a repeat ADE, defined as a same or same-class drug re-exposure, or repeat inappropriate drug withdrawal, causing a same or similar presentation as a prior ADE. Sample size was based on enrolment into the parent studies. **Results:** We reviewed the charts of 614 ED patients diagnosed with 655 ADEs. Of these, 20% (133/665, 95%CI 17.0-23.0%) were repeat events. Most repeat ADEs were moderate (61%) or severe (32%) in nature, and 33% (95%CI 25.1-41.1%) required hospital admission. The most commonly implicated drugs were warfarin (10%), hydrochlorothiazide (4%) and insulin (4%), and the most commonly implicated drug classes were antithrombotics (17%), psychotropics (12%) and analgesics (9%). Repeat ADEs commonly required clinical monitoring (59%), additional medications to treat the ADE (50%) and follow-up lab testing (35%). Overall, 61% (95%CI 51.3-70.7%) of culprit drug re-exposures were deemed potentially or definitely inappropriate. **Conclusion:** Inappropriate re-exposures to previously harmful medications cause a substantial number of recurrent ADEs, and may represent an ideal target for prevention. We were unable to search for repeat ADEs in the records of other hospitals that our patients may have visited, and could not detect ADEs that were not documented in the medical record. As a result, we likely underestimated the frequency of repeat ADEs.

Keywords: adverse drug events, patient safety, health services

LO92

Factors contributing to the development of adverse drug events treated in emergency departments

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Introduction: Adverse drug events (ADEs), unintended and harmful events associated with medications, commonly cause or contribute to emergency department (ED) presentations. Understanding provider, patient and system factors that contribute to their development may assist in developing effective preventative strategies. Our **objective** was to identify factors that contributed to the development of ADEs that caused ED presentations. **Methods:** We reviewed the charts of ADE patients enrolled in 1 of 3 prospective studies conducted in 3 tertiary care and 1 urban community ED. In the parent studies, researchers

enrolled patients by applying a systematic selection algorithm to minimize selection bias, and physicians and pharmacists evaluated patients prospectively to evaluate the causal associations between the drug regimens and patient presentations. Subsequently, a research pharmacist and physician independently reviewed the charts of ADE patients from these cohorts, abstracting data using electronic forms. Reviewers recorded patient, provider and system factors that contributed to the development of ADEs. The main outcome was the presence of at least one contributing factor in the development of an ADE. We used descriptive statistics with appropriate measures of variance. The sample size was determined by enrolment into the primary studies. **Results:** We reviewed the charts of 670 patients diagnosed with 725 ADEs. We identified ≥1 contributing factors in 62% (95%CI 58-65%) of ADEs. Multiple contributing factors were present in 17% of ADEs (95%CI 13-20%). The most common contributing factors were inadequate patient counseling or instructions about medication use (15%), insufficient laboratory monitoring or follow-up of monitoring tests (12%), lack of staff education (7%), lack of provider adherence with recommended treatment guidelines (7%), and delayed or inadequate clinical reassessment after a medication change (6%). Provider errors in drug administration contributed to 0.3% of ADEs (95%CI 0.0-0.7). **Conclusion:** Contributing factors were identified for most ADEs. They were often related to inadequate counseling and follow-up, and were rarely the result of errors. Further research is required to understand how communication of medication instructions can be improved. Investments in technologies to reduce provider errors may not significantly reduce the numbers of ADE patients presenting to EDs.

Keywords: adverse drug event, patient safety, prevention

LO93

Prognostic value of S-100B protein for prediction of post-concussion symptoms following a mild traumatic brain injury: systematic review and meta-analysis

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Introduction: Mild traumatic brain injury (mTBI) is a major cause of morbidity but there are no validated tools to help clinicians predict post-concussion symptoms. This systematic review and meta-analysis aimed to determine the prognostic value of S-100B protein to predict post-concussion symptoms following a mTBI in adults. **Methods:** The protocol of this systematic review was registered with the PROSPERO database (CRD42016032578). A search strategy was performed on seven databases (CINAHL, Cochrane CENTRAL, EMBASE, MEDLINE, Web of Knowledge, PyscBITE, PsycINFO) from their inception to October 2016. Studies evaluating the association between S-100B protein level and post-concussion symptoms assessed at least seven days after the mTBI were eligible. Individual patient data were requested. Studies eligibility assessment, data extraction and risk of bias assessment were performed independently by two researchers. Analyses were done following the *meta-analysis using individual participant data or summary aggregate data guidelines* from the Cochrane Methodology Review Group. **Results:** Outcomes were dichotomised as persistent (≥3 months) or early (≥7 days <3 months). Our search strategy yielded 23,298 citations of which 29 studies presenting between seven and 223 patients (n = 2505) were included. Post-concussion syndrome (PCS) (16 studies), neuropsychological symptoms (9 studies) and health-related quality of life (4 studies) were the most frequently presented outcomes. The S-100B protein serum level of patients with no PCS was similar to that of patients experiencing persistent PCS (mean difference 0.00 [-0.05, 0.04]) or early PCS (mean difference 0.03 [-0.02, 0.08]). The odds of having persistent PCS (OR 0.56 (95% CI: 0.29-1.10) or early PCS (OR 1.67 (95% CI: 0.98-2.85) in patients with an elevated S-100B protein serum level was not significantly different from that of patients with normal values. No meta-analysis was performed for other outcomes than PCS due to heterogeneity and small samples. Studies' overall risk of bias was considered moderate. **Conclusion:** Results suggest that the prognostic value of S-100B protein serum level to predict persistent and early post-concussion symptoms is limited. Variability in injury to S-100B protein sample time and outcomes assessed could potentially explain the lack of association and needs further evaluation.

Keywords: traumatic brain injury, post-concussion symptom, meta-analysis

LO94

Prognostic value of neuron-specific enolase (NSE) for prediction of post-concussion symptoms following a mild traumatic brain injury: a systematic review

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Introduction: Mild traumatic brain injury (mTBI) is an understudied worldwide health problem and a socio-economic burden that remains a major cause of morbidity. However, there is no prognostication tool to help clinicians predict the occurrence of post-concussion symptoms. This systematic review aimed to determine the prognostic value of neuron-specific enolase (NSE) to predict post-concussion symptoms following a mTBI in adults. **Methods:** The protocol of this systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO) database (registration number CRD42016033683). Seven databases (CINAHL, Cochrane CENTRAL, EMBASE, MEDLINE, PsycBITE, PsycINFO, Web of Knowledge/Biosis) were searched for cohort studies evaluating the association between NSE levels and post-concussion symptoms assessed at least seven days after the mild TBI. Grey literature was also screened using databases on dissertations and theses as well as abstracts from relevant congresses. Two researchers independently screened studies for inclusion, extracted data, and appraised their quality using the Quality in Prognostic Studies (QUIPS) tool from the Cochrane Collaboration Group. **Results:** Our search strategy yielded a total of 23,298 citations from which eight cohorts presented in 10 studies were included. Studies included between 45 and 141 patients (total = 608 patients). The most frequently assessed outcomes were post-concussion syndrome (PCS) (13 assessments), neuropsychological disorders (10 assessments), return to work or sick leave (2 assessments) and Glasgow Outcome Scale (GOS) (2 assessments). No association was found between an elevated NSE serum level and the occurrence of PCS. Of the 33 outcomes assessments performed, only three showed an association between a higher level of serum NSE and a post-concussion symptom (alteration of at least three cognitive domains at 2 weeks, standardised physician assessment at 6 weeks and headache at 6 months following a mild TBI). Included studies' overall risk of bias was considered moderate. **Conclusion:** Results of this systematic review conclude that based on current levels of evidence, serum NSE levels alone do not provide prognostic information on persistent or early post-concussion symptoms after a mTBI.

Keywords: traumatic brain injury, post-concussion symptom, systematic review

LO95

A prospective evaluation of mild traumatic brain injuries in a working population in Edmonton, AB

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Introduction: Patients with mild traumatic brain injury (mTBI) frequently present to the emergency department (ED); however, wide variation in diagnosis and management has been demonstrated in this setting. Sub-optimal mTBI management can contribute to post-concussion syndrome (PCS), affecting vocational outcomes like return to work. This study documented the work-related events, ED management, discharge advice, and outcomes for employed patients presenting to the ED with mTBI. **Methods:** Adult (>17 years) patients presenting to one of three urban EDs in Edmonton, Alberta with Glasgow coma scale score ≥13 within 72 hours of a concussive event were recruited by on-site research assistants. Follow-up calls ascertained outcomes, including symptoms and their severity, advice received in the ED, and adherence to discharge instructions, at 30 and 90 days after ED discharge. Dichotomous variables were analyzed using chi-square testing; continuous variables were compared using t-tests or Mann-Whitney tests, as appropriate. Work-related injury and return to work outcomes were modelled using logistic or linear regression, as appropriate. **Results:** Overall, 250 patents were enrolled; 172 (69%) were employed at the time of their injury and completed at least one follow-up. The median age was 37 years (interquartile range [IQR]: 24, 49.5), both sexes were equally represented (48% male), and work-related concussions were uncommon (16%). Work-related concussion was related to manual labor jobs and self-reported history of attention deficit disorder. Patients often received advice to avoid sports (81%) and/or work (71%); however, the duration of recommended time off varied. Most employed patients (80%) missed at least one day of work (median = 7 days; IQR: 3, 14); 91% of employees returned to work by 90 days, despite 41% reporting persistent symptoms. Increased days of missed work were linked to divorce, history of sleep disorder, and physician's advice to avoid work. **Conclusion:** While work-related concussions are uncommon, most employees who sustain a mTBI at any time miss some work. Many patients experience mTBI symptoms past 90 days, which has serious implications for workers' abilities to fulfill their work duties and risk of subsequent injury. Workers, employers, and the workers compensation system should take the necessary precautions to ensure that workers return to work safely and successfully following a concussion.

Keywords: occupational injury, mild traumatic brain injury

LO96

Syncope prognosis based on emergency department diagnosis: a prospective cohort study

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Introduction: Relatively little is known about outcomes after disposition among syncope patients assigned various diagnostic categories during emergency department (ED) evaluation. We sought to measure the 30-day serious outcomes among 4 diagnostic groups (vasovagal, orthostatic hypotension, cardiac, other/unknown) within 30 days of the index ED visit. **Methods:** We prospectively enrolled adult syncope patients at six EDs and excluded patients with pre-syncope, persistent mental status changes, intoxication, seizure, and major trauma. Patient characteristics, ED management, diagnostic impression (vasovagal, orthostatic, cardiac, or other/unknown) at the end of the ED visit and physicians' confidence in assigning the etiology were collected. Serious outcomes at 30-days included: death, arrhythmia, myocardial infarction, structural heart disease, pulmonary embolism, and hemorrhage. **Results:** 5,010 patients (mean age 53.4 years; 54.8% females) were enrolled; 3.5% suffered serious outcomes: deaths (0.3%), arrhythmias (1.8%), non-arrhythmic cardiac (0.5%) and non-cardiac (0.9%). The cause of syncope was determined as vasovagal among 53.3% and cardiac in 5.4% of patients. The proportion of patients with ED investigations ($p < 0.001$) and short-term serious outcomes increased ($p < 0.01$) increased in each diagnostic category in the following order: vasovagal, orthostatic hypotension, other/unknown cause and cardiac. No deaths occurred in patients with vasovagal syncope. A higher proportion of all serious outcomes occurred among patients suspected of cardiac syncope in the ED ($p < 0.01$). Confidence was highest among physicians for a vasovagal syncope diagnosis and lowest when the cause was other/unknown. **Conclusion:** Short-term serious outcomes strongly correlated with the etiology assigned in the ED visit. The physician's clinical judgment should be incorporated in risk-stratification for prognostication and safe management of ED syncope patients.

Keywords: syncope, prognosis

LO97

Validation of the HEART score in Canadian emergency department chest pain patients using a high-sensitivity troponin T assay

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Introduction: The HEART score is a validated tool created to risk stratify emergency department (ED) chest pain patients using 5 simple criteria (History, ECG findings, Age, Risk factors, and Troponin). Several studies have demonstrated the superiority of HEART over other well known risk stratification tools in identifying low risk chest pain patients suitable for early discharge. All but one of these studies used conventional troponin assays, and most were conducted in European populations. This study aims to validate the HEART score using a high-sensitivity troponin T assay in a Canadian population. **Methods:** This prospective cohort study was conducted at a single urban tertiary centre and regional percutaneous coronary intervention site in Calgary, Alberta. Patients were eligible for enrolment if they presented to the ED with chest pain, were age 25-years or older and required biomarker testing to rule out AMI at the discretion of the attending emergency physician. Patients were excluded if they had clear acute ischemic ECG changes, new arrhythmia or renal failure requiring hemodialysis. Clinical data were recorded by the emergency physician at the time of enrolment and outcomes were obtained from administrative data. High-sensitivity troponin-T (Roche Elecsys hs-cTnT) results were obtained in all patients at presentation. The primary outcome was AMI within 30-days of ED visit, the secondary outcome was 30-day major adverse cardiac events (MACE). **Results:** A total of 984 ED patients with complete HEART scores were enrolled from August 2014 to September 2016. The 30-day incidence of AMI and MACE in the overall population was 3.3% and 20.6%, respectively. HEART scores were predictive of 30-day AMI incidence: low risk (0-3): 0.77% (95%CI 0.0-1.5%), moderate risk (4-6): 4.3% (95%CI 2.3-6.2%) and high risk (7-10): 12.2% (95%CI 5.5-19.0%). HEART scores also predicted 30-day MACE: low risk (0-3): 5.0% (95% CI 3.1-6.9%), moderate risk (4-6): 31.8% (95%CI 27.2-36.4%) and high-risk (7-10): 61.4% (95%CI 51.2-71.5%). More than half of patients, 522 (53.0%) could be identified as low risk based on the HEART score

using a single troponin result. **Conclusion:** Using a single high-sensitivity troponin result collected at ED presentation, the HEART score can rapidly and effectively identify more than half of ED chest pain patients as low risk for 30-day AMI, but is less sensitive for 30-day MACE.
Keywords: troponin, chest pain, myocardial infarction

LO98

Optimal length of observation for emergency department patients with syncope: a time to event analysis

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Introduction: Concern for occult serious conditions leads to variations in ED syncope management [hospitalization, duration of ED/inpatient monitoring including Syncope Observation Units (SOU) for prolonged monitoring]. We sought to develop evidence-based recommendations for duration of ED/post-ED ECG monitoring using the Canadian Syncope Risk Score (CSRS) by assessing the time to serious adverse event (SAE) occurrence. **Methods:** We enrolled adults with syncope at 6 EDs and collected demographics, time of syncope and ED arrival, CSRS predictors and time of SAE. We stratified patients as per the CSRS (low, medium and high risk as ≤0, 1-3 and ≥4 respectively). 30-day adjudicated SAEs included death, myocardial infarction, arrhythmia, structural heart disease, pulmonary embolism or serious hemorrhage. We categorized arrhythmias, interventions for arrhythmias and death from unknown cause as arrhythmic SAE and the rest as non-arrhythmic SAE. We performed Kaplan-Meier analysis using time of ED registration for primary and time of syncope for secondary analyses. **Results:** 5,372 patients (mean age 54.3 years, 54% females, and 13.7% hospitalized) were enrolled with 538 (10%) patients suffering SAE (0.3% died due to an unknown cause and 0.5% suffered ventricular arrhythmia). 64.8% of SAEs occurred within 6 hours of ED arrival. The probability for any SAE or arrhythmia was highest within 2-hours of ED arrival for low-risk patients (0.65% and 0.31%; dropped to 0.54% and 0.06% after 2-hours) and within 6-hours for the medium and high-risk patients (any SAE 6.9% and 17.4%; arrhythmia 6.5% and 18.9% respectively) which also dropped after 6-hours (any SAE 0.99% and 2.92%; arrhythmia 0.78% and 3.07% respectively). For any CSRS threshold, the risk of arrhythmia was highest within the first 15-days (for CSRS ≥2 patients 15.6% vs. 0.006%). ED monitoring for 2-hours (low-risk) and 6-hours (medium and high-risk) and using a CSRS ≥2 cut-off for outpatient 15-day ECG monitoring will lead to 52% increase in arrhythmia detection. The majority (82.2%) arrived to the ED within 2-hours (median time 1.1 hours) and secondary analysis yielded similar results. **Conclusion:** Our study found 2 and 6 hours of ED monitoring for low-risk and medium/high-risk CSRS patients respectively, with 15-day outpatient ECG monitoring for CSRS ≥2 patients will improve arrhythmia detection without the need for hospitalization or observation units.
Keywords: syncope, risk stratification, electrocardiographic monitoring

Grizzly Den Presentations

GD01

Age-adjusted D-dimer and two-site compression point-of-care ultrasonography to rule out acute deep vein thrombosis

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Introduction: Undiagnosed deep vein thrombosis (DVT) can lead to significant morbidity and mortality, including death from DVT-associated massive pulmonary embolism (PE). While several validated clinical prediction rules, blood test and imaging modalities exist to investigate a potential DVT, there is currently a lack of rapid, accessible and reliable methods to exclude the possibility of DVT without resorting to formal venous duplex scanning. Currently, the use in the ED of a validated clinical prediction rule combined to either a high-sensitivity D-dimer test or ultrasonography of the lower extremities has a poor predictive value, as 75-90% of patients suspected of DVT have a negative formal venous duplex scan. Compression bedside ultrasound has however recently been shown to be a safe, rapid and accurate method for the diagnosis of proximal DVT in the emergency department with a high sensitivity and specificity (combined sensitivity and specificity of 96.1% and 96.8%, respectively[1]). **Research question:** In the present study, we will primarily assess whether two-site compression POCUS combined with a negative age-adjusted D-dimer test can accurately rule out DVT in ED patients regardless of the Wells criteria. **Methods:** This is a single-center, prospective, observational study carried out over one year in the Emergency Department of the Jewish General Hospital in Montreal, Quebec. We aim to enroll a convenience sample of 475 patients aged 18 years and older presenting to the ED with symptoms suggestive of a DVT. All enrolled patients will receive the standard of care required for a lower leg DVT presentation. After calculating Patients DVT risk using modified wells criteria, all patients will undergo POCUS for DVT followed by a D-dimer test. Based on their results, patients will either undergo formal duplex scanning, or will be discharged without further testing and receive a three-month phone follow-up. A true negative lower leg DVT will be defined as follows: (1) Negative follow-up phone questionnaire for patients who were sent home with no formal duplex venous scanning. (2) Negative formal duplex venous scanning for patients who were deemed likely to have lower leg DVT using the Wells score, with a negative D-dimer and POCUS. Age adjusted DVT was added to account for below knee DVT and avoid the need for patients to return for fellow up duplex study in 1 week. To estimate our technique's sensitivity with a 4% margin of error with 95% confidence intervals, 92 confirmed DVT patients are needed. We expect to recruit a total 475 patients within one-year period at the JGH (95 DVT-positive patients and 380 DVT-negative patients). **Impact:** The use of compression bedside ultrasound with a negative age-adjusted D-dimer test to rule out DVT in the ED may accelerate the decision regarding patient disposition and significantly decrease the length of patient stay in the ED. In addition, it may help avoid unnecessary medical interventions and diagnostic tests, thus representing potential quality of care and cost-saving improvements as well.

[1]Pomero F, Dentali F, Borretta V, et al. Accuracy of emergency physician-performed ultrasonography in the diagnosis of deep-vein thrombosis: a systematic review and meta-analysis. Thromb Haemost 2013;109:137–45.

GD02

An international consensus study to identify quality indicators for ambulatory emergency care

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Introduction: Redirecting low acuity patients from emergency departments to primary care walk-in clinics has been identified as a priority by many health authorities. Promoting family physicians for the

management of ambulatory patients with urgent health concerns reflects the assumption that primary care facilities can offer high-quality and more affordable ambulatory emergency care. However, no performance assessment framework has been developed for ambulatory emergency care and consequently, quality of care provided in these alternate settings has never been formally compared. **Primary objective:** To identify structure, process and outcome indicators for ambulatory emergency care. **Methods:** We will identify and develop quality indicators (QIs) for ambulatory emergency care using a RAND/UCLA Appropriateness Method (RAM) composed of three different steps. First, we will perform a scoping literature review to inventory 1) all previously recommended QIs assessing care provided to ambulatory emergency patients in the ED or the primary care settings; 2) all conditions evaluated with the retrieved QIs; and 3) all outcomes measured by the same QIs. Second, a steering committee composed of the research team and of international experts in performance assessment in emergency and primary care will be presented with the lists of QI-related conditions and outcomes. They will be asked to identify potential outcome indicators for ambulatory emergency care by generating any relevant combinations of one condition and one outcome (e.g. acute asthma exacerbation/re-consultation). Committee members will be given the latitude to use and pair any conditions or outcomes not included in the lists as long as they think the resulting indicators are compatible with the study objectives. Using a structured nominal group approach, they will combine their suggestions and refine the list of potential QIs. This list of potential outcome indicators composed of pairs "condition/outcome" will be merged with the list of already published QIs identified during the literature review. Third, as per the RAM standards, we will assemble an international multidisciplinary panel (n = 20) of patients, emergency and primary care providers, researchers and decision makers, after recommendations from international emergency and primary care associations, and from the Canadian Strategy for Patient-Oriented Research (SPOR) Support Units. Through iterative rounds of ratings using both web-based survey tools and videoconferencing, panelists will independently assess all candidate QIs. They will be asked to rate on a nine-level scale to what extent each QI is a relevant and useful measure of ambulatory emergency care quality. From one round to the next, QIs with a median panelist rating score of one to three will be excluded. Those with a median score of seven or more will be automatically included in the final list. QIs with median score of four to six will be retained for future deliberations among the panelists. Rounds of ratings will be conducted until all QIs are classified. Impact: The QIs identified will be used to develop a performance assessment framework for ambulatory emergency care. This will represent an essential step toward testing the assumption that EDs and primary care walk-in clinics provide equivalent care quality to low acuity patients.

GD03

Hyoscine butylbromide (Buscopan) versus acetaminophen for non-surgical abdominal pain in children: a randomized controlled superiority trial

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Background: Children with abdominal pain in the emergency department (ED) are at particular risk of suboptimal analgesia due to fears of missing appendicitis and absent guidelines. Many still experience pain at discharge. Acetaminophen is the most commonly used analgesic and efficacy of hyoscine butylbromide (HBB) is supported by adult evidence. However, no evidence exists for either agent in children with abdominal pain. **Objective:** To determine if HBB is superior to acetaminophen for abdominal pain in children. **Methods:** We will consecutively recruit children 8-17 years presenting to the ED with presumed non-surgical abdominal pain rated >4/10 on the Faces Pain Scale – Revised (FPS-R) and described as colicky, excluding:-Suspected appendicitis or bowel obstruction-Anticholinergic, analgesic, or antispasmodic <12 hours-Peritoneal inflammation-Unable to swallow pills-Hypersensitivity to either intervention-Medically unstable-Previous bowel obstruction, abdominal surgery, myasthenia gravis, liver disease, glaucoma, or recent abdominal trauma (<48 hours)-Toxin ingestion (<24 hours)-Vomiting-Pregnancy Randomization and allocation concealment will be pharmacy-controlled and performed using a computerized random number generator and sequentially numbered, opaque, sealed envelopes, respectively. The physician, research assistant, nurse, and participant will be blinded. Due to perceptible differences, participants will be randomized in a double-dummy approach to:-HBB 10 mg tablet + acetaminophen placebo OR-Acetaminophen 15 mg/kg liquid (maximum 975 mg) + HBB placebo. The primary outcome will be the difference from baseline on the FPS-R at 120 minutes, reflecting HBB's time to peak plasma concentration. The FPS-R has been validated in children > five years. Secondary outcomes include:-Pain scores at 15, 30, 45, 60, 80, 100, and 120 minutes post-intervention (FPS-R and 100 mm visual analog scale)-Discharge pain score-Rescue analgesia-Time to achieve a 20% reduction in pain-Adverse effects-Recidivism < 48 hours-Missed surgical diagnoses (National Ambulatory Care Reporting System (NACRS) database)-Caregiver satisfaction (five-item Likert scale). Using the intention to treat principle, ordinal, ratio, and categorical data will be analyzed using the Mann-Whitney, paired t-test, and Pearson's chi-square, respectively and summarized using 95% confidence intervals. Assuming a standard deviation of 2 faces, 83 children per group will be required to detect a 1-face difference at 5% significance with 90% power. Increasing by 20% equals 100 participants per group. P values <0.05 will be considered significant. An institutional audit revealed 380 eligible patients per year during research assistant availability. Given a 30% refusal rate, we expect five participants enrolled per week for 40 weeks. **Importance:** Our findings will guide evidence-based analgesic choices for children with non-surgical abdominal pain in the ED.

GD04

A blinded, randomized controlled trial of opioid analgesics for the management of acute fracture pain in older adults discharged from the emergency department

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Background: Emergency department (ED) providers are frequently challenged with how best to treat acute pain in older patients, specifically when non-opioid analgesics are ineffective or contraindicated. Studies have documented older patients presenting to the ED with painful conditions are less likely to receive pain medications than younger patients, and this oligoanalgesia has been associated with increased risk of delirium and longer hospital stays. Given the concerns for drug interactions, side effects, over-sedation and addiction, emergency physicians often report uncertainty regarding the ideal choice of opioid analgesic in older adults. There are no guidelines informing best practice for the management of acute pain in this population. **Objective:** The primary objective is to compare the efficacy of codeine, oxycodone and hydromorphone for acute fracture pain in older patients discharged from the ED. **Methods:** This will be a blinded, randomized controlled

trial of older adults (age > 70) discharged home from the ED with acute pain secondary to an upper extremity, lower extremity, rib, pelvic or vertebral compression fracture. Patients will be randomized to receive a 3-day supply of codeine, oxycodone or hydromorphone. Patients will also be given acetaminophen. Patients will be contacted by phone or email 3 days following their ED visit. The primary outcome will be differences in pain scores at 3 days assessed using the validated Brief Pain Inventory (Short Form). Secondary outcomes will include side effects (ie: confusion, constipation), adverse events (ie: falls, healthcare visits) and pain interference with daily activity. Patients, physicians and all research staff will be blinded to group allocation. **Data Analysis Plan:** The study design assumed three arms (codeine, oxycodone and hydromorphone), therefore the 2-tailed alpha will be set to 0.025 to adjust for the increased risk of type-I error with 3 pairwise comparisons. To test for pairwise equality between groups, a 1-way ANOVA will be employed. Proportional differences will be assessed using Pearson chi-square statistic**. Sample size calculation:** Assuming a mean (SD) change in pain scores between groups of 2.2 (3.0), a minimum clinically important difference on the Brief Pain Inventory of 2.0, a 2-tailed alpha of 0.025 to adjust for 3 pairwise comparisons and a beta of 0.20, we estimate that 47 patients per group (N = 141) will be required. To account for potential loss to follow-up, we will increase our sample size by 25% per group, resulting in a final sample size of 177 patients (59 per group). **Importance:** All analgesics (including opioids) prescribed to older adults are associated with risk of adverse events. This study seeks to inform ED providers of opioid efficacy, side effects and patient-important, functional outcomes in this growing patient population.

GD05

Careful Anticoagulation Review in Emergency Medicine (CARe-EM)

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Background: The number of patients prescribed anticoagulation for stroke prevention is increasing, along with the proportion of emergency department (ED) patients who are anticoagulant users. Bleeding is the most common side effect. Inappropriate dosing, co-prescription of anti-inflammatories or aspirin, and renal impairment all increase the bleeding risk. An ED visit is an opportunity to review anticoagulant bleeding risks and intervene to prevent bleeding in patients at high risk. **Objectives:** To establish the 12-month incidence of bleeding in anticoagulated patients visiting the ED, to develop an ED specific anticoagulant-associated bleeding prediction score, to evaluate the ED utility of existing prediction scores. **Methods:** Research ethics board approval has been granted. Patients will be identified in Hamilton General and Juravinski EDs. Each patient will be followed forward in time for 12 months to document bleeding events. **Population:** Inclusion criteria: ED patients prescribed warfarin, rivaroxaban, dabigatran, apixaban, edoxaban or low molecular weight heparin (prevalent users). Exclusion criteria: Patients under 16 years of age. Primary outcome: The incidence of major bleeding (defined by ISTH criteria) within 12 months from the index ED visit. Secondary outcomes: Derivation of an ED prediction score to identify patients at high risk of anticoagulant-associated bleeding within 12 months. Tertiary outcomes: Evaluation of ATRIA, modified HAS-BLED and HEMORR2HAGES scores utility in predicting bleeding within 12 months. **Data management:** The data will be stored anonymously and securely on RedCAP. A literature search / expert discussion has identified multiple potential risk factors for bleeding. This data is collected at the time of the index ED presentation. A committee of emergency, thrombosis, gastroenterology and cardiology physicians will review each major bleeding case. **Analysis:** Primary analysis: a multiple logistic regression analysis to identify variables associated with major bleeding diagnosed within 12 months of the index presentation. Using the model β coefficients we will derive a simple clinical decision rule. Secondary analysis: assessing the area under the curve and optimal cut points for pre-existing bleeding prediction scores for predicting major bleeding within 12 months. **Sample size calculation:** With 3000 patients we expect 2700 to be anticoagulated long term, and at least 135/2700 patients will have a major bleed. This is a sufficient number for multivariate analysis to establish a simple model. We estimate 20,000 anticoagulated ED patient attendances/year. **Importance:** This is the first study to consider the ED visit an opportunity to prevent bleeding. We will establish a method to identify ED patients at high risk of anticoagulant-associated bleeding.

GD06

Derivation and internal validation of a clinical prognostic tool for recurrent emergency visits for hyperglycemia in patients with diabetes mellitus: a multicentre prospective cohort study

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Background: Patients with poorly controlled diabetes mellitus (DM) often visit the emergency department (ED) for management of hyperglycemic episodes, including diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS). It has been previously reported that risk factors for readmission to the intensive care unit (ICU) in DKA include older age, female sex and the presence of significant comorbidity including sepsis. However, there are no ED-based studies on this topic, particularly in a Canadian setting, and data on outcomes such as recurrent ED visits, hospital or ICU admission after discharge in these patients is lacking. **Objectives**: The primary objective of this study is to derive and internally validate a clinical risk tool for prognosis of patients presenting with hyperglycemic emergencies to identify those at higher risk of adverse outcomes within 30 days of initial ED presentation. **Methods**: This will be a multicentre prospective cohort study of eligible consecutive adult patients with an ED diagnosis of hyperglycemia, DKA or HHS. We will include all visits of adult (≥18 years) ED patients with either a known or unknown history of DM and a diagnosis of hyperglycemia (blood glucose >11.0 mmol/L), DKA or HHS. We will include patients with co-morbid diagnoses in addition to hyperglycemia. We will exclude patients: a) with advanced care directives for resuscitation involving refusal of treatment, and b) who are initially assessed at a peripheral hospital and transferred to our sites for ongoing management. Research assistants will then contact the enrolled participants via telephone for follow-up regarding clinical outcomes, including repeat visits to see a health care provider, changes in diabetic medications, and time taken off of work or school. Participants will be followed to determine if they have further ED visits, admissions or ICU admissions after their ED visit for hyperglycemia. Data on missed patients or those who refused consent will be collected to assess for selection/enrolment bias. **Statistical considerations:** The primary outcome will be an unplanned return ED visit for hyperglycemia within 30 days of initial presentation. Secondary outcomes will include unplanned admission to hospital or ICU for hyperglycemia, or death within 30 days of the index ED visit. Additionally, we hope to characterize patient-important and health-care system outcomes such as time taken off work or school and follow-up visits to see a healthcare provider. We will conduct descriptive statistics on investigations, treatments, disposition and patient-important outcomes. We will

perform an initial univariate logistic regression, followed by a multivariate analysis to identify predictor variables associated with adverse events such as recurrent ED visits, and admission to hospital or ICU for hyperglycemia within 30 days. We will include individual patients who have multiple recurrent visits to the ED during the study period and statistically weight for these using generalized estimating equations (GEE), which are used to develop regression models for correlated data that arise from repeated measures of the same individuals over time. Finally, a clinical risk tool will be derived by rounding the beta coefficients. Internal validation will be conducted using bootstrapping techniques. **Importance**: ED visits for hyperglycemia significantly affect both the healthcare system overall and the individual patient. The results of this project will assist clinicians to better identify these patients and enable them to intervene either medically or educationally to prevent subsequent visits to the ED. As a result, patients will have improved care, better blood glucose control, and be identified for closer follow-up with a family physician or diabetes specialist. Furthermore, by aiming to reduce the number of recurrent visits, this project may reduce ED utilization and the associated healthcare costs with frequent visits and admissions for hyperglycemia.

Moderated Poster Presentations

MP01

The canary in the coal mine: Does palliative care consultation influence emergency department utilization?

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Introduction: For cancer patients undergoing active treatment, emergency department (ED) visits may be an indicator of a breakdown in continuity and quality of care. Palliative care (PC) may be an important resource for patients in need of symptom management even during treatment with curative intent. This study aims to describe ED utilization by cancer patients and determine if PC consults impact ED use. **Methods:** Patient data from the Tom Baker Cancer Center (TBCC) was linked to PC and ED data as a retrospective cohort study. ED data was obtained from two administrative databases and PC data was obtained from four administrative databases and restricted to the first four hundred days following diagnosis. Univariate and Multivariate analyses were used. **Results:** Three actively treated cancer patient cohorts were identified based on first presentation following intake at the TBCC: 1) Used ED first ($n = 1637$), 2) Used PC first ($n = 539$), and 3) Only used services at the TBCC ($n = 2153$). Using Multivariate analysis, patients living alone or who had a diagnosis of prostate or breast cancer were more likely to access the ED first or to only use services at the TBCC rather than access PC first. Patients who were divorced, on income support, or diagnosed with a lung or GI cancer, were more likely to access PC first rather than access the ED or only use services at the TBCC. A subgroup analysis was performed on those who accessed the ED at some point during their care, consisting of three groups: 1) ED Only Users ($n = 1091$), 2) ED First Users, who also accessed PC ($n = 546$), and 3) PC First Users, who also accessed the ED. There was a significant difference in rates of ED visits between the three groups: ED Only Users went to the ED at a rate of 3.8 per 1000 patient days; ED First Users, who also accessed PC, went to the ED at a rate of 7.7 per 1000 patient days; and PC First Users, who also accessed the ED, went to the ED at a rate of 9.2 per 1000 patient days ($p < 0.001$). **Conclusion:** In a tertiary cancer centre, patients who were divorced, on income support, or diagnosed with lung or GI cancer were more likely to access PC. Amongst those patients who presented to the ED, those who accessed PC first had higher rates of ED use. Further explorations of presenting complaints, utilization patterns, and symptom burdens will be analyzed to determine if early PC consults can influence or decrease ED utilization.

Keywords: palliative care, cancer patients, utilization

MP02

Paramedic safety culture across Eastern Ontario

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Introduction: Safety culture is defined as the shared beliefs that an organization's employees hold relative to workplace safety. Perceptions of workplace safety culture within paramedic services have been shown to be associated with patient and provider safety outcomes as well as safe work practices. We sought to characterize paramedics' perceptions of the organizational safety culture across Eastern Ontario, Canada to provide important benchmarking data to evaluate future quality initiatives. **Methods:** This was a cross-sectional survey study conducted September 2015-January 2016 in 7 paramedic services across Eastern Ontario. We distributed an abridged version of Patterson's previously published EMS-SAQ survey, measuring six domains of workplace safety culture, to 1,066 paramedics during continuing medical education sessions. The questions were presented for rating on a 5 point Likert scale (1 = strongly agree, 5 = strongly disagree) and a response of 1 or 2 was considered a 'positive perception' response. We present descriptive statistics and chi-square tests where appropriate. **Results:** We received responses from 1,041 paramedics (97.6%), with a response rate varying between 88.0% and 100% across the 8 paramedic services. One third (33.6%) were Advanced Care Paramedics (ACPs) and 39.4% of paramedics had more than 10 years' experience. The percentage of positive responses for each domain were: Safety Climate 31.2% (95% CI 28.4-34.1), Teamwork Climate 29.3% (95% CI 26.6-32.1), Stress Recognition 56.8% (95% CI 53.8-59.8), Perceptions of Management 67.0% (95% CI 64.0-69.8), Working Conditions 42.6% (95% CI 39.6-45.7), Job Satisfaction 41.6% (95% CI 38.6-44.6). Primary care paramedics had more positive perception responses for Job Satisfaction (45% vs 35%, $p = 0.002$), whereas ACPs had more positive perception responses for Stress Recognition (61.5% vs 54.1%, $p = 0.022$). No association was found between gender or years of experience and a positive perception of any safety domain. **Conclusion:** The results provide valuable workplace safety culture data that will be used to target and evaluate needed quality improvement initiatives while also raising some awareness to paramedics of important factors related to patient and provider safety.

Keywords: paramedic, safety culture, patient safety

MP03

Predicting survival after pediatric out-of-hospital cardiac arrest

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Introduction: Pediatric out-of-hospital cardiac arrest (OHCA) is unique in terms of epidemiology, treatment, and outcomes. There is a paucity of literature examining predictors of survival to help guide resuscitation in this population. **Objective:** The primary objective was to examine predictors of survival to hospital discharge. The secondary objective was to determine the probability of return of spontaneous circulation

(ROSC) over the duration of resuscitation. **Methods:** We performed a retrospective cohort study of non-traumatic OHCA (<18 years) treated by EMS from the Toronto Regional RescuNET Epistry-Cardiac Arrest database from 2006 to 2015. We used competing risk analysis to calculate the probability of ROSC over the duration of resuscitation. We then used multivariable logistic regression to examine the role of Utstein factors and duration of resuscitation in predicting survival to hospital discharge. Candidate variables were limited to Utstein factors and duration of resuscitation due to the number of events. We used area under the receiver operating characteristic (ROC) curve (AUC) to determine the predictive ability of our logistic regression model. **Results:** A total of 658 patients met inclusion criteria. Survival to discharge was 10.2% with 70.1% of those children having a good neurologic outcome. The overall median time to ROSC was 23.9 min. (IQR 15.0,36.7). However, the median time to ROSC for survivors was significantly shorter than the time to ROSC for patients who died in hospital (15.9 (IQR 10.6 to 22.8) vs. 33.2 (IQR 22.0 to 48.6); P value <0.001). There was a decrease in the odds of survival of 14% per minute during the first 25 minutes of cardiac arrest. Older age (OR 0.9, 95% CI 0.86,0.99), and longer duration of resuscitation (OR 0.9, 95% CI 0.88,0.93) were associated with worse outcome while initial shockable rhythm (OR 5.8, 95% CI 2.0,16.5), and witnessed arrests (OR 2.4, 95% CI 1.10,5.30) were associated with improved patient outcome. The AUC for the Utstein factors was fair (0.77). Including duration of resuscitation improved the discrimination of the model to 0.85. **Conclusion:** Inclusion of duration of resuscitation improved the performance of our model compared to Utstein factors alone. However, our results suggest there are a number of other important factors for predicting patient outcome from pediatric OHCA.

Keywords: pediatric, cardiac arrest, resuscitation

MP04

Interim analysis of the impact of the Emergency Department Transformation System on ambulance offload delay

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Introduction: Emergency Department Systems Transformation (EDST) is a bundle of Toyota Production System based interventions implemented in two London, Canada tertiary care Emergency Departments (ED) between April 2014 and July 2016 to improve patient care by increasing value and reducing waste. Some of the 17 primary interventions included computerized physician order entry optimization, staff schedule realignment, physician scorecards, and a novel initial assessment process. Offload delays are associated with longer hospital length of stay and delayed admission, and may increase morbidity and mortality. Delays also result in fewer circulating ambulances in the community. CIHI sets a benchmark of 30 minutes as an acceptable offload target. It is possible that EDST may have impacted offload times. **Methods:** Middlesex-London EMS provided offload times. Data was collected from London Health Sciences Centre including daily ED visit volumes, ED occupancy, offload nursing hours, and site variation. A binomial logistic regression analysis was performed to determine the impact of interventions and confounding variables on the proportion of patients meeting CIHI benchmark. A chi-square analysis was done comparing proportion of patients meeting the benchmark in the first 3 months versus the last 3 months to identify overall impact of EDST to date. **Results:** Increased offload nursing hours had a positive impact ($p < 0.001$) on the proportion of offload times meeting the CIHI benchmark while increased ED visit volume and hospital inpatient volume had a significant negative impact ($p < 0.001$). At both ED sites, the proportion of patients meeting the offload target ranged from 58-83% over the timeframe. There was a significant increase in the proportion of patients meeting the benchmark from the first quarter to the last quarter (69.6% vs 75.0%; 95% CI 3.45% to 7.38%, $p = 0.000$). Specific interventions had varying degrees of impact on offload times. **Conclusion:** The proportion of patients meeting the benchmark offload time varied over the study timeframe but significantly increased with EDST implementation. Offload times are one of many outcomes we aim to improve with EDST and it remains an ongoing process as new interventions continue to be implemented. Once transformation is complete, future studies will focus on the impact of EDST on all ED flow metrics, and patient and provider satisfaction.

Keywords: emergency department systems transformation (EDST), ambulance, offload

MP05

Do emergency department staff use a current domestic violence documentation tool or other forms of intimate partner violence documentation in patient records?

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Introduction: Domestic violence (DV) rates in smaller cities been reported to be some of the highest in Canada. It is highly likely that emergency department staff will come across victims of intimate partner violence (IPV) in their daily practice. The purpose of this study is to better understand current practices for detecting IPV as we are currently uncertain whether patients are assessed for IPV and what the current documentation practices are. **Methods:** A standardized retrospective chart review, following principles outlined by Gilbert et al. 1996, was completed by two researchers to capture domestic violence documentation rates in patients presenting to the ED between January and April 2015 with injuries that may have been caused by IPV. To assess self-reported documentation/questioning practices, a cross-sectional online survey was distributed to ED staff via staff email lists three times between July and October 2016, with a response rate of 45.9% ($n = 55$). The primary outcome was DV field usage. Secondary outcomes included documentation in patient charts and current questioning habits. **Results:** Overall, we found documentation in 4.64% of all included patient charts ($n = 366$). No documentation was noted in the DV field. 52.4% patients with deliberate injuries had no documentation of assailant identity. With regards to self reported documentation practices, 16.4% of ED staff never questioned female patients about intimate partner violence, 83.6% asked when thought appropriate, and none asked routinely. None of the staff used a structured screening tool. 60% of ED staff documented their questioning but 92.7% did not use the DV-field for documentation. 58.2% of ED staff could not identify the DV field and 45.5% of respondents did not know how to interpret the DV field if positive. **Conclusion:** Our findings suggest that the current documentation tool (DV-field) is not being utilized. Furthermore, low rates of IPV documentation, and potentially questioning, in high risk patients indicates that there is need to improve current practises.

Keywords: intimate partner violence, screening, emergency department

MP06

Use of ultrasound and x-ray to predict improvement in hip osteoarthritis symptoms following intra-articular steroid injection

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Introduction: Intra-articular steroid injection (IASI) is commonly used in the emergency department for management of osteoarthritis (OA) symptoms. Hip IASI carries risks, such as avascular necrosis, and there is currently no reliable way to predict long-term response of a patient's OA to IASI. Ultrasound (US) conveniently assesses for active arthropathy by detecting effusion-synovitis, and x-ray (XR) is useful for visualizing bone-related changes. We investigated the extent that a response to hip IASI could be predicted from baseline OA patient clinical and physical features alongside US and XR imaging features. **Methods:** 97 consenting patients with symptomatic hip OA presenting for hip IASI were evaluated at baseline (XR and US) and again 8-weeks after IASI (US only). Self-reported pain (WOMAC), hip range of motion (ROM) were measured at baseline and follow up. On US images we quantified joint effusion and synovial thickening, i.e., "effusion-synovitis", by the bone-capsule distance (BCD) at the apex of the femoral head from outer femoral cortex to outer synovium. On XR, we measured minimum joint space width (cm) and Kellgren-Lawrence (K-L) Grade for osteophytes and sclerotic changes. **Results:** In our 97 patients (43 female) aged 28-87 years (mean 59 + /-13 years, K-L grades averaged 2.5 + /-1.5, and US BCD averaged 5.9 + /-2.0 mm. We performed multiple linear regression using age, sex, BMI, ROM of hip flexion, US BCD, radiographic joint space width and K-L grade against the dependent variable, change in WOMAC pain subscore ($R = 0.587$, $P = 0.002$). We compared the response predicted by this model to the actual change in WOMAC pain. At a threshold value of -20% for minimal clinically important difference, 35/97 patients were responders, and a 2x2 table gave 67% overall model predictive accuracy, 61% sensitivity, and 71% specificity. Likelihood ratio for a positive response (LR +) was 2.13. **Conclusion:** Combining radiographic information on structural damage, US information on active arthropathy, and demographics correctly predicted about two-thirds of the patients that would benefit from IASI after 8 weeks. A patient with hip OA that met our model criteria was more than twice as likely to respond to IASI. With further model refinement, effective, personalized evidence-based management of symptomatic hip OA is possible using XR and hip US, which could both be performed during an ER visit.

Keywords: osteoarthritis, injection, imaging

MP07

Office-based family physicians' use of point of care ultrasound for early pregnancy complaints

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Introduction: In Canada, family physicians (FPs) provide the majority of early pregnancy care. To receive a same day US, most patients will be sent to the emergency department (ED). FPs are starting to use point of care ultrasound (POCUS) for a variety of indications. The FaMOUS course was modeled after the Canadian Emergency Ultrasound Society (CEUS) ED Echo (EDE) curriculum and adapted with permission for FPs. The objective of this study was to assess the indications for POCUS use in early pregnancy and determine the diagnostic accuracy of POCUS performed by FPs following FaMOUS certification to detect intrauterine pregnancy (IUP) and fetal cardiac activity (FCA). **Methods:** This was a prospective, observational study conducted in 3 FP clinics from November 2015 to June 2016. Pregnant women <20 weeks gestational age who underwent a focused, transabdominal POCUS by a FaMOUS-certified FP using a handheld GE VScan were enrolled. FPs documented the presence or absence of IUP and FCA. The reference standard was radiologist-interpreted US performed after the FP POCUS. FPs were surveyed to assess provider confidence using POCUS and perceived impact on clinical decision-making. **Results:** Of 253 eligible patients, 56 (22.1%) underwent POCUS. Of these, 50 (89.3%) had a radiologist-interpreted US following the office-based FP visit. POCUS was used for the following indications: 11 (19.6%) had vaginal bleeding, 5 (8.9%) had abdominal pain, 7 (12.5%) had both vaginal bleeding and abdominal pain, and the indication for 33 (58.9%) patients was unclear. All patients had a documented IUP, resulting in a sensitivity of 94.0% (95% CI: 83.5%, 98.5%) and 100% positive predictive value. FCA resulted in sensitivity of 82.9% (95% CI: 69.2, 92.4%) and specificity of 100% (95% CI: 29.2%, 100.0%). When surveyed, 100% of FPs were confident performing POCUS and reported POCUS had an overall positive impact on clinical practice. 75% agreed the use of POCUS decreased the need for urgent radiologist-interpreted US. **Conclusion:** Following a certification process modeled after the CEUS EDE curriculum, FPs used POCUS for both CEUS-defined indications and indications that were unclear. FPs trained in early pregnancy POCUS demonstrated excellent diagnostic accuracy identifying IUP and FCA. Future study should assess the clinical impact of office-based POCUS, including whether its use results in decreased ED visits for this patient population.

Keywords: point of care ultrasound, first trimester, women's health

MP08

What's the plan?: Improving ED patient discharge communication through patient-centred discharge handouts

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Introduction: Discharge from the Emergency Department (ED) is a high-risk period for communication failures. Clear verbal and written discharge instructions at patient-level health literacy are fundamental to a safe discharge process. As part of a hospital-wide quality initiative to measure and improve discharge processes, and in response to patient feedback, the St. Michael's Hospital ED and patient advisors co-designed and implemented patient-centred discharge handouts. **Methods:** The design and implementation of discharge handouts was based on a collaborative and iterative approach, including stakeholder engagement and patient co-design. Discharge topics were based on the 10 most common historical ED diagnoses. ED patient advisors and the hospital's plain language review team co-designed and edited materials for readability and comprehension. Process mapping of ED workflow identified opportunities for interventions. Multidisciplinary ED stakeholders co-led implementation, including staff education, training and huddles for feedback. Patient telephone surveys to every 25th patient presenting to the ED meeting the study inclusion criteria (16 years of age or older, directly discharged from the ED, speaks English, has a valid telephone number, and has capacity to consent) were conducted both pre- (June-Sept 2016) and post- (Oct-Dec 2016) implementation. **Results:** Stakeholder engagement and co-design took place over 10 months. Education was provided across one MD staff meeting, four RN inservices, and at monthly learner orientation. 44846 patients presented to the ED and 25600 met the study inclusion criteria. 935 surveys (response rate = 97%; declined n = 30) were completed to date. Pre-implementation (n = 467), 9.2% (n = 43) of patients received printed discharge materials and 71% (n = 330) understood symptoms to look for after leaving the ED. Post-implementation (n = 468), 44% (n = 207) of patients received printed discharge materials with 97% (n = 200) finding the handouts helpful and 82% (n = 385) understanding symptoms to look for after leaving the ED. **Conclusion:** Through the introduction of patient

co-designed and patient-centred discharge handouts, we have found a marked improvement in patient understanding, and consequently safer discharge practices. Future efforts will focus on optimizing discharge communication, both verbal and written, tailored to individual patient preferences.

Keywords: emergency department discharge, communication, discharge handouts

MP09

Canadian Community Utilization of Stroke Prevention Pilot Study-Emergency Department (C-CUSP ED)

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Introduction: Atrial fibrillation (AF) is the most common sustained arrhythmia affecting 1-2% of the population. Oral anticoagulation (OAC) reduces stroke risk by 60-80% in AF patients, but only 50% of indicated patients receive OAC. Many patients present to the ED with AF due to arrhythmia symptoms, however; lack of OAC prescription in the ED has been identified as a significant gap in the care of AF patients. **Methods:** This was a multi-center, pragmatic, three-phase before-after study, in three Canadian sites. Patients who presented to the ED with electrocardiographically (ECG) documented, nonvalvular AF and were discharged home were included. Phase 1 was a retrospective chart review to determine OAC prescription of AF patients in each ED; Phase 2 was a low-intensity knowledge translation intervention where a simple OAC-prescription tool for ED physicians with subsequent short-term OAC prescription was used, as well as an AF patient education package and a letter to family physicians; phase 3 incorporated Phase 2 interventions, but added immediate follow-up in a community AF clinic. The **primary** outcome of the study was the rate of new OAC prescriptions at ED discharge in AF patients who were OAC eligible and were not on OAC at presentation. **Results:** A total of 632 patients were included from June, 2015-November, 2016. ED census ranged from 30000-68000 annual visits. Mean age was 71 ± 15, 67 ± 12, 67 ± 13 years, respectively. 47.5% were women, most responsible ED diagnosis was AF in 75.8%. The mean CHA_2DS_2-VASc score was 2.6 ± 1.8, with no difference amongst groups. There were 266 patients eligible for OAC and were not on this at presentation. In this group, the prescription of new OAC was 15.8% in Phase 1 as compared to 54% and 47%, in Phases 2 and 3, respectively. After adjustment for center, components of the CHA_2DS_2-VASc score, prior risk of bleeding and most responsible ED diagnosis, the odds ratio for new OAC prescription was 8.0 (95%CI (3.5,18.3) $p < 0.001$) for Phase 3 vs 1, and 10.0 (95%CI (4.4,22.9) $p < 0.001$), for Phase 2 vs 1). No difference in OAC prescription was seen between Phases 2 and 3. **Conclusion:** Use of a simple OAC-prescription tool was associated with an increase in new OAC prescription in the ED for eligible patients with AF. Further testing in a rigorous study design to assess the effect of this practice on stroke prevention in the AF patients who present to the ED is indicated.

Keywords: atrial fibrillation, oral anticoagulation

MP10

How dry I am: how much fluid do paramedics give when they administer an IV fluid bolus?

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Introduction: How is "administer a fluid bolus" interpreted by paramedics? There is no existing literature describing this practice in the prehospital setting. Paramedic medical directives authorize the administration of Normal Saline 20 ml/kg to hypotensive patients (systolic BP <90). Anecdotally, auditors of Ambulance Call Reports (ACRs) and paramedics report this amount of fluid is rarely administered. The aim of this study was to determine the amount and rate of IV fluid administered by Advanced Care (ACP) and Primary Care (PCP) paramedics when they give an IV 'fluid bolus' during an ambulance call. **Methods:** We conducted a retrospective analysis of iMedic platform, electronic, ACRs (January 01, 2015 to June 30, 2015) from 8 municipal paramedic services that serve an urban and rural population of 1.4 million. ACRs containing a procedure code 351 (intravenous fluid bolus) were identified. A stratified, random sample of 20 cases per paramedic category (ACP and PCP) from each service was generated using a random number table. ACRs were manually searched, data abstracted onto spread sheets, and the results analyzed using descriptive statistics (Wizard ver 1.8.16 for Mac). **Results:** The initial sample was 220 cases. 25 were excluded for incomplete documentation, leaving 195 cases (ACP 59, PCP 136) for analysis. The mean IV fluid bolus volume delivered was: ACP 414.8 ml (95%CI: 344.2, 485.4), PCP 242.3 ml (95%CI: 210.9, 274.5). The mean rate of infusion was: ACP 22.7 ml/min (95%CI: 17.6, 27.8) PCP 15.7 ml/min (95%CI 13.2,18.1). Percentage of cases where >250 ml was infused: ACP 74.6%, PCP 44.1%. Percentage of cases where at least 10 ml/kg of fluid was given: ACP 17.0%, PCP 2.9%. Percentage of cases reaching the maximum 20 ml/kg of fluid: ACP 0.5%, PCP 0%. IV cannula size: 18G-ACP 57.4%, PCP 33.3%; 20G ACP 37.0%, PCP 56.8; 22G ACP 0.6%, PCP 9.8%. **Conclusion:** Paramedics rarely gave the amount of IV fluid they were authorized to give to hypotensive patients. On average, Advanced Care Paramedics administered significantly more fluid and gave it significantly faster than Primary Care Paramedics. ACPs were more likely than PCPs to use 18G cannulas and rarely used 22G cannulas whereas PCPs preferred to use 20G IV cannulas. Further training is required to clarify and improve the paramedic practice of IV bolus administration.

Keywords: paramedic, fluid bolus, practice

MP11

A quality improvement initiative to decrease the rate of solitary blood cultures in the emergency department

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Introduction: Best practice guidelines recommend that at least two sets of blood cultures be sent when blood cultures are required. However, high rates of solitary blood cultures are still common in the emergency department. The aim of this study was to evaluate the efficacy of different quality improvement initiatives aimed at reducing the rate of solitary blood cultures being sent to the lab on patients ultimately discharged from our emergency department. **Methods:** This was a multi-centre, multi-phase, prospective study evaluating a comprehensive education-based intervention and a second intervention that combined a computerized forcing function along with a brief education-based intervention. The results were analyzed using segmented regression analysis, as well as statistical process control charts. **Results:** The baseline rate of solitary sets of blood cultures was 41.1%. The education intervention reduced this rate to 30.3%. The introduction of a forcing function with a brief educational intervention further reduced the rate to 11.6%. This represents an absolute reduction of 29.5% from baseline (relative reduction of 71.8%). According to segmental regression

analyses, the education intervention alone did not produce a statistically significant change when factoring possible background time-related trends ($P = 0.071$). However, the forcing function produced a statistically significant improvement ($P < 0.0005$), which was maintained for 6 months. **Conclusion:** The combination of a brief education-based intervention and a computerized forcing function was more effective than education alone in reducing solitary blood culture collection in our emergency department in this time series study. Forcing functions can be a powerful tool in modifying behaviours and processes in the clinical setting.

Keywords: quality assurance, blood cultures, computerized order entry

MP12

Acute asthma presentations to emergency departments in Alberta: an epidemiological analysis of presentations

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Introduction: Asthma is a chronic condition and exacerbations are a common reason for emergency department (ED) presentations across Canada. The objective of this study was to characterize and describe acute asthma presentations over a five-year period. **Methods:** Administrative health data for Alberta from 2011-2015 was obtained from the National Ambulatory Care Reporting System (NACRS) for all adult (>17 years) acute asthma (ICD-10-CA: J45) ED presentations. All presentations to an Alberta ED with a primary or secondary diagnosis of acute asthma were eligible for inclusion. Presentations with a Canadian Triage and Acuity Scale (CTAS) score of 1 were excluded. Data from NACRS were linked with a provincial diagnostic imaging database. Data are reported as means and standard deviation (SD), medians and interquartile range (IQR) or proportions, as appropriate. **Results:** From 2011-2015, a total of 51,269 (~10,000/year) acute asthma presentations were made by 34,481 patients (~0.3 presentations per patient per year). The median age was 35 years (IQR: 25, 49 years) and more patients were female (57.2%). Few patients arrived to the ED by ambulance (6.5%) and the most frequent CTAS score was 3 (43.5%). The majority of these patients (77%) had a primary diagnosis of asthma in the ED. Differences were explored between those with a primary asthma diagnosis and those with a secondary diagnosis (e.g., ambulance arrival, length of stay, hospital admission, etc.). Although differences were statistically significant, no clinically relevant differences were identified. Patients with asthma most frequently had a co-diagnosis of acute upper respiratory infection (6.2%); other co-diagnoses included bronchitis (4.7%), pneumonia (3.7%), heart failure (0.18%), pulmonary embolism (0.15%), and pneumothorax (0.03%). For 39.3% of patients, ED management included chest x-ray. The majority of patients were discharged from the ED (92.2%) following a median length of stay of 2.2 hours (IQR: 1.2, 3.8 hours). **Conclusion:** Acute asthma remains an important ED presentation in Alberta and the absolute frequency of presentations has remained relatively stable over the past five years. Frequency of chest x-ray ordering is high and represents a target for future interventions to reduce ionizing radiation exposure, improve patient flow and reduce healthcare costs.

Keywords: emergency department, asthma, epidemiology

MP13

Characteristics and outcomes of older emergency department patients assigned a low acuity triage score

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Introduction: Older patients are a high-risk population in the Emergency Department (ED) for poor outcomes after ED visit, including return presentation and hospital admission. Little is known however about outcomes in older patients identified as "low acuity" by triage. We aim to describe the characteristics, ED workup, disposition, and 14-day outcomes of ED patients 65 years and up who are triaged as low acuity and compare them to a younger cohort. **Methods:** This health records review was done in a Canadian tertiary care ED. Included patients received a Canadian Triage Acuity score (CTAS) of 4 or 5 and were either 65 years and up ("older" group), or 40-55 years (controls). Data collected included patient demographics, tests and services involved in ED, and disposition. Return ED visit and hospital admission rates at 14 days were tracked. Data were analyzed descriptively and chi-square testing conducted to assess for differences ($p < 0.05$) between groups. A pre-planned stratified analysis of patients 65-74 years, 75-84, and 85 and older was conducted. **Results:** 350 patients (mean age 76.5, 56.6% female) were included in the older group and 150 in the control group (mean age 47.3, 55.3% female). Most patients presented with musculoskeletal or skin complaints (older cohort: 28.6% extremity pain/injury, 10% rash, 8.9% laceration, versus control 30% extremity pain/injury, 14.7% rash, 14.0% laceration) and were triaged to the ambulatory care area (88.6% elderly, 99.3% control). Older patients were significantly more likely than younger controls to be admitted on index visit (5.0% vs 0.3% admit rate, $p = 0.016$). They had a trend towards increased re-presentation rates within 14 days (13.7% vs 8.7% control, $p = 0.11$) and were more likely to be admitted on re-presentation (4.0% vs 0.7%, $p = 0.045$). In sub-group analysis, very elderly patients (85 years and up, $n = 79$) were more likely to be admitted (8.9%, $p = 0.003$). **Conclusion:** Patients 65 years of age and older who present to the ED with issues labelled as "less acute" at triage are 16 times more likely to be admitted than younger controls. Patients 85 years and up are the primary drivers of this higher admit rate. This study characterizes "low acuity" elders presenting to ED and indicates these patients are high risk for re-presentation and admission within 14 days.

Keywords: geriatrics, triage

MP14

Prospective external validation of the Ottawa 3DY screening tool for the detection of altered mental status of elderly patients presenting to the emergency department

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Introduction: Altered mental status (AMS) and cognitive impairment are common problems in elderly patients presenting to the emergency department (ED). The primary objective of this study was to test the diagnostic accuracy of the Ottawa 3DY (O3DY) screening tool for the detection of AMS in the ED. **Methods:** This was a prospective cohort study conducted at an inner city, academic ED with an annual census of 85,000 visits. Study investigators and trained research assistants screened and approached a convenience sample of patients for informed written consent. Patients completed the O3DY, Short Blessed Test (SBT) and Mini-Mental Status Exam (MMSE). Descriptive statistics using counts, medians, means and interquartile ranges (IQR) were calculated. Sensitivity and specificity of the O3DY compared to the MMSE were calculated in STATA (version 11.2). **Results:** We screened 163 patients for inclusion, 150 were eligible to participate, and 116 patients were enrolled in the final study. The median age of participants was 81 (IQR 77-85), 44.8% were female, and the most common pre-existing comorbidity was hypertension. The median ED

LOS at the time of O3DY completion was 1:40 (IQR 1:34-1:46). Characteristics of patients eligible, yet who declined to participate, were similar to the study population. The sensitivity of the O3DY for AMS was 71.4% (95%CI 47.8-95.1), and specificity was 56.3% (46.7-65.9). Sensitivity of the SBT was 85.7% (67.4-99.9) and specificity was 58.3% (48.7-67.8). Inter-rater reliability for the O3DY (k = 0.64) and SBT (k = 0.63) were moderate. **Conclusion:** In a cohort of geriatric patients presenting to an inner-city, academic ED the O3DY and SBT tools demonstrate moderate sensitivity and specificity for the detection of AMS.
Keywords: geriatrics, altered mental status, Ottawa

MP15

Profile and circumstances of cycling injuries: Data from an urban emergency department

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Introduction: Cycling as a form of active transportation is popular in many urban communities. However, little is known about the prevalence and circumstances of cycling injuries, particularly injuries resulting from single bicycle crashes which are not recorded in road trauma surveillance systems based on police crash reports. This study aimed to examine the profile and circumstances of cycling injuries seen in an urban emergency department (ED). **Methods:** This was a cross-sectional historical chart review study. All injured patients attending our ED are electronically flagged according to mechanism of injury. We reviewed the medical charts of all ED visits in 2015 that were flagged as "Cyclist Injury" or "Fall" to identify all cyclists who were injured while travelling on public roads (including sidewalks). Off road injuries were excluded. **Results:** In 2015, a total of 6450 ED presentations were flagged as cyclist injury (n = 694) or fall (n = 5756), and 667 cycling injuries met our inclusion criteria. Of these, 73 (11%) were admitted to hospital. The most common mechanisms of injury were fall from bicycle (51%), crash into stationary object (16%), and collisions with moving motor vehicles (25%). Potential contributing factors included alcohol or drug impairment (11%), road hazards (9%), avoidance manoeuvre (5%) and dooring (3%), although the cause of the crash was generally poorly documented in the medical charts. The most common injured body regions were upper extremity (55%) followed by head and neck (34%). Most injuries were abrasions/lacerations and fractures. **Conclusion:** Two thirds of cyclist injuries in this series were caused by single bicycle incidents, events not captured in official road trauma statistics which are based on police crash reports. The large majority of injured cyclists were treated and released from the ED. In most cases, the cause of the crash was poorly documented. This data highlights the limitations of using police crash reports or hospital admission records for road trauma surveillance and the significant knowledge gap in our understanding of causative factors leading to cycling injuries.
Keywords: road trauma, cyclists

MP16

Quality of work life among nurses and physicians in Québec rural emergency departments

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Introduction: Recruitment and retention of healthcare staff are difficult in rural communities. Poor quality of work life (QWL) may be an underling factor as rural healthcare professionals are often isolated and work with limited resources. However, QWL data on rural emergency (ED) staff is limited. We assessed QWL among nurses and physicians as part of an ongoing study on ED care in Québec. **Methods:** We selected EDs offering 24/7 medical coverage, with hospitalization beds, in rural or small towns (Stats Canada definition). Of Québec's 26 rural EDs, 23 (88%) agreed to participate. The online Quality of Work Life Systemic Inventory (QWLSI, with 1 item per 34 "life domains"), was sent to all non-locum ED nurses and physicians (about 500 potential participants). The QWLSI is used for comparing QWL scores to those of a large international database. We present overall and subscale QWL scores as percentiles (PCTL) of scores in the large database, and comparisons of nurses' and physicians' scores (t test). **Results:** Thirty-three physicians and 84 nurses participated. Mean age was 39.8 years (SD = 10.1): physicians = 37 (7.7) and nurses = 40.9 (10.7). Overall QWL scores for all were in the 32nd PCTL, i.e. low. Nurses were in the 28th PCTL and physicians in the 44nd ($p > 0.05$). For both groups, QWL was below the 25th PCTL i.e. very low, for "sharing workload during absence of an employee", "working equipment", "flexibility of work schedule", "impact of working hours on health", "possibility of being absent for familial reasons", "relations with employees". The groups differed ($p < 0.05$) on only two subscales: remuneration and career path. For remuneration, scores were similar on fringe benefits (nurses 22nd PCTL, physicians 32nd) and income security (nurses 72nd, physicians 74th), but differed on income level (nurses 74th, physicians 93rd). The groups differed on all 3 career path items: advancement possibilities (nurses 53th, physicians 91st), possibilities for transfer (nurses 51nd, physicians 84th) and continuing education (nurses 18th, physicians 49th). **Conclusion:** Overall QWL among rural ED staff is poor. Groups had similar QWL scores except on career path, with physicians perceiving better long-term prospects. Given difficulties in rural recruitment and retention, these findings suggest that QWL should be assessed in rural and urban EDs nationwide.
Keywords: rural, quality of work life, emergency

MP17

Improving Communications during Aged Care Transitions (IMPACT): lessons learned

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Introduction: When patients transition from long term care (LTC) to emergency departments (ED), communication among clinicians in different settings is often poor. We pilot tested a transfer form to facilitate communications of handover information among LTCs, emergency medical services (EMS), and EDs regarding LTC residents transitioning to and from the ED. We interpret implementation challenges in light of the "theoretical domains" implementation framework in order to produce lessons for future healthcare communication interventions. **Methods:** We provided setting specific training and a user guide to 13 participating sites, collected 90 forms to assess completion rates, and assessed perspectives on the form from 266 surveys of healthcare providers. Throughout the study, staff kept detailed notes on implementation of the form. We retrospectively categorized implementation challenges reported by survey respondents, and/or recorded in staff implementation notes, according to the theoretical domains framework. **Results:** The LTC patient transfer forms were used in 36.4% of

transitions (90/247), and were completed most often by staff in the LTC (57/90, 63%). Survey results indicated that ED and EMS staff felt the information on the form was useful to them, although they rarely completed their sections of the form. Implementation challenges included low awareness/recognition of the form among healthcare providers, belief that the form distracted from patient care, lack of time for form completion, negative reinforcement for LTC staff (who saw little return for the time they invested in completing the form), and mistrust among clinicians who work in different settings. **Conclusion:** Future efforts to improve healthcare communications must be acceptable for all clinicians. Innovation should balance the workload required among sites/clinicians and the benefits that the intervention offers to sites/clinicians should be explicitly tracked and reported. For this intervention, more effort should be made to inform LTC sites that the transfer information they provide is useful for EMS and ED clinicians. Moreover, gaps in perspectives and lack of trust among clinicians who work in different settings must be recognized and addressed in any multi-site communication intervention.

Keywords: handover, communication, seniors

MP18

A patient focused information design intervention to support the mTBI Choosing Wisely recommendation

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Introduction: Within Alberta, 30% of patients presenting to emergency with minor traumatic brain injury (mTBI) will receive a CT scan before being sent home, regardless of whether it was clinically indicated. Choosing Wisely (CW) Canada recommends using validated clinical decision support to determine whether a CT scan is necessary for patients presenting with a mTBI. In order to provide patients with information on the risks and benefits of CT scans in mTBI and to encourage discussions between patients and their doctor, the Emergency StrategicClinical Network (ESCN) designed a patient focused information visualization on CT scans for head injuries. **Methods:** The ESCN, Physician Learning Program and CW Alberta partnered with the Mount Royal University Department of Information Design to develop a patient information visualization (infographic) intervention. Students spent a semester developing these infographics on Choosing Wisely recommendations, which were then presented to stakeholders. A student was then selected to develop a final design. Refinement of the design took place in consultation with clinical experts and tested in two patient focus groups. The final design was evaluated against the International Patient Decision Aid Standards checklist. The infographic was posted in 2 local emergency department waiting rooms. A survey was administered to any patients in the waiting room when volunteers were available. The survey was designed to evaluate whether the tool influenced patient beliefs about the risks and benefits of CT scans, and their willingness to engage in a discussion with their doctor. **Results:** In a 26 day period, 90 patients consented and completed the survey. Before reading the infographic, 33% of patients thought that after a head injury a CT was always a good idea and 63% thought it was sometimes a good idea. 82% and 91% of patients stated the poster helped them understand the indications and risks of CT imaging for mTBI. After viewing the poster, only 15% of patients felt that a CT was always a good idea after a mTBI. **Conclusion:** The mTBI patient infographic significantly changed patient perceptions regarding the need for CT scans in the setting of mTBI. This study demonstrates that targeted patient education materials can help support CW recommendations.

Keywords: Choosing Wisely, head injury, patient education

MP19

Comparison of the psychometric properties of the VAS, FPS-R and CAS in the pediatric emergency department

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Introduction: Appropriate pain management relies on the use of valid, reliable and age-appropriate tools that are validated in the setting in which they are intended to be used. The aim of the study was to assess the psychometric properties of pain scales commonly used in children presenting to the pediatric emergency department (PED) with an acute musculoskeletal injury. **Methods:** Convergent validity was assessed by determining the Spearman's correlations and the agreement using the Bland-Altman method between the Visual Analogue Scale (VAS), Faces Pain Scale-Revised (FPS-R) and Color Analogue Scale (CAS). Responsiveness to change was determined by performing the Wilcoxon signed-rank test between the pre-post analgesia mean scores. Reliability of the scales was estimated using relative (Spearman's correlation, Intraclass Correlation Coefficient) and absolute indices (Coefficient of Reliability). **Results:** A total of 495 participants was included in the analyses. Mean age was 11.9 $\pm$2.7 years and participants were mainly boys (55.3%). Correlation between each pair of scales was 0.79 (VAS/FPS-R), 0.92 (VAS/CAS) and 0.81 (CAS/FPS-R). Limits of agreement (80%CI) were -2.71 to 1.27 (VAS/FPS-R), -1.13 to 1.15 (VAS/CAS) and -1.45 to 2.61 (CAS/FPS-R). Responsiveness to change was demonstrated by significant differences in mean pain scores, among the three scales, between pre- and post-medication administration ($p < 0.0001$). ICC and CR estimates suggested acceptable reliability for the three scales at 0.79 and $\pm$1.49 for VAS, 0.82 and $\pm$1.35 for CAS, and 0.76 and $\pm$1.84 for FPS-R. **Conclusion:** The scales demonstrated good psychometric properties with a large sample of children with acute pain in the PED. The VAS and CAS showed a stronger convergent validity, while FPS-R was not in agreement with the other scales. Clinically, VAS and CAS scales can be used interchangeably to assess pain intensity of children with acute pain.

Keywords: pain, pediatrics, pain intensity scale

MP20

Prevalence of incidental findings on chest computed tomography in patients with suspected pulmonary embolism in the ED

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Introduction: Computed tomographic pulmonary angiograms (CTPAs) are often ordered to evaluate pulmonary embolism (PE) in the emergency department (ED). However, these studies often yield alternative diagnoses and report incidental findings that lead to additional unnecessary investigations. Our objective was to assess the prevalence and significance of such findings and their implications in patient management. **Methods:** This is a retrospective cohort study of adults presenting to two tertiary care EDs in 2015, being evaluated with CTPA for PE. Data was extracted by two reviewers from electronic CT records with inter-rater reliability reported using kappa statistic. We measured prevalence of PE, incidental findings and alternative diagnoses with data reported as mean and standard deviation (SD). Univariate analyses were performed with t-test for continuous variables and Mantel-Haenszel test for categorical variables. A sample size of 770 was calculated based on an expected difference in prevalence between significant and

non-significant incidental findings of 80% ($\alpha = 5\%$, Power = 90%). **Results:** A total of 1629 studies were included (mean 62 yrs, SD 16.7, 56.9% female, median CTAS score 2, 45.2% admitted). PE was found in 233 (14.3%) patients. 173 (10.6%) studies had a finding of an alternative diagnosis, the majority being pulmonary infiltrates (n = 130, 75.1%). In patients who underwent both CTPA and chest x-ray (CXR), CXRs alone would have led to the same alternative diagnosis in 116 (77.1%) patients. A total of 223 (13.6%) patients had an incidental finding; the majority included pulmonary nodules (n = 83, 37.2%) and adenopathy (n = 26, 11.6%). Only 26 (17.1%) incidental findings were significant; most common included pulmonary nodules (n = 6, 3.9%) and masses (n = 7, 4.6%) that lead to newly identified and biopsied lung cancer diagnoses. Incidental findings led to an additional 301 follow-up CTs with a yield of significant result of 9.2% (n = 48 CTs). **Conclusion:** Chest CTs ordered in the ED for clinical suspicion of PE is equally as likely to identify alternative diagnoses or incidental findings as PE. The majority of incidental findings are non-significant and result in an increased use of CT. CXRs should routinely be ordered prior to further investigation for PE with chest CT to reduce unnecessary testing and thus time and cost to the system.

Keywords: pulmonary embolism, chest computed tomography, incidental findings

MP21

An interprofessional delirium assessment tool for healthcare professionals and trainees working in the emergency department

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Introduction: Multiple studies since the '90's demonstrate that ED staff fail to identify delirium in up to 75% of older patients. Those patients who are discharged have a 3-fold increased mortality. **Methods:** We iteratively developed a 14-item interprofessional tool with 4 clinical vignettes to assess comfort, knowledge and ability to identify delirium among medical students, EM residents, staff MDs and RNs. We conducted a prospective observational study using modified Dillman survey methodology. Surveys were sent on paper to residents and nurses and online to medical students and staff MDs. **Results:** Our response rate was 68% (38/56) for residents, 80%(16/20) for RNs; but only 37% (13/35) for staff MDs and 13%(139/1036) for medical students. Comfort with identifying delirium increased with level of medical training; 38/139(27%) 1st-4th year medical students (MS1-MS4); 25/38(66%) 1st-5th year residents (R1-R5); and 12/13(92%) staff physicians reported being comfortable ($\chi2 = 34.7$, df = 2, $p < 0.001$). MS1-MS2 were the least comfortable, with only 5/82(6%) reporting comfort, increasing to 33/57(58%) among MS3-MS4 ($\chi2 = 44.9$, df = 1, $p < 0.001$). A greater proportion of R4-R5 who completed a geriatric emergency medicine (Geri-EM) curriculum reported comfort, 11/12(92%) compared to 14/26 (54%) of R1-R3 ($\chi2 = 19.2$, df = 1, $p < 0.05$). Only 5/16(31%) nurses reported being comfortable with identifying delirium. Ability to identify all 4 clinical vignettes correctly was higher among MS3-MS4 than MS1-MS2 (32/57(56%) vs. 30/82(37%), $\chi2 = 5.2$, df = 1, $p < 0.05$). There was no difference between respondents from different levels of medical training (62/139(45%) MS1-MS4, 21/38(55%) R1-R5 and 6/13(46%) staff MDs, $\chi2 = 1.4$, df = 2 $p = 0.52$). There was no effect of Geri-EM completion on perfect vignette scores (6/12(50%) R4-R5 vs. 15/26(58%) R1-R3, $\chi2 = 0.20$, df = 1, $p = 0.66$). There was a trend towards a lower proportion of nurses who identified all 4 clinical vignettes correctly compared to physicians (4/16(25%) vs. 27/51(53%), $\chi2 = 3.82$, df = 1, $p = 0.051$). **Conclusion:** Our tool may be useful for assessing comfort and knowledge of delirium among ED physicians and nurses. Completion of the Geri-EM curriculum was associated with increased comfort with detecting delirium but not knowledge. Future studies should assess current ED delirium comfort and knowledge at different levels of training; between professions and examine differences nationwide.

Keywords: delirium, survey, education

MP22

The impact of collaborative social media promotion on the dissemination of *CJEM* articles

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Introduction: The *CJEM* Social Media Team was created in 2014 to assist the journal with the dissemination of its research online. It consists of two Social Media Editors (Junior and Senior) and a team of volunteer medical students and residents to assist their work. Collaborative promotional agreements were developed to promote *CJEM* articles on the Skeptics' Guide to Emergency Medicine (SGEM) podcast through the 'Hot off the Press' (HOP) series and the CanadiEM blog through an infographic series. **Methods:** *CJEM* papers were selected for promotion by the Team based on their perceived interest to the online community of emergency physicians. Altmetric scores, which are a measure of online dissemination derived from a weighted algorithm of social media metrics, were collated for articles promoted using the SGEM HOP or CanadiEM blogs. A control group was created using the articles with the top two Altmetric scores in each *CJEM* issue in 2015 and 2016. Erratum, Letters, and articles written by the social media editors were excluded from the control groups. The success of the social media promotion was quantified through the measurement of Altmetric scores as of January 1, 2017. Unpaired two-tailed *t*-tests with unequal variance were used to test for significant differences. **Results:** 106 and 82 eligible articles were published in 2015 and 2016, respectively. Four articles in 2015 and two articles in 2016 were excluded from the control groups because they were written by the social media editors. SGEM HOP podcasts promoted one article in 2015 and five articles in 2016. CanadiEM infographics promoted three articles in 2015 and eight articles in 2016. No articles were promoted in both series. The average Altmetric score was higher for SGEM HOP (61.0) than CanadiEM Infographics (31.5, $p < 0.04$), 2015 controls (15.8, $p < 0.01$), and 2016 controls (13.6, $p < 0.01$). The average Altmetric score for CanadiEM Infographics was higher than 2015 controls ($p < 0.04$) and 2016 controls ($p < 0.02$). There was no significant difference between the control groups. **Conclusion:** The results suggest that collaborating with established social media websites to promote *CJEM* articles using podcasts and infographics increases their social media dissemination. Given the nonrandomized design of these results, causative conclusions cannot be drawn. A randomized study of the impact of social media promotion on readership is underway.

Keywords: social media, podcasts, infographics

MP23

The yield of computed tomography of the head in patients presenting with syncope: a systematic review

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Introduction: Syncope accounts for 1-3% of Emergency Department (ED) visits. Previous studies have reported overuse of computed

tomography (CT) of the head among syncope patients. Professional organizations including Choosing Wisely have recommended against its use in the absence of high-risk features. However, a review of CT head use among syncope patients and its diagnostic yield has not been previously reported. **Methods:** We conducted a systematic review using EMBASE, Medline, and Cochrane databases from inception to August 2016. We included studies involving adult syncope patients that reported CT head use and its diagnostic yield during acute management by a two-step process: first title/abstract review and then full-text review of selected articles. We excluded case reports, narrative reviews and those involving children. We collected the proportion of patients who had CT head performed, and its diagnostic yield. Outcomes included identification of acute intracranial conditions (hemorrhage, mass or infarct) that require further management. Two reviewers independently abstracted the data and discrepancies were resolved by consensus. We calculated inter-observer reliability for inclusion in the systematic review using kappa values. We performed meta-analysis for diagnostic yield of the CT head. **Results:** Fifteen studies with 2,802 syncope patients in four sub-groups (proportion of patients among whom CT head was performed and its yield in ED and inpatient settings; studies that reported only the yield among those with CT head performed; and the use and yield among syncope patients ≥65 years old) were included. The inter-observer agreement for inclusion of final articles for meta-analysis was $\kappa = 0.925$ [95% CI: 0.861-0.990]. Seven ED studies (n = 1,261) reported 55.7% patients (95% CI: 32.1-78.0%) had head CT performed with a yield of 4.0% (95% CI: 2.7-5.6%); 5 studies with 1138 hospitalized patients reported that 38.6% (95% CI: 20.4-58.6%) had head CT with a yield of 1.1% (95% CI: 0.4-2.2%). The yield among studies that report only outcomes for CT head was 2.3% and the yield among patients' ≥65 years was 7.7%. **Conclusion:** Our review found that a very high proportion of syncope patients had CT head performed during acute management with a very low diagnostic yield. The yield is higher among patients ≥65 years old. A robust tool to identify patients who require a CT head will reduce unnecessary testing.

Keywords: syncope, computed tomography of the head

MP24

Effect on pain of an oral sucrose solution versus placebo in children 1 to 3 months old needing nasopharyngeal aspiration; a randomized controlled trial

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Introduction: Oral sweet solutions have been accepted as effective pain reducing agents for neonates. However studies in the Emergency Department (ED) setting have conflicting results. The objective is to compare the efficacy of an oral sucrose solution versus placebo in reducing pain in children 1 to 3 months of age during nasopharyngeal aspiration (NPA) in the ED. **Methods:** A randomized, double-blinded, placebo controlled clinical trial was conducted in a pediatric university-affiliated hospital ED. Participants from 1 to 3 months of age requiring NPA were recruited and randomly allocated to receive 2 mls of an 88% sucrose solution (SUC) or 2 mls of a placebo solution (PLA) orally, 2 mins before NPA. The primary outcome was the mean difference in pain scores at 1 min post NPA as assessed by the Face, Legs, Activity, Cry and Consolability (FLACC) Pain Scale. Secondary outcomes were the difference in pain scores using the Neonatal Infant Pain Scale (NIPS), crying time, heart rate and adverse events. **Results:** 72 participants were recruited and completed the study, 37 (group SUC) and 35 (group PLA) respectively. Both groups had similar demographic and clinical characteristics and baseline FLACC and NIPS pain scores (all p = value >0.4). The mean difference in FLACC scores compared to baseline was 3.3 (2.5-4.1) (SUC) vs. 3.2 (2.3-4.1) (PLA) (p = .94) at 1 min and -1.2 (-1.7 to 0.7) (SUC) vs. -0.8 (-1.5 to -0.1) (PLA) (p = .66) at 3 mins after NPA. For the NIPS scores, it was 2.3 (1.6-3.0) (SUC) vs. 2.5 (1.8-3.2) (PLA) (p = .86) at 1 min and -1.2 (-1.6 to -0.8) (SUC) vs. -0.8 (-1.3 to 0.2) (PLA) (p = .59) 3 mins after NPA. There was no difference in the mean crying time, 114 (98-130) secs (SUC) vs. 109 (92-126) secs (PLA) (p = .81). No significant difference was found in participants' heart rate at 1 min 174 (154-194) BPM (SUC) vs. 179 (160-198) BPM (PLA) (p = .32) and at 3 mins 165 (143-187) BPM (SUC) vs. 164 (142-186) BPM (PLA) (p = .86) after NPA. Three patients had vomiting during the procedure (2 PLA and 1 SUC), and one had an episode of chocking (PLA). **Conclusion:** In infants 1 to 3 months of age undergoing nasopharyngeal aspiration 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 and crying time were not significantly decreased when sucrose was provided.

Keywords: pediatrics, pain, sucrose

MP25

The role of advanced imaging in the management of benign headaches in the emergency department: a systematic review

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Introduction: Headache is a common emergency department (ED) presentation. Benign (i.e., non-pathological) headaches are particularly common, including exacerbations of chronic migraine, tension, and cluster headache. Several studies have reported concerns over the frequent use of advanced imaging, specifically computed tomography (CT), in the ED management of benign or primary headache presentations. This systematic review examined the proportion of adult ED benign headache presentations who receive a CT(head). **Methods:** Eight bibliographic databases and the grey literature were searched. All studies reporting the proportion of benign headache patients receiving a CT(head) in the ED were eligible for inclusion. Studies which included a secondary headache population of 15% of their total study population or less where eligible for inclusion. Two reviewers independently assessed study inclusion and completed quality assessment and data extraction. Weighted medians were calculated for the primary and secondary outcomes, as appropriate. **Results:** The search returned 2,444 unique citations, of which 20 met the inclusion criteria (21 patient groups were analyzed). The majority of the studies were descriptive in nature and conducted in North America. The reported proportion of benign headache patients receiving a CT(head) varied considerably (range: 2.06-67.21%); with a weighted median of 30.0% (interquartile range: 30.0, 30.0). Studies published in 2000 or later (18/21 groups) were found to have a higher weighted median percentage compared to those published pre-2000 (p = 0.016). Neither the country of origin nor the proportion of patients with secondary headache included within the study population had a significant effect on CT utilization. Of the three studies which reported the discharge diagnosis of all patients, sub-arachnoid hemorrhage was discovered in 2/241 (0.83%) of CT scans. **Conclusion:** Considerable variation in CT utilization for benign headache ED presentations exists and estimates indicate that more than a quarter of patients receive a CT(head). Overall, these CT scans rarely identify significant pathology, suggesting imaging may be safely reduced. Further research is required to identify interventions which can safely and effectively reduce unnecessary imaging among headache presentations.

Keywords: headache, diagnostic imaging, computed tomography

MP26

Rate and outcome of incidental findings among abdominal computed tomography scans in the emergency department

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Introduction: With the increased accessibility of computed tomography (CT), use in the emergency department has increased. Increased use has lead to a reduction in missed diagnoses but also an increase in radiation burden and the increased likelihood of incidental findings. In this study, we sought to characterize the use of abdominal CTs at an academic tertiary center in order to quantify the rate and clinical significance incidental findings. **Methods:** This was a retrospective chart review of radiological database of all abdominal CT ordered by the emergency department from January 1st to March 21st 2015. Incidental findings requiring follow up were defined by the American college of radiology guidelines. Clinically significant incidental findings were defined as those that resulted in a finding of malignancy or comparably serious disease. Abdominal CTs were excluded if they were ordered together with CT thorax. The data was abstracted by one trained reviewer using a standardized data collection sheet and 10% of the data was verified by a second reviewer. Inter-rater reliability reported by Kappa statistic. Data were reported as mean and standard deviation. A sample size of 770 was calculated based on an expected difference in prevalence between significant and non-significant incidental findings of 80% ($\alpha = 5\%$, Power = 90%). **Results:** A total of 1882 imaging studies were included (56.3% female, age 59.4 years (16.3), CTAS 3 (1.3). The most common presenting complaints: abdominal pain (980, 52.1%), flank pain (196, 10.4%) and nausea/vomiting (111, 6%). Indications included rule out (r/o) obstructing renal stones/colic (329; 17.5%), r/o diverticulitis/colitis (307; 16.4%) and abdominal pain not yet differentiated (283; 15.1%). The most common final diagnoses as a result of CT were renal stone/colic (212, 11.3%), colitis/diverticulitis (191, 10.2%), and bowel obstruction (111, 6%).Incidental findings recommending further imaging occurred in 93 (4.9%). Of these, 43 were completed, and 15 resulted in clinically significant findings: cancer of the colon (2), lung (2), bladder (2), metastatic cancer (2), adnexa (4), endometrium (1), lymphoma (1), and venous thrombus (1). **Conclusion:** Incidental findings are far less common (5%) then previously reported (as high as 30%) and rarely clinically significant.

Keywords: abdominal computed tomography, emergency department

MP27

Costs of emergency syncope care in Canada

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Introduction: Syncope is a common emergency department (ED) presentation and constitutes 1% of all ED visits, approximately 160,000 visits annually across Canada. Lack of standardized syncope care has economic and cost implications. Currently, emergency medical services (EMS) is over utilized, variations in ED management exist and a substantial proportion (46.5%) are hospitalized for cardiac monitoring. Our previous studies have proposed ways to reduce health care utilization through development of EMS clinical decision tool, ED risk scores and remote cardiac monitoring. We sought to: 1) Estimate costs associated with syncope care in the pre-hospital, ED and inpatient settings; and 2) Determine potential cost savings if the proposed alternate strategies were adopted. **Methods:** A prospective cohort study was conducted in five Canadian EDs from 2010-2014. We enrolled adult (≥16 years) syncope patients and excluded those with prolonged loss of consciousness, mental status changes, seizure, significant trauma, or alcohol/illicit drug abuse. Demographics, medical history, mode of arrival, EMS time points, reasons for hospitalization, ED and inpatient length of stay, final ED diagnosis and any serious adverse event within 30 days of index visit were collected. Descriptive and inferential statistics were used. **Results:** Out of 4,064 patients enrolled, 67.3% were transported to the ED by EMS and the average cost per event was $262.78 (range at study sites: $156.43-$553.03). The average cost per ED visit was $267.98 (range: $174.66-$374.95). 12.9% of the patients were admitted and the average of cost per admission was $9,886.15 (range: $9,715.23-$10,277.98). Syncope is associated with an estimated total annual cost of $257 million. In Canada, we estimate that diverting low-risk patients will save $5 million in the pre-hospital setting and $15 million in the ED annually, and implementing a remote cardiac monitoring strategy will save $50 million annually. **Conclusion:** It is estimated that the proposed strategies will save $70 million annually. This is likely an underestimation as cost savings due to reduction in investigations related to diversion of ED patients, reduction in ED length of stay and hospitalization are unaccounted. Adoption of similar strategies will likely lead to significantly higher cost savings in countries with higher resource utilization for syncope management.

Keywords: syncope, cost analysis, resource utilization

MP28

A randomized comparative trial of the usage, knowledge retention and media preferences in undergraduate medical students using podcasts and blog posts

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Introduction: Podcasts and blog posts are gaining popularity in Free Open Access Medical education (FOAMed). However, there remains a paucity of research comparing the two media for undergraduate medical education. This study aims to investigate if there are differences in medical students' usage conditions, knowledge retention and preferences in the two types of media (podcasts, blog posts). **Methods:** Medical students were block-randomized to either the podcast or blog post group according to their year of schooling. They completed an online assessment of their baseline knowledge on the subject matter and preferences within the various types of media. Participants then received access to learning materials and were given four weeks to complete the follow-up assessment. Simple descriptive statistical data were used to detail student preferences. Paired samples t-tests and a Repeated Measures Analysis of Variance (RM-ANOVA) were conducted to assess knowledge acquisition. A carry forward analysis was used to impute missing data from students lost to follow-up. **Results:** A total of 65 medical students participated in our study (podcasts n = 33, blog posts n = 32). The initial survey suggests that students prefer general topic discussion and "approach-to" themes (68% and 84%, respectively). 55% of students in the podcast group preferred podcasts that were less than 30 minutes. None of the blog post group preferred a shorter text, and each blog post required a mean of 25 minutes to read. Completion of at least one follow-up assessment was comparable (68% podcasts, 70% blog posts). The podcast listeners tended to engage in multiple activities while using the learning material (e.g. at least 2-3 of the following: driving, eating, chores, taking notes, exercising), while the blog readers tended to do fewer activities (e.g. only 1 of the

following: taking notes, eating, only reading). Both groups showed significant improvements in their test scores (Asthma: 22% improvement, Toxicology: 29%; $p < 0.01$ for both), with blog posts demonstrating a larger but non-significant difference (RM-ANOVA, Topic*Modality $F(1,59) = 0.001$, $p = 0.973$). **Conclusion:** This study suggests that podcasts and blog posts significantly improve medical student knowledge retention to a similar degree, but differ in usage conditions.
Keywords: medical education, podcast, blogs

MP29

Did the Canadian Pediatric Society policy statement in 2007 impact trampoline-related injuries in Halifax, Nova Scotia?

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Introduction: The Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) found a significant rise in trampoline-related injuries from 1999-2005, many of which required hospitalization. In 2007 and again in 2013, the Canadian Pediatric Society (CPS) recommended against the recreational use of trampolines at home. The purpose of this study was to evaluate the impact of this policy statement on trampoline-related injuries in Halifax, Nova Scotia. **Methods:** Trampoline injury data was obtained from the CHIRPP database at the IWK Health Centre, the paediatric referral hospital for the Maritimes. The data was stratified according to the timing of the CPS policy statement (before: 2001-2006, after: 2008-2013 and after reaffirmation 2013-2015). Data variables included mechanism, site, nature and context of injury. The data were evaluated using SPSS and chi-squared tests. **Results:** Since the 2007 CPS policy statement, an average of 162 per 10,000 ED visits at the IWK Health Centre were the result of trampoline-related injuries compared to 95 per 10,000 pre-policy. The majority of injuries (76-80%) occurred in children 5-14 years of age. Recreational use at home in the yard was the most common location of the accident (78-88%), with most injuries occurring on the trampoline mat itself (83-85%) due to incorrect landing (32-35%), falls (21-27%), or being struck by a person or object (24-25%). Soft tissue injuries (15-17%), sprains (19-22%) or fractures (40-46%) to the elbow (11-12%), forearm (5-9%) or ankle (19-21%) continued to be the most common nature and sites of injuries. The injury data before compared to after the CPS policy statement did not differ significantly in gender, the mechanism of injury, the type of injury, or body part involved (p-value >0.05). There was a significant difference in the number of injuries between age groups post-policy, with more occurring in children less than 4 and between the age of 10-14 ($p < 0.009$). Moreover, where the trampoline injury was located was also significantly different post-policy with more injuries occurring in sports/recreational facilities ($p < 0.001$). **Conclusion:** Trampolining is a high-risk activity with injuries occurring predominantly in children and youth. Despite the recommendations brought forth by the CPS, trampoline-related injuries remain an important source of pediatric injuries at the IWK Health Centre in Halifax, Nova Scotia.
Keywords: pediatrics, injury prevention, Canadian Paediatric Policy

MP30

Validation of the 4AT questionnaire in the emergency department

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Introduction: Delirium is a very prevalent cognitive impairment in elderly inpatients, but it often goes undetected, especially in the emergency department (ED). The tools currently available to screen or diagnose patients at risk of delirium are very time-consuming and are impossible to systematically perform in the ED environment. For this reason, short tests are necessary to screen for delirium in this fast-paced setting. The objective of this study was to evaluate the performance of the French version of the Rapid Assessment Test for Delirium (4AT) for the detection of delirium and cognitive impairment in older patients. The 4AT takes less than 2 minutes to administer, which is a great advantage on the others tests. **Methods:** The study was conducted in four emergency departments across the province of Québec. Participants were independent or semi-independent patients aged 65 and older, admitted to hospital and who had an 8-hour exposure to the ED. The Telephone Interview for Cognitive Status (TICS) was administered at the initial interview and the Confusion Assessment Method (CAM) as well as the 4AT were administered to patients twice a day during their ED or hospital stay. The 4AT's sensitivity and specificity were compared to that of the CAM (for delirium), and to that of the TICS (for cognitive impairment). **Results:** 324 patients were included in the study, with a mean age of 76 years old. Among the recruited participants, 21 (6.5%) had a prevalent delirium according to the CAM, and 30 (10.2%) had an incident delirium. According to the 4AT, 48 patients (14.9%) had cognitive impairment and 81 (25.2%) had a prevalent delirium. According to the TICS, 87 patients (29.2%) have cognitive impairment. The 4AT has a sensitivity of 68,4% (IC 95% : 47,5-89,3) and a specificity of 73.2% (IC 95% : 67,8-78,7) for delirium, and a sensitivity of 50% (IC 95% : 35,9-64,1) and a specificity of 87,0% (IC 95% : 81,2-92) for cognitive impairment. **Conclusion:** The French Version of the 4AT could be a fast and reliable screening tool for delirium and cognitive impairment in ED. Further research is necessary for its validation in the ED.
Keywords: validation, rapid assessment test for delirium (4AT), seniors

MP31

The contrarian effect: how does a Choosing Wisely focused knowledge translation initiative affect emergency physician practice in a high awareness-low investigation environment?

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Introduction: We previously reported that a targeted knowledge translation (KT) intervention was associated with a trend towards increased awareness and knowledge of the Choosing Wisely Canada (CWC) emergency medicine (EM) recommendations. We wished to assess if the intervention changed physician practice, specifically looking at the imperative "do not order lumbar XRs for non-traumatic low back pain unless red flags exist". **Methods:** A departmental KT initiative was implemented in April 2016 and consisted of a 1-hour seminar reviewing the CWC-EM recommendations, access to a video cast, departmental posters, and a before and after awareness survey. The effectiveness of our intervention was assessed by analyzing the frequency of lumbar XR imaging conducted for low back pain before and after the introduction of our intervention at a tertiary teaching hospital emergency department. All patient visits for the complaint of low back pain were included. The rates of XR imaging from June 2014 to September 2014 for the pre-intervention period and June 2016 to September 2016 for the post-intervention period were collected and analyzed using Fisher exact tests. A sample size of 683 was required to detect a 5% change with an alpha of 0.05 and a power of 80%. **Results:** Baseline characteristics of patients were similar for the pre- and post-intervention periods. There was a total of 781 patient visits for low back pain in June to September 2014 and 672 in June to September 2016. The XR imaging

rate for low back pain increased from 12% (95% CI 9.9-14.5) to 16.2% (95% CI 13.6-19.2) following the intervention (p = 0.023). **Conclusion:** We previously demonstrated a trend towards increased awareness and knowledge of the CWC EM recommendations following a knowledge translation initiative. Baseline XR imaging rates for low back pain were lower than what has been reported. We observed that our intervention was associated with an increased frequency of imaging for low back pain. This may be due to a contrarian effect. We feel this calls into question the role of knowledge translation initiatives where physician practice already closely adheres to pre-established recommendations.

Keywords: Choosing Wisely, physician awareness, knowledge translation

MP32

The Pulmonary Embolism Severity Index (PESI) score and disposition decisions in Calgary emergency departments

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Introduction: The Pulmonary Embolism Severity Index (PESI) score predicts short-term mortality from pulmonary embolism and low-risk patients suitable for home therapy. However, it is unknown if it is a driver for disposition decisions for emergency department (ED) patients. The primary objective of this study was to define the relationship between disposition decisions and the PESI score in Calgary zone hospitals. **Methods:** The PESI score was calculated retrospectively for 576 patients presenting to one of four Calgary zone hospitals for pulmonary embolism over the last 2 years. The calculated PESI score allowed the mortality risk of each patient to be estimated for very low risk (Class I, 0-1.6% 30-day mortality rate), low risk (Class II, 1.7-3.5% 30-day mortality rate), intermediate risk (Class III, 3.2-7.1% 30-day mortality rate), high risk (Class IV, 4.0-11.4% 30-day mortality rate), and very high risk (Class V, 10.0- 24.5% 30- day mortality rate). The patients were grouped based on being admitted to the hospital for inpatient care, or discharged for outpatient care. Descriptive statistics were used to describe the data. **Results:** Of the 576 patients, 317 (55%) were discharged and 259 (45%) were admitted to the hospital for inpatient care. Among admitted patients, 20.5% were considered Class I, 29.3% were Class II, 24.3% were Class III, 17.6% were Class IV, and 8.1% were Class V. Among discharged patients, 53.9 % were Class I, 25.6% were Class II, 15.5% were Class III, 4.4% were Class IV, and 0.6% were Class V. Of the 25 very high-risk (Class V) patients, 2 (8.0%) were discharged from the ED and treated as outpatients. Of the 223 very low risk (Class I) patients, 171 (76.7%) were discharged and 52 (23.3%) were admitted to hospital. **Conclusion:** A significant percentage of pulmonary embolism patients admitted to Calgary Zone hospital wards are PESI low risk (29.3%) or very low risk (20.5%). Implementation of a PESI score-based disposition pathway could improve the safety, cost-effectiveness and quality of ED disposition decisions for PE.

Keywords: pulmonary embolism, admission avoidance, clinical decision rules

MP33

A systematic review of the psychometric properties and diagnostic performance of instruments to identify mental health and substance use problems among children in the emergency department

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Introduction: The objective of this systematic review was to investigate the psychometric properties and diagnostic performance of instruments used in the emergency department to identify pediatric mental health and substance use problems. **Methods:** A search of seven electronic databases and the grey literature was conducted. Studies assessing any instrument to identify and or diagnose mental illness, emotional or behavioural problems, or substance use disorders in pediatric patients with presentations for mental health or substance use issues were considered eligible for inclusion. Two independent reviewers judged the relevance and study quality of the studies. A descriptive analysis of the outcomes was reported. **Results:** From 4832 references, 14 studies were included. Eighteen instruments were evaluated for identifying suicide risk, alcohol use disorders, mood disorders, and ED decision-making. The HEADS-ED has good inter-rater reliability (r = 0.785) for identifying general mental health problems and modest evidence for ruling out patients requiring hospital admission (positive likelihood ratio, $LR^+ = 6.30$). The internal consistency varied for tools to screen for suicide risk ($\alpha = 0.46$-0.97); no tools have both high sensitivity and high specificity. The Ask Suicide-Screening Questionnaire (ASQ) is highly sensitive (98%) and provides strong evidence to rule out risk (negative likelihood ratio, $LR^- = 0.04$). Among tools to screen for alcohol use disorders, a two-item tool based on DSM-IV criteria was found to be the most accurate in identifying patients with a disorder (area under the curve: 0.89), and has modest evidence to rule in and rule out risk ($LR^+ = 8.80$, $LR^- = 0.13$). **Conclusion:** Reliable, valid, and accurate instruments are available for use with pediatric mental health ED visits. Based on available evidence, emergency care clinicians are recommended to use the HEADS-ED to rule in ED admission, ASQ to rule out suicide risk, and DSM-IV two-item tool to rule in/rule out alcohol use disorders.

Keywords: pediatrics, mental health, emergency department

MP34

Assessment of pain management during transport of intubated patients in a prehospital setting

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Introduction: While methods have been developed to assess pain and provide analgesia to hospitalized intubated patients, little is known about current EMS practices in providing similar care during air and land medical transports. Therefore, we sought to determine if opioid analgesia is provided to intubated patients during transportation in out-of-hospital setting. **Methods:** We conducted a health record review examining electronic records of intubated patients transported by Ornge in 2015. Ornge is the exclusive provider of air and land transport of critically ill patients in Ontario, Canada with over 18,000 transports per year. We identified cases using Ornge's database and selected intubated patients meeting inclusion criteria. A standardized data extraction form was piloted and used by a single trained data extractor. The primary outcome was frequency of administration and dose adequacy of an opioid analgesic. Secondary outcomes included: choice of analgesics used (fentanyl, hydromorphone or morphine), adverse events, and impact of age, sex, or reason for transfer on pain management. We present descriptive statistics. **Results:** Our strategy identified 500 potential cases, of which 448 met our inclusion criteria. Among those 448 patients, 154 (34.4%) were females, 328 (73.4%) received analgesia and 211 (64.3%) received more than one dose during transport (median frequency of 2 doses, IQR = 1 to 3). The average transport time was 148 minutes and repeated dosing (>1 repeat dose) occurred primarily (45.5%) in transports of over 180 minutes. Fentanyl was the most commonly used analgesic (97.6%) and most commonly used dose was

50 micrograms (51.8%). Adverse events occurred in 8 (2.5%) patients with 5 patients having new hypotension (MAP <65 mm Hg). There was no significant difference in administration of analgesia based on patient's age or sex (68.8% of females and 75.3% of male patients received analgesia). Interestingly, 30.8% of patients repatriated to originating-hospital received analgesia compared to 72.3% of patients receiving analgesia for all other reasons for transfers. **Conclusion:** More than 73% of intubated patients transported by Ornge received an opioid analgesic, most commonly fentanyl. We found no clinically relevant difference in the administration of analgesics based on age, sex or reason for transfer other than home repatriation.
Keywords: emergency medical services operations, pain management, intubation

MP35
The CanadiEM Junior Editor Program: Integrating medical students and junior residents into a dedicated FOAMed training program
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Introduction / Innovation Concept: Free Open Access Medical education (FOAM) is a rapidly emerging medium for the dissemination of medical knowledge, especially in Emergency Medicine. However, the most contributors to FOAM are EM attendings who write on established platforms which they also maintain. EM learners have difficulty breaking into this quickly evolving field. In an effort to encourage FOAM involvement of trainees early in their careers, CanadiEM recruited 10 junior residents and medical students with the purpose of developing the skills necessary to contribute to FOAM. These Junior Editors actively participate in the blog workflow, developing writing, editorial, and management skills necessary to operate a high-traffic EM website. **Methods:** Potential candidates were recruited by placing an advertisement and application on the CanadiEM website. 10 medical students or junior residents were invited to online group video interviews and were all accepted as Junior Editors (JE). Senior CanadiEM staff held online training sessions for all new JEs on how to use Wordpress to create, edit and publish posts, as well as basics in Search Engine Optimization. The junior editors collaboratively developed an instructional document containing the information they learned during these sessions. JEs then volunteered for editorial jobs via an online messaging system (Slack) as they became available. After uploading the draft of each post, the final products are reviewed by senior Editor and feedback was given to each JE. **Curriculum, Tool, or Material:** All JEs have learned to use the Wordpress blogging platform to create, edit, and upload posts; optimize blog posts for search engines. Following their own interests, some JEs have also learned to edit podcasts, promote the blog on social media resources (Twitter and Facebook), create infographics, and copy-edit blog posts. **Conclusion:** After 8 months, the JE program has yielded 6 very active editors who maintain a strong blog workflow, have well-developed social media skills, and are actively involved in developing their own content for future posts. The JE program is a strong pathway to introduce medical trainees to both the technical and creative aspects of FOAM and serves as a novel approach to transition students from passive utilization of online content to active contributors.
Keywords: free open access medical education (FOAM), innovation

MP36
Safety and clinically important events in PCP-initiated STEMI bypass in Ottawa: a health record review
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Introduction: In Ottawa, STEMI patients are transported directly to percutaneous coronary intervention (PCI) by advanced care paramedics (ACPs), primary care paramedics (PCPs), or transferred from PCP to ACP crew (ACP-intercept). PCPs have a limited skill set to address complications during transport.The objective of this study was to determine what clinically important events (CIEs) occurred in STEMI patients transported for primary PCI via a PCP crew, and what proportion of such events could only be treated by ACP protocols. **Methods:** We conducted a health record review of STEMI patients transported for primary PCI from Jan 1, 2011-Dec 21, 2015. Ottawa has a single PCI center and its EMS system employs both PCP and ACP paramedics. We identified **c**onsecutive STEMI bypass patients transported by PCP-only and ACP-intercept using the dispatch database. A data extraction form was piloted and used to extract patient demographics, transport times, and primary outcomes: CIEs and interventions performed during transport, and secondary outcomes: hospital diagnosis, and mortality. CIEs were reviewed by two investigators to determine if they would be treated differently by ACP protocols. We present descriptive statistics. **Results:** We identified 967 STEMI bypass cases among which 214 (118 PCP-only and 96 ACP-intercept) met all inclusion criteria. Characteristics were: mean age 61.4 years, 78% male, 31.8% anterior and 44.4% inferior infarcts, mean response time 6 min, total paramedic contact time 29 min, and in cases of ACP-intercept 7 min of PCP-only contact time.A CIE occurred in 127 (59%) of cases: SBP < 90 mmHg 26.2%, HR < 60 30.4%, HR > 100 20.6%, malignant arrhythmias 7.5%, altered mental status 6.5%, airway intervention 2.3%, 2 patients (0.9%) arrested, both survived. Of the CIE identified, 54 (42.5%) could be addressed differently by ACP vs PCP protocols (25.2% of total cases). The majority related to fluid boluses for hypotension (44 cases; 35% of CIE). ACP intervention for CIEs within the ACP intercept group was 51.6%. There were 6 in-hospital deaths (2.8%) with no difference in transport crew type. **Conclusion:** CIEs are common in STEMI bypass patients however a smaller proportion of such CIE would be addressed differently by ACP protocols compared to PCP protocols. The vast majority of CIE appeared to be transient and of limited clinical significance.
Keywords: ST-segment elevation myocardial infarction bypass, emergency medical services bypass

Poster Presentations

P001
Do all toddler's fractures need to be managed by orthopaedic surgeons?
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Introduction: There is increasing evidence that emergency room physicians or primary care physicians can definitively manage many uncomplicated paediatric fractures without orthopaedic follow-up. This strategy leads to a reduction in radiation exposure and decreased costs to patient families and the healthcare system without impacting patient outcomes. The aim of this study was to determine whether patients who sustained a toddler's fracture of the tibia required orthopaedic surgeon follow-up. **Methods:** A retrospective analysis including patients who presented to the Hospital for Sick Children (SickKids) for management of toddlers' fractures between Jan 2009 and Dec 2014 was performed**.**

Results: 186 patients (115 males, 72 females) with an average age of 2.00 (range 0.2-3.9) were included in the study. The mean number of clinic visits including initial consultation in the emergency department was 2.00 (±1.0). The mean number of radiology department appointments was 2.76 (±1.1) where patients received a mean number of 5.86 (±2.6) radiographs. Complications were minimal and no patient developed a non-union nor re-fractured. All patients achieved clinical and radiographic union. To date, no patient has returned to clinic or undergone surgery for concerns regarding leg length inequality or malalignment. **Conclusion:** Our series supports reduced clinical follow-up of patients with a toddler's fracture of the tibia. If the diagnosis can be made on the initial radiographs, emergency room physicians or primary care providers can definitively manage these patients with appropriate immobilization that can be removed by the parents between 3-4 weeks after the injury. A fracture clinic follow-up is only necessary if the diagnosis cannot be made on the initial radiographs. Our toddler's fracture pathway will reduce patient radiation exposure and reduce costs incurred by the healthcare system and patients' families without jeopardizing patient outcomes.

Keywords: toddlers fracture, clinical care pathway

P002

Do 5th metatarsal fractures need to be managed by orthopaedic surgeons?

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Introduction: There is increasing evidence that emergency room physicians or primary care physicians can definitively manage many uncomplicated paediatric fractures without orthopaedic follow-up. This strategy leads to a reduction in radiation exposure and decreased costs to patient families and the healthcare system without impacting patient outcomes. The aim of this study was to determine whether patients who sustained an isolated 5th metatarsal fractures require orthopaedic surgeon follow-up. **Methods:** A retrospective analysis including patients who presented to the Hospital for Sick Children (SickKids) for management of metatarsal fractures from 2009-2014 was performed**. Results:** 124 patients (66 males, 58 females) with mean age of 11.3 (SD = 2.9) years old were included in the study. Complications were minimal with no patients requiring operative management. There were zero non-unions and 3 delayed unions. Despite zero instances of surgical correction and a low complication rate, fracture clinic resource utilization was substantial. Fractures were managed with a mean number of 3.1 (SD = 0.98) clinic visits, including initial evaluation in the emergency department. A mean number of 2.8 (SD = 1.1) radiology department visits were conducted, with a mean of 8.1 (SD = 3.8) x-rays total per patient. **Conclusion:** Our series supports reduced clinical follow-up of patients with isolated 5th metatarsal fractures. If the diagnosis can be made on the initial radiographs, ER physicians or primary care providers can definitively manage these patients with appropriate immobilization. A fracture clinic follow-up is only necessary if the diagnosis cannot be made on the initial radiographs. Our clinical care pathway will reduce radiation exposure and reduce costs incurred by the healthcare system and patients' families without jeopardizing patient outcomes.

Keywords: metatarsal, fracture, clinical care pathway

P003

Emergency department quality assurance sepsis project: why are more people dying in southwestern Ontario?

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Introduction: London Health Sciences Centre (LHSC) includes two academic, urban hospitals in London, Canada. The hospital-standardized mortality ratio (HSMR) is consistently higher than provincial and national averages. Unpublished data reveals that sepsis contributes the largest number of statistically unexpected deaths to LHSC's HSMR calculation. Factors contributing to in-hospital sepsis mortality are hypothesized to include demography, emergency department (ED) flow or sepsis treatment. **Methods:** Retrospective chart review of patients aged >=18 years, presenting to an LHSC ED between 01 Nov 2014 and 31 Oct 2015, with >=2 SIRS criteria and/or ED suspicion of infection and/or ED or hospital discharge sepsis diagnosis (ICD-10 diagnostic codes A4xx and R65). Data were abstracted from electronic health records. Regional, provincial and national data was retrieved from CIHI and Statistics Canada. **Results:** Median age and sex in London and across Canada are similar (48.2 years vs 48.9 years; 48% male vs 49% male). Baseline prevalences of diabetes, hypertension, COPD and mood disorders were similar in the Local Health Integration Network and Ontario (6% vs 7%, 19% vs 19%, 3% vs 4%, and 10% vs 8%). Median "Physician Initial Assessment," (PIA) times for sepsis patients at LHSC were faster than median Canadian PIA times for CTAS I and II patients (CTAS I: 7 min vs 11 min, CTAS II: 34 min vs 54 min), and slower for CTAS III-V patients (CTAS III: 98 min vs 79 min, CTAS IV: 99 min vs 66 min, CTAS V: 132 min vs 53 min). Median ED length of stay for admitted, high acuity (CTAS I-III) patients was 6 h at LHSC versus 10 h across Canada.Median [IQR] time to intravenous fluid resuscitation was 60.5 min [29.8-101.2] for septic shock patients and 77.0 min [36.0-127.0] for expired patients. Median [IQR] time to antibiotics was 130 min [73.0-229.0] for sepsis patients, 106 min [60.0-189.0] for severe sepsis patients, and 82 min [42.2-142] for septic shock patients. **Conclusion:** Excess sepsis-related mortality at LHSC is not convincingly related to patient demographics or ED flow. Gains may be made by improving time to antibiotics and IV fluids.

Keywords: sepsis, risk stratification, comorbidity

P004

Hair cannabinoid concentrations in hyperemesis cannabis: a case-control study

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Introduction: Emergency physicians increasingly encounter young patients with protracted, forceful hyperemesis associated with heavy cannabis use, previously termed "cyclic vomiting." The national discourse on liberalization of cannabis has largely ignored this poorly understood condition. We wondered to what degree hyperemesis cannabis is an idiosyncratic reaction, like motion sickness or migraine, versus a more predictable dose-response effect of heavy, prolonged use. **Methods:** As part of a larger case-control study using structured interviews, we measured cannabinoid concentrations in scalp hair of both cases and controls. Cases were required to have an emergency visit for vomiting, 2+ episodes of severe vomiting in the previous year, history of near-daily use of cannabis for 6+ months, positive urine Δ9-tetrahydrocannabinol (THC) and age 16-55 years; exclusion criteria were chronic opioid use, synthetic cannabinoid use, or established alternative diagnosis. Age- and sex-matched chronic cannabis-using controls without vomiting were identified via social referral primarily from the cases themselves. Scalp hair was analyzed for THC, cannabinol (CBN), cannabidiol (CBD) and 11-*nor*-9-carboxy-THC (THC-COOH) by LC-MS/MS (limit of quantification ~15 pg/mg hair; accuracy <5%) in an independent laboratory blinded to subject

classification. **Results:** We obtained satisfactory hair and urine samples from 18 cases (median [IQR] age 27 [20,31] years; 12 male) and 13 controls. THC and CBN concentrations were higher in cases than controls (THC 240 [120,820] vs 99 [73, 290] pg/mg; CBN 63 [33, 260] vs 15 [negative, 76] pg/mg; each $P < 0.05$). CBD and THC-COOH were often unquantifiable to undetectable in both cases and controls. **Conclusion:** Hyperemesis cannabis patients have substantially higher hair cannabinoid concentrations than their peers without vomiting, although there is some overlap. The association cannot demonstrate a direct dose-response with THC–confounding (e.g. other cannabinoids, external smoke deposition), altered metabolism and reverse causation (e.g. seeking temporary symptom relief by using more cannabis) could also yield a positive association. Nevertheless, these findings support counselling patients with hyperemesis to reduce or discontinue using cannabis. They also support national regulatory initiatives including education, labelling, and progressive taxation based on potency intended to discourage excessive use.

Keywords: cannabis, hyperemesis, drug abuse

P005

Consultations in the emergency department: a systematic review

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Introduction: Consultation in the emergency department (ED) is a common component of emergency health care. Consultation is defined as a case in which an ED physician (EP) requests the services of another physician (consultant) for an ED patient to assist, advise, and/or transfer care when the care required is beyond the expertise of the EP's practice. While consultation is generally considered required and beneficial for patient care, consultation can also have a negative impact by incurring delays in patient flow and disposition. These delays contribute to ED crowding, patient dissatisfaction and, in some cases, worse health outcomes. Using an a priori protocol and accepted methodology, the aim of this systematic review was to update a previous review on the same topic and determine the proportion of 1) ED visits that involve consultation and 2) consultation cases that result in admission. PROPSPERO registration number: CRD42017054054. **Methods:** Literature search involved multiple electronic databases (e.g., MEDLINE and EMBASE) and grey literature (e.g., Google Scholar and conference abstracts). Study selection was conducted independently by two reviewers and determined by consensus among the two reviewers with disagreements resolved by a third party. Data extraction was conducted independently by two reviewers and determined by consensus among the two reviewers with disagreements resolved by a third party. A descriptive analysis was conducted. Outcome measure data were aggregated and reported with suitable descriptive statistics such as raw or weighted mean, median, or proportion with 95% confidence interval. **Results:** Literature search yielded 1,584 studies, of which 65 were included. Two-thirds of studies were conducted in USA or Canada. Of the 65, 54 were focused on a particular patient group or consulting specialty (e.g., psychiatry) while 11 considered the general ED population. Of these 11, the median proportion of ED visits involving consultation was 26%. The median proportion of cases with consultation that resulted in admission was 60%. **Conclusion:** Consultations in the ED are quite common and many of these cases result in admission. Given their frequency of occurrence and increasing ED crowding, efforts to reduce consult delays and expedite disposition appear warranted.

Keywords: consultation, admission

P006

Characterizing patients with newly-diagnosed diabetes mellitus in the emergency department: A one-year health records review

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Introduction: Diabetes mellitus is an increasingly prevalent chronic condition that is usually managed in an outpatient setting. However, the emergency department (ED) plays a crucial role in the management of diabetic patients, particularly for those who are presenting with newly diagnosed diabetes. Little research has been done to characterize the population of patients presenting to the ED with hyperglycemia with no previous diagnosis of diabetes. The objective of this study was to describe the epidemiology, treatment, and outcomes of patients who were newly diagnosed with diabetes in the ED and to compare those with newly diagnosed type I versus type II diabetes. **Methods:** A one-year health records review of newly diagnosed diabetes patients ≥18 years presenting to one of four tertiary care EDs was conducted. All patients with a discharge diagnosis of hyperglycemia, diabetic ketoacidosis or hyperosmolar hyperglycemic syndrome were screened, but only those who did not have a previous history of diabetes were included. Trained research personnel collected data on patient characteristics, management, disposition, and outcome. Descriptive statistics were used to summarize the data where appropriate. **Results:** Of 645 patients presenting with hyperglycemia in the study period, 112 (17.4%) were newly diagnosed diabetes patients. Of these patients, 30 (26.8%) were later diagnosed with type I diabetes and 82 (73.2%) were diagnosed with type II diabetes. For the newly diagnosed type I patients the mean (SD) age was 27.6 (9.9) and the mean (SD) age for type II patients was 52.4 (14.1). Of all the new onset patients, 26.8% were diagnosed with diabetic ketoacidosis. The percentage of patients diagnosed with diabetic ketoacidosis was higher in type I than type II (63.3% vs 13.4%; $P < 0.01$). A total of 49 (43.8%) patients were admitted to the hospital, and more patients with type I were admitted compared to those with type II (66.7% vs 35.4 %; $P < 0.01$). **Conclusion:** Limited research has been done to describe patients newly diagnosed with diabetes in the ED. Patients with type I were found to be more likely to present to the ED with serious symptoms requiring admission to hospital. Our findings demonstrate that the ED may have a strong potential role for improving diabetic care, by providing future opportunities for education and follow-up in the ED to reduce complications, particularly in type I.

Keywords: diabetes, hyperglycemia

P007

A comparative analysis of qSOFA, SIRS and Early Warning Scores Criteria to identify sepsis in the prehospital setting

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Introduction: Early recognition of sepsis is key in delivering timely life-saving interventions. The role of paramedics in recognition of these patients is understudied. It is not known if the usual prehospital information gathered is sufficient for severe sepsis recognition. We sought to: 1) evaluate the paramedic medical records (PMRs) of severe sepsis patients to describe epidemiologic characteristics; 2) determine which severe sepsis recognition and prediction scores are routinely captured by paramedics; and 3) determine how these scores perform in the prehospital setting. **Methods:** We performed a retrospective review of patients ≥18 years who met the definition of severe sepsis in one of two urban Emergency Departments (ED) and had arrived by ambulance over

an eighteen-month period. PMRs were evaluated for demographic, physiologic and clinical variables. The information was entered into a database, which auto-filled a tool that determined SIRS criteria, shock index, prehospital critical illness score, NEWS, MEWS, HEWS, MEDS and qSOFA. Descriptive statistics were calculated. **Results:** We enrolled 298 eligible sepsis patients: male 50.3%, mean age 73 years, and mean prehospital transportation time 30 minutes. Hospital mortality was 37.5%. PMRs captured initial: respiratory rate 88.6%, heart rate 90%, systolic blood pressure 83.2%, oxygen saturation 59%, temperature 18.7%, and Glasgow Coma Scale 89%. Although complete MEWS and HEWS data capture rate was <17%, 98% and 68% patients met the cut-point defining "critically-unwell" (MEWS ≥3) and "trigger score" (HEWS ≥5), respectively. The qSOFA criteria were completely captured in 82% of patients; however, it was positive in only 36%. It performed similarly to SIRS, which was positive in only 34% of patients. The other scores were interim in having complete data captured and performance for sepsis recognition. **Conclusion:** Patients transported by ambulance with severe sepsis have high mortality. Despite the variable rate of data capture, PMRs include sufficient data points to recognize prehospital severe sepsis. A validated screening tool that can be applied by paramedics is still lacking. qSOFA does not appear to be sensitive enough to be used as a prehospital screening tool for deadly sepsis, however, MEWS or HEWS may be appropriate to evaluate in a large prospective study.

Keywords: prehospital, sepsis, early recognition

P008

Implementation of a voluntary provincial knowledge translation intervention project to improve the appropriateness of CT imaging for patients with mild traumatic brain injury and suspected pulmonary embolism

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Introduction: Utilization of CT imaging has risen dramatically with increases in availability, but without corresponding improvements in patient outcomes. Previous attempts to improve imaging appropriateness via guideline implementation have met with limited success, with commonly cited barriers including a lack of confidence in patient outcomes, medicolegal risk, and patient expectations. The objective of this project is to improve CT utilization and appropriateness by addressing common barriers through clinical decision support (CDS) embedded in clinical practice. **Methods:** This matched-pair cluster-randomized trial saw 12 Alberta EDs with CT scanners randomized to receive CDS for diagnostic imaging. After extensive site engagement to recruit emergency medicine and diagnostic imaging leadership and stakeholders and understand local contexts, half of the sites received CDS for mild traumatic brain injury (MTBI) based on the Canadian CT Head Rule, while the remainder received CDS for suspected pulmonary embolism (PE), including the Pulmonary Embolism Rule-out Criteria (PERC), Wells Score, age-adjusted D-dimer and CT pulmonary angiography (CTPA) use. Hardcopy CT order forms including quantitative decision support, source literature and patient handouts were developed and adapted and integrated into workflow as per local site preference. Regular physician and site report cards on CT utilization and CDS use were also provided. The primary outcome was diagnostic imaging utilization for patients with MTBI and suspected PE. **Results:** During the study period, 144 emergency physicians at 6 EDs saw 3,278 patients with MTBI and 146 emergency physicians at six matched comparison EDs saw 18,606 patients with suspected PE. Use of CDS was highly variable by site, ranging from 0% to 29% of CT orders for MTBI and from 13% to 75% of CTPA orders for suspected PE. Impact on CT utilization, appropriateness, diagnostic yield is currently under investigation, but is expected to be limited at many sites given the variable adoption of decision support. **Conclusion:** A comprehensive CDS intervention to improve evidence-based imaging has met with variable uptake. Meaningful and widespread sustained improvements in practice will likely require incentives, accountability measures and leadership authority to enforce change.

Keywords: decision support, diagnostic imaging, knowledge translation

P009

Improving elderly care transitions through the local adaptation and implementation of the Acute Care for Elderly (ACE) program

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Introduction: Decreasing readmission rates and return emergency department (ED) visits represent a major challenge for health organizations. Seniors are especially vulnerable to discharge adverse events which can result in unplanned readmissions and loss of physical, functional and/or cognitive capacity. The ACE Collaborative is a national quality improvement initiative that aims to improve care of elderly patients. We aimed to adapt Mount Sinai's Care Transitions program to our local context in order to decrease avoidable readmissions and ED visits among seniors. **Methods:** We performed a prospective pre/post implementation cohort study. We recruited frail elderly hospitalized patients (≥50 years old) discharged to home and at risk of readmission (modified LACE index score ≥ 7/12). We excluded patients being discharged to long-term nursing homes or institutions. Our intervention is based on selected strategic ACE Care Transitions best practices: transition coach, telehealth personal response services and a structured discharge checklist. The intervention is offered to selected patients before hospital discharge. Our primary outcome is a 30-day post-discharge composite of hospital readmission and return ED visit rate. Our secondary outcomes are functional autonomy, satisfaction with care transition, quality of life, caregiver strain and healthcare resource use at recruitment and at 30-days follow-up. Hospital-level administrative data is also collected to measure global effect of practice changes. **Results:** The project is currently ongoing and preliminary results are available for the pre-implementation cohort only. Patients in this cohort (n = 33) were mainly men (61%), aged 75 ± 10 years and presented an OARS score (Activities of Daily Living instrument that ranges from 0-28) of 5.6 ± 4.9. At 30 days post-discharge, the patients in our cohort had a 42.4% readmission rate (14 hospitalisations) and a 54.5% return ED visit rate (18 visits). For the same time period, readmission and return ED rates for all patients in the same corresponding age-group at the hospital level were 14.4% and 21.9%, respectively. Further results for our post-intervention cohort will be presented at CAEP 2017. **Conclusion:** Our cohort of elderly patients have high readmission and return ED visit rates. Our ongoing quality improvement project aims to decrease these readmissions and ED visits.

Keywords: discharge, geriatrics, implementation

P010

Code Silver: Lessons learned from the design and implementation of Active Shooter Simulation In-Situ Training (ASSIST)

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Introduction: Hospital shootings are rare events that pose extreme and immediate risk to staff, patients and visitors. In 2015, the Ontario Hospital Association mandated all hospitals devise an armed assailant Code Silver protocol, an alert issued to mitigate risk and manage casualties. We describe the design and implementation of ASSIST (Active Shooter Simulation In-Situ Training), an institutional, full-scale hybrid simulation exercise to test hospital-wide response and readiness for an active shooter event, and identify latent safety threats (LSTs) related to the high-stakes alert and transport of internal trauma patients. **Methods:** A hospital-wide in-situ simulation was conducted at a Level 1 trauma centre in downtown Toronto. The two-hour exercise tested a draft Code Silver policy created by the hospital's disaster planning committee, to identify missing elements and challenges with protocol implementation. The scenario consisted of a shooting during a hospital meeting with three casualties: a manikin with life-threatening head and abdomen gunshot wounds (GSWs), a standardized patient (SP) with hypotension from an abdominal GSW, and a second SP with minor injuries and significant psychological distress. The exercise piloted the use of a novel emergency department (ED)-based medical exfiltration team to transport internal victims to the trauma bay. The on-call trauma team provided medical care. Ethnographic observation of response by municipal police, hospital security, logistics and medical personnel was completed. LSTs were evaluated and categorized using video framework analysis. Feasibility was measured through debriefings and impact on ED workflow. **Results:** Seventy-six multidisciplinary medical and logistical staff and learners participated in this exercise. Using a framework analysis, the following LSTs were identified: 1) Significant communication difficulties within the shooting area, 2) Safe access and transport for internal casualties, 3) Difficulty accessing hospital resources (blood bank) 4) Challenges coordinating response with external agencies (police, EMS) and 5) Delay in setting up an off-site command centre. **Conclusion:** In situ simulation represents a novel approach to the development of Code Silver alert processes. Findings from ethnographic observations and a video-based analysis form a framework to address safety, logistical and medical response considerations.

Keyword: disaster preparedness, code silver, in situ simulation

P011

Discerning perceived barriers and facilitators to goals of care discussion in the emergency department: A survey of emergency physicians and residents

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Introduction: Patients presenting to the Emergency Department (ED) may require clarification of their goals of care (GOC) to ensure they receive treatments aligned with their values. However, these discussions can be difficult to conduct for multiple reasons, including lack of time in a busy ED, competing priorities and a limited relationship with the patient. Few studies have examined the perceived challenges faced by Emergency Physicians in conducting GOC discussions. This study sought to contextualize and discern the barriers and facilitators to having these conversations as reported by Emergency physicians. **Methods:** An interdisciplinary team of Emergency Medicine, Palliative Care and Internal Medicine providers developed an online survey comprised of multiple choice, Likert-scale and open-ended questions to explore four domains of GOC discussions: training; communication; environment; and personal beliefs. Invitations and scheduled reminders were sent to 275 ED physicians at six academic sites in a Canadian urban centre, including 49 EM residents. **Results:** 105 (46%) staff physicians and 23 (47%) residents responded with similar representation from all sites. Differences were reported in the frequency of GOC discussions: 59% of staff physicians conduct several per month whereas 65% of residents conduct less than one per month. Most agreed that GOC discussions are within their scope of practice (92%), they feel comfortable (96%), and are adequately trained (73%) to have them; however, 66% reported difficulty initiating GOC discussions. 73% believed that admitting services should conduct GOC discussions, yet acuity was noted in the comments as a major determinant with initiating GOC discussions by ED physicians. Main barriers identified were lack of time, chaotic environment, lack of advanced directives and the inability to reach substitute decision makers. 54% of respondents indicated that the availability of 24-hour Palliative Care consults would facilitate GOC discussions in the ED. **Conclusion:** Emergency physicians are prepared to conduct goals of care discussions, but often believe they should instead be conducted by the patient's admitting service. Multiple perceived barriers to goals of care discussion in the ED were identified, and a majority of respondents felt that the availability of Palliative Care in the ED may facilitate these discussions.

Keywords: palliative care, barriers to care

P012

Québec emergency physicians propose priority solutions to improve rural emergency care

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Introduction: In the province of Québec, roughly 20% of the population lives in rural areas. Rural emergency departments (EDs) face different challenges than their urban counterparts. Yet, few studies have sought to understand these challenges. This study aims to survey Québec's emergency physicians to: 1) identify problems specific to rural EDs, 2) find solutions for improving accessibility and quality of care offered in rural regions and, 3) rank solutions in order of priority. These results will allow data triangulation with other of our studies that seek to identify challenges faced by rural EDs and potential solutions. **Methods:** During the 2016 annual conference of the *Québec Emergency Physicians' Association*, we asked physicians and residents (including those from urban EDs), to complete a survey about the challenges faced by rural EDs. The survey contained two sections. The first took the form of open-ended questions in which respondents could write three challenges about accessibility and quality of care in rural EDs (objective 1) and three solutions to address these challenges (objective 2). The second section listed 11 potential solutions identified in our previous study. The solutions were ranked based on their priority level on a five-point Likert scale that ranged from "not a priority" to "an absolute priority" (objective 3). We added the total number of points for each solution and produced a ranking list. **Results:** Ninety-one physicians out of the 417 at the conference completed the survey; 58% came from urban EDs and 42% from rural EDs. Open-ended questions suggest that access to specialists and interfacility transfers are the principal challenges faced by rural EDs. The top five solutions identified as the highest priorities were: 1) care protocols, 2) improvement of interfacility transfers, 3) training with simulators, 4) targeted ultrasound and, 5) implementation of staff retention and recruitment strategies. **Conclusion:** This study is relevant and useful as roughly a quarter of attendants at the conference spontaneously volunteered to help identify and prioritize solutions to foster the accessibility and quality of care in rural EDs. Furthermore, it represents a stepping stone for our recently-launched

wide-scope study, Urgences Rurales 360, that aims to explore problems faced by every of the 28 rural EDs in Québec and the solutions that could be implemented to resolve them.
Keywords: rural, emergency, access

P013

What are the short-term goals of patients presenting the emergency department with an acute mental health complaint?

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Introduction: In the last year, Canada published its Strategy for Patient-Oriented Research (SPOR) to ensure that patients receive the right treatment at the right time. Approximately, one in five Canadians will experience a mental illness in their life time, with many presenting to the Emergency Department (ED) as their entry point into the system. In order to improve patient outcomes and focus on patient-identified priorities, the aim of this study was to identify the short-term goals of patients with an acute mental health complaint (AMHC) presenting to the ED. **Methods:** We prospectively recruited a convenience sample of patients presenting to an inner city, academic ED with an annual census of 85,000 visits. Patients provided written informed consent and completed a survey package that included questions about employment intentions and short-term life goals. We collated the goals and used a content analysis to summarize the frequency of themes that emerged. **Results:** This study reports on the preliminary data from 108 of the targeted 200 patients (mean age 39.7 $\pm$13.6 years; 65% male). A total of 75% of participants reported being unemployed, 84% of whom reported that they would like to gain some form of employment in the near future. Over half the sample (52%) identified that they were not satisfied with their current housing situation. In addition to improving housing and obtaining work, improving mental health ($n = 34$), improving relationships with family or friends ($n = 27$), going back to school ($n = 22$) and managing addiction problems ($n = 20$) were identified as the most common short-term goals. Other goals/priorities included improving physical health, traveling, exercising, and eating better. **Conclusion:** This study provides new information about the priorities of adults presenting with AMHC to the ED. It also offers insight into how to collaborate with patients to build sustainable, accessible, and coordinated care pathways that can bring about positive changes in their lives. This information can be used to compliment current care for mental health problems, ensuring greater quality, accountability, and continuity of care for this vulnerable patient group.
Keywords: patient centered care, goals, mental health

P014

Palliative and end of life care education in Canadian emergency medicine residency programs: a national cross-sectional survey

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Introduction: Palliative care is a broad approach to care for patients with serious or life-threatening illnesses. This includes relief of symptoms, such as pain, that interfere with a patient's quality of life. It therefore falls firmly within the realm of emergency medicine (EM). 94% of emergency physicians report a need for education in dealing with death and dying. Nevertheless, there are no generally agreed upon competencies for Canadian EM residents with regard to palliative care and end of life care in the emergency department (ED). We performed a cross-sectional study of Canadian EM residency programs to measure the existing curricula in palliative and end of life care. Our primary outcome was the prevalence of structured educational programs for palliative and end of life care. **Methods:** An e-survey was e-mailed to all program directors of both CCFP(EM) and EM post-graduate training programs countrywide, using FluidSurveys^{TM}. It included questions regarding current palliative and end of life care curricula from formal rotations to seminars and online modules. The survey was developed in consultation with the author group including specialists in education, palliative care medicine, emergency medicine, and medical education. Hired translators were employed to include French speaking programs in Canada. This study had ethical approval: Interior Health REB and UBC CREB certificate 2016-17-026-H. **Results:** The survey was open from October 12th to December 19th, 2016. During that time, we received 26 responses including 5 French speaking programs, for a response rate of 72.2%. The primary outcome was present in 38.5% of programs. There was no difference between FRCP and CCFP(EM) programs in the occurrence of the primary outcome ($p = 1$; Fisher's Exact Text). However, CCFP(EM) program directors commented that many of their residents had completed palliative care rotations in their family medicine training. The largest barriers to education included time (84.6%), curriculum development (80.8%), and availability of instructors (50.0%). **Conclusion:** Our preliminary analysis shows that few Canadian post-graduate EM programs have a structured educational program pertaining to palliative and end of life care. Current barriers to education that can be addressed in future curricular initiatives include lack of time, curriculum development, and instructor availability.
Keywords: end of life care, palliative care, resident education

P015

Leadership and administration: a novel elective rotation for emergency medicine residency training

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Introduction / Innovation Concept: In 2015, the Royal College of Physicians and Surgeons of Canada set out to redefine the CanMEDS roles including replacement of the "manager" role to that of the "leader". This was to highlight the fact that skills in leadership are crucially important as ongoing health care improvement occurs. This educational innovation was born out of a need for formal education in leadership and administration in post graduate emergency medicine training. **Methods:** Few post graduate emergency medicine training programs in Canada have leadership and administrative curricula involving either longitudinal or discrete 4 week rotations. We sought to create an evidence based leadership and administrative experience based on the CanMEDS roles. We adapted components of pre-existing rotations from other universities and selected competencies from Thoma et al in order to compile a list of objectives. This was coupled with a reading list, various departmental, hospital, and regional meetings, a physician leadership training seminar, a departmental presentation, and a leadership project. **Curriculum, Tool, or Material:** The curriculum involved 4 weeks combining 8 emergency department (ED) clinical shifts with a leadership and administration component. The latter involved clinical interdepartmental meetings, a hospital medical advisory council (MAC) meeting, a provincial medical directors meeting, a health authority MAC meeting, and taking part in planning for an ED quality improvement initiative focused on triage. Attendance at a 2-day physician administrator leadership training seminar was also included. The reading list included books on leadership and references to ED quality improvement. In addition, exposure to a B.C. Ministry of

Health document entitled, "Setting Priorities for the Health Care System," the KGH Medical Staff Rules, and the B.C. Health Quality Matrix occurred. A summary presentation to the full ED on change management and leadership in residency occurred at completion. **Conclusion:** This innovative leadership and administration elective was the culmination of a need to see more formal post graduate leadership training in residency. The rotation was based on the CanMEDS framework, particularly the "leader" competency, and was based on recent evidence regarding leadership and administration competencies in emergency medicine. We hope this serves as a potential model for other rotation based electives or core rotations that desire to blend leadership competencies with clinical emergency medicine.
Keywords: education, leadership, administration

P016

Low risk ankle rule, high reward-a quality improvement initiative to reduce ankle x-rays in the pediatric emergency department

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Introduction: Our tertiary care institution embarked on the Choosing Wisely campaign to reduce unnecessary testing, and selected the reduction of ankle x-rays as part of its top five priority initiatives. The Low Risk Ankle Rule (LRAR), an evidence-based decision rule, has been derived and validated to clinically evaluate ankle injuries which do not require radiography. The LRAR, is cost-effective, has 100% sensitivity for clinically important ankle injuries and reduces ankle imaging rates by 30-60% in both academic and community setting. Our objective was to significantly reduce the proportion of ankle x-rays ordered for acute ankle injuries presenting to our pediatric Emergency Department (ED). **Methods:** Medical records were reviewed for all patients presenting to our tertiary care pediatric ED (ages 3- 18 years) with an isolated acute ankle injury from Jan 1, 2016-Sept 30, 2016. Children with outside imaging, an injury that occurred >72 hours prior, or those who had a repeat ED visit for same injury were excluded. Quality improvement (QI) initiatives included multidisciplinary staff education about the LRAR, posters placed within the ED highlighting the LRAR, development of a new diagnostic imaging requisition for ankle x-rays requiring use of the LRAR and collaboration with the Division of Radiology to ensure compliance with new requisition. The proportion of patients presenting to the ED with acute ankle injuries who received x-rays was measured. ED length of stay (LOS), return visits to the ED and orthopedic referrals were collected as balancing measures. **Results:** At baseline 88% of patients with acute ankle injuries received x-rays. Following our multiple interventions, the proportion of x-rays decreased significantly to 54%, ($p < 0.001$). This decrease in x-ray rate was not associated with an increase in ED LOS, ED return visits or orthopedic referrals. There was an increase uptake of the dedicated x-ray requisition over time to 71%. **Conclusion:** This QI initiative to increase uptake of the LRAR, resulted in a significant reduction of ankle x-rays rates for children presenting with acute ankle injuries in our pediatric ED without increasing LOS, return visits or need for orthopedic referrals for missed injuries. Just as in the derivation and validation studies, the reductions have been sustained and reduced unnecessary testing and ionizing radiation.
Keywords: quality improvement, decision rules, ankle imaging

P017

A time-driven activity-based costing method to estimate health care costs in the emergency department

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Introduction: Poor physicians' knowledge of health care costs has been identified as an important barrier to improving efficiency and reducing overuse in care delivery. Moreover, costs of tests and treatments estimated with traditional costing methods have been shown to be imprecise and unreliable. We estimated the cost of frequent care activities in the emergency department (ED) using the time-driven activity-based costing (TDABC) method. **Methods:** We conducted a TDABC study in the ED of the CHUL, Québec city (77000 visits/year). We estimated the cost of all potential care activities (e.g. triage) provided to adult patients with selected urgent (e.g. pulmonary sepsis) and non urgent (e.g. urinary tract infection) conditions frequently encountered in the ED. Following Lean management principles, process maps were developed by a group of ED care providers for each care activity to identify human resources, supplies and equipment involved, and to estimate the time required to complete each process. Resource unit cost (e.g. cost per minute of a nurse) and overhead rate were calculated using financial information from fiscal year 2015-16. Estimated cost of each care activity (e.g. chest X-ray) including physicians' charges was calculated by summing overhead allocation and the cost of each process (e.g. disinfection of the X-ray machine) as obtained by multiplying the resource unit cost by the time for process completion. **Results:** Process maps were developed for 14 conditions and 68 ED care activities. We estimated the costs of activities (CAN$) related to nursing (e.g. urinalysis and culture triage ordering $14.70), clerk tasks (e.g. patient registration $3.40), physicians (e.g. FAST scan $20.90), laboratory testing (e.g. CBC $6.30), diagnostic imaging (e.g. abdominal CT scan $146.50), therapy (e.g. 5 mg of iv morphine $20.40), and resuscitation (rapid sequence intubation with ketamine and succinylcholine $146.40). Overall, emergency physicians' charges, personnel salaries and overheads accounted for 38%, 22% and 16% of all ED care costs, respectively. **Conclusion:** Our results represent an important step toward increasing emergency physicians' awareness on the real cost of their interventions and empowering them to adopt more cost-effective practice patterns.
Keywords: activity-based costing, efficiency, performance

P018

Prehospital diversion of mental health patients to a mental health center vs the emergency department: safety and compliance of an EMS direct transport protocol

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Introduction: Prehospital transport of patients to an alternative destination (diversion) has been proposed as part of a solution to overcrowding in emergency departments (ED). We evaluated compliance and safety of an EMS protocol allowing paramedics to transport medically stable patients with psychiatric issues directly to an alternate facility [Crisis Intervention (CI)], bypassing the ED. Patients were eligible for diversion if they were ≥18 years old, classified as CTAS III-IV, scored <4 on the Prehospital Early Warning (PHEW) score, and did not have any vital sign parameters in a danger zone (as per PHEW score criteria). **Methods:** A retrospective analysis was conducted on patients presenting to Sudbury EMS with behavioural or psychiatric issues. Data was abstracted from EMS reports, hospital medical records, and discharge forms from CI. Protocol compliance was measured using missed protocol opportunities (patients eligible for diversion but taken directly to the ED) and protocol noncompliance rates; protocol safety was

measured using protocol failure (presentation to ED within 48 hours of appropriate diversion) and patient morbidity rates (hospital admission within 48 hours of diversion). Data was analysed qualitatively and quantitatively using proportions. **Results:** EMS responded to 695 calls with psychiatric complaints. Of the 650 taken directly to the ED, 18 met diversion criteria; these were missed protocol opportunities (3%). 45 patients were diverted. There was protocol noncompliance in 36 cases (80%), but 34 were due to incomplete recording of vital signs. There were direct protocol violations in only 2 cases (4%). There was protocol failure in 3 cases (33%), and patient morbidity in 8 cases (18%). No patients died within 48 hours of diversion. **Conclusion:** EMS providers were highly compliant with the protocol when transporting patients directly to the ED. There were high levels of protocol non-compliance in diverting patients to CI, though this is largely attributed to incomplete recording of vital signs; direct protocol violations were low. The protocol provides moderate levels of safety in diverted patients. Broader implementation of a diversion protocol could reduce the volume of mental health patients seen in the ED, and improve quality of care received by this patient population.
Keywords: prehospital care, diversion, mental health

P019

Prehospital diversion of intoxicated patients to a detoxification facility vs the emergency department: safety and compliance of an EMS direct transport protocol

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Introduction: Prehospital transport of patients to an alternative destination (diversion) has been proposed as part of a solution to overcrowding in emergency departments (ED). We evaluated compliance and safety of an EMS bypass protocol allowing paramedics to transport intoxicated patients directly to an alternate facility [Withdrawal Management Services (WMS)], bypassing the ED. Patients were eligible for diversion if they were ≥18 years old, classified as CTAS level III-IV, scored <4 on the Prehospital Early Warning (PHEW) score, and did not have any vital sign parameters in a danger zone (as per PHEW score criteria). **Methods:** A retrospective analysis was conducted on intoxicated patients presenting to Sudbury EMS. Data was abstracted from EMS reports, hospital medical records, and discharge forms from WMS. Protocol compliance was measured using missed protocol opportunities (patients eligible for diversion but taken directly to the ED) and protocol noncompliance rates; protocol safety was measured using protocol failure (presentation to ED within 48 hours of appropriate diversion) and patient morbidity rates (hospital admission within 48 hours of diversion). Data was analysed qualitatively and quantitatively using proportions. **Results:** EMS responded to 681 calls for intoxication. Of the 568 taken directly to the ED, 65 met diversion criteria; these were missed protocol opportunities (11%). 113 patients were diverted. There was protocol noncompliance in 41 cases (36%), but 35 were due to incomplete recording of vital signs. There were direct protocol violations in only 6 cases (5%). There was protocol failure in 16 cases (22%), and patient morbidity in 1 case (1%). No patients died within 48 hours of diversion. **Conclusion:** EMS providers were fairly compliant with the protocol when transporting patients directly to the ED. There was some protocol non-compliance with patients diverted to WMS, though this is largely attributed to incomplete recording of vital signs; direct protocol violations were low. The protocol provides high levels of safety for patients diverted to WMS. Broader implementation of the protocol could reduce the volume of intoxicated patients seen in the ED, and improve quality of care received by this population.
Keywords: prehospital care, diversion, alcohol intoxication

P020

Ultrasound-guided peripheral intravenous access in the emergency department: A randomized controlled trial comparing single and dual-operator technique

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Introduction: Intravenous (IV) cannulation is a common and important procedure in the emergency department (ED). Ultrasound-guided IV (UGIV) insertion has been shown to be more effective than the blind approach for patients with difficult IV access. The optimal technique for UGIV insertion has not been determined. The objective of this study is to compare the first-attempt canulation success rate between a single-operator technique (provider holds the ultrasound probe while simultaneously placing the IV), with dual-operator technique (whereby a second provider holds the probe) in ED patients with predicted difficult access. **Methods:** We conducted a randomized controlled trial using a convenience sample of adult ED patients. Participating ED nurses received a one-hour UGIV training session on including didactic and practical training on simulated arms. Patients were enrolled if they met any of three criteria for difficult access: (1) history of difficult access, (2) no visible or palpable veins, or (3) two failed blind attempts. High-acuity patients or those unable to consent or comply with the procedure were excluded. Eligible patients were randomized to single or dual-operator technique and a maximum of two UGIV attempts were allowed. The primary outcome was first-attempt success rate. Additional outcomes included overall success rate, number of attempts, time to successful cannulation (needle insertion to flashback), patient pain scores, operator 'ease of use' scores, and complications 30 minutes after insertion including IV failure. Other variables collected included patient demographics, presenting complaint, indication for ultrasound use, relevant medical history, and location/depth of the target vessel. Fisher's exact test was used to compare success rates between groups. **Results:** Data collection was ongoing at the time of submission, but is expected to be completed by May 01, 2017. **Conclusion:** This is the first randomized-controlled trial comparing single and dual-operator ultrasound technique for difficult IV insertion in ED patients. The results from this study will provide evidence to guide education, and ensure best practice of UGIV insertion in the ED.
Keywords: ultrasound, vascular access, nurse education

P021

A 'Pawsitive' addition to the ER patient experience: A pilot evaluation of the St. John Ambulance therapy dog program in a Canadian hospital

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Introduction: Animal-assisted interventions (AAI) have been applied in numerous clinical settings to help reduce pain, stress, and anxiety. This qualitative study sets out to evaluate the St. John Ambulance Therapy Dog program in the emergency department of the Royal University Hospital. **Methods:** An observer identified patients interested in visiting with a Therapy Dog during their emergency department stay and obtained consent. Participants were asked to indicate on a pictographic scale their physical and mental states before and after the visit. The Therapy Dog team, consisting of a dog and handler, visited the patient for 5-10 minutes. During this time an observer took notes. Participants were asked at the conclusion of the visit to answer questions regarding their overall experience with the Therapy Dog team.

Results: 117 patients participated in this study. Pre- and post AAI pictographic faces [c1] scale results showed an average improvement of 1.2. Before AAI, patients most commonly reported feeling pain, anxiety, tiredness, sadness, boredom, weakness, and a desire to go home. Immediately after the AAI, they most commonly reported feeling happiness, relaxation, better, calmness, and good. Observers noted positive participant and family changes during the AAI, including tone of voice, body language, facial expression (e.g., smiling), and openness. Patients often made efforts to make physical contact for the majority of the visit, often despite pain and immobility. There was also frequent sharing of stories about patients' pets, which seemed to serve as a comfort within the emergency department environment. **Conclusion:** Animal-assisted interventions with a therapy dog team in an emergency department is a 'pawsitive' addition to the patient experience. An important next step is to measure whether the positive impact continued post visit.
Keywords: animal-assisted interventions, therapy dog, emergency department

P022

Physician reporting of medically unfit drivers: barriers and incentives

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Introduction: Most medically unfit drivers are not reported to licensing authorities. In BC, physicians are only obligated to report unfit drivers who continue to drive after being warned to stop. This study investigates barriers to and incentives for physician reporting of medically unfit drivers. **Methods:** We used an online survey to study physician-reported barriers to reporting medically unfit drivers and their idea of incentives that would improve reporting. Email invitations to participate in the survey were sent to all physicians in BC through *DoctorsofBC* and to all emergency physicians (EPs) in the UBC Department of Emergency Medicine. **Results:** We received responses from 242 physicians (47% EPs, 40% GPs, 13% others). The most common barrier to reporting was not knowing which unfit drivers continue to drive (79% of respondents). Other barriers included lack of time (51%), lack of knowledge of the process, guidelines, or legal requirement for reporting (51%, 50%, 45% respectively), fearing loss of rapport with patients (48%), pressure from patients not to report (34%), lack of remuneration (27%), and pressure from family members not to report (25%).EPs were significantly less likely than other physicians to cite loss of rapport, pressure from patients, or pressure from family as barriers, but more likely to cite not being aware of drivers who continue to drive after being warned, lack of knowledge (regarding legal requirements to report, guidelines for determining fitness, and the reporting process), and lack of time. Factors that would increase reporting unfit drivers included better understanding of criteria for fitness to drive (70%), more information regarding how to report (67%), more information on when to report (65%), and compensation (43%).Free text comments from respondents identified other barriers/incentives. Reporting might be simplified by telephone hotlines or allowing physician designates to report. Physicians feared legal liability and suggested the need for better medico-legal protection. Loss of patient rapport might be minimized by public education. Failure of response from licensing authorities to a report (long wait times, lack of feedback to physician) was seen as a barrier to reporting. **Conclusion:** We identified barriers to physician reporting of medically unfit drivers and incentives that might increase reporting. This information could inform programs aiming to improve reporting of unfit drivers.
Keywords: driver fitness, motor vehicle crashes

P023

Emergency department data provides a realistic count of pedestrian injuries

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Introduction: Walking as a form of active transportation is promoted by health professions and environmentalists alike. While the health benefits are indisputable, active transportation is not without risk. Pedestrians are vulnerable road users who often suffer serious injuries especially when involved with collisions with motor-vehicles. While pedestrian injuries involving motor-vehicles are captured in road trauma surveillance systems based on police crash reports, non-collision injuries in this population may be caused by poorly designed infrastructure but are seldom counted as road trauma. This gap hinders road improvement efforts aiming to increase safety for all road users. This study aims to address this knowledge gap. Our objective is to study the profile and circumstances of injuries in pedestrians presenting to ED. **Methods:** This was a cross-sectional historical chart review study. All injured patients attending our ED are electronically flagged according to mechanism of injury. We reviewed the medical charts of all ED visits flagged as "Pedestrian" or "Fall" to identify all injured pedestrians (defined in this study as anyone walking on a public roadway or getting on/off public transportation). All pedestrian injuries occurred in 2015 were included for chart review. **Results:** In 2015, a total of 6192 ED presentations were flagged as pedestrian (n = 436) or fall (n = 5756), and 1108 of these met our inclusion criteria. Of these, 181 (16%) were admitted to hospital. Older pedestrians ($\geq$ 70 yrs) had a higher hospital admission rate (78/303; 27%) compared to younger ones (<70 yrs: 103/805; 13%). Collision with motor vehicles (MVCs) resulted in only 25% of pedestrian injuries while fall (or tripping) accounted for about 72%. MVC related injuries were more common in younger pedestrians (29% vs 13%) whereas fall related injuries occurred more in older pedestrians (85% vs 67%). The most commonly sustained injuries among the fallers were abrasions followed by fractures. **Conclusion:** Police crash reports (which capture only MVC related pedestrian injuries) or hospital admission data (which miss those who are treated and released from ED) do not capture all cases of pedestrian injury. ED visit data provides a more realistic count of pedestrian injuries. More pedestrian injuries are caused by falls than by MVCs and policymakers should pay more attention to fall prevention strategies for older pedestrians outside their home environment.
Keywords: pedestrian, road trauma

P024

Physician reporting of medically unfit drivers: knowledge, attitudes, and practice

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Introduction: Medical conditions that impair perception, cognition or motor skills may make people unfit to drive. Reporting unfit drivers to licensing authorities is seen by many as a public health obligation. This study investigates physician knowledge, attitudes and practice around the management of medically unfit drivers. **Methods:** We used an online survey to explore physician knowledge of fitness to drive issues and their attitudes and practice with regard to counselling and reporting unfit drivers. Email invitations to participate in the survey were sent to all physicians in BC through *DoctorsofBC* and to all emergency physicians (EPs) in the UBC Department of Emergency Medicine.

Results: We received responses from 242 physicians (47% EPs, 40% GPs, 13% others). The majority (78%) reported little/no knowledge on determining driver fitness and 94% had little/no training around guidelines, reporting, and laws involving fitness to drive. Most (88%) agreed that physicians should be obligated to advise medically unfit patients not to drive, and 74% reported that they often warn patients not to drive. The majority of physicians also chart their opinion of patients' fitness to drive (67% do so more than twice per year). Most respondents (70%) indicated that it is "always appropriate" to report *definitely* unfit drivers whereas only 25% indicated that it is "always appropriate" to report *potentially* unfit drivers. However, in practice physicians see far more unfit drivers than they report to licensing authority: 67% of physicians encounter definitely unfit drivers more than twice per year but only 19% report definitely unfit drivers more than twice per year and 34% never report definitely unfit drivers. Compared to other physicians, EPs reported less knowledge and training about criteria for determining fitness to drive, were more likely to feel that reporting unfit drivers was not their responsibility, and were less likely to report unfit drivers to licensing authorities. **Conclusion:** Our findings indicate a need for more education and information resources to help physicians, particularly EPs, identify and manage medically unfit drivers. Although most physicians warn unfit drivers not to drive and document this in medical records, many medically unfit drivers are not reported to licensing authorities, a potential public health problem that should be further investigated.

Keywords: driver fitness, motor vehicle crashes

P025

The Dunning-Kruger effect in medical education: double trouble for the learner in difficulty

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Introduction: It is difficult for learners to perform accurate self-assessments. This difficulty may be exaggerated in unskilled learners, a phenomenon termed the Dunning-Kruger Effect (Dunning & Kruger, 1999). Learners with the least amount of knowledge or skill may paradoxically be more likely to evaluate themselves favorably compared with their peers. This phenomenon is particularly relevant in medicine where we rely on self-directed learning not only in many of our undergraduate and postgraduate programs, but in guiding the pursuit of continuing medical education. The objectives of this study are to 1) determine whether the Dunning-Kruger Effect is present in medical education settings, 2) to determine the quality of studies in this area, and 3) to determine how this effect, if present, could influence approaches to the learner in difficulty. **Methods:** This is a review of the literature. PubMed databases were searched for all relevant articles. Included studies reported self-assessment of medical trainees or staff and comparison with an external rating. Studies were identified using select keywords and MeSH terms. Only studies published in English were included. No publication date limits were adopted. The Medical Education Research Study Quality Instrument (MERSQI) was used to assess study quality. Both authors independently abstracted data and rated study quality. **Results:** Eighty-six articles were identified in the PubMed search. On abstract review, 45 studies were found to meet criteria for further full article review. Studies were variable in setting and approach to self and external assessment. Criteria were not met for pooled analyses/meta-analysis. Results are presented as a summary of findings with special consideration of findings based on level of training (undergraduate, postgraduate, staff clinician). **Conclusion:** This review summarizes the current literature on the Dunning-Kruger Effect in medical education and provides an assessment of the quality of studies in this area to date. The potential relevance of the Dunning-Kruger Effect in medical education is discussed as are implications for interventions to support the learner in difficulty. Additional study in this area is indicated, in particular given the significant upcoming changes to postgraduate medical education in Canada in the era of Competence By Design (CBD).

Keywords: self-assessment, Dunning-Kruger, education

P026

Need for training in medical education: staff emergency physician perspectives

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Introduction: Emergency medicine physicians in our urban/suburban area have a range of training in medical education; some have no formal training in medical education, whereas others have completed Master's level training in adult education. Not all staff have a university appointment; of those who are affiliated with our university, 87 have appointments through the Department of Medicine, 21 through the Department of Pediatrics, and 117 through the Department of Family Medicine. Emergency physicians in our area are a diverse group of physicians in terms of both formal training in adult education and in the variety of settings in which we work. The purpose of this study was to gauge interest in formal training in adult education among emergency medicine physicians. **Methods:** With research ethics board approval, we created and sent a 10-item electronic questionnaire to emergency medicine staff in our area. The questionnaire included items on demographics, experience in emergency medicine, additional post-graduate training, current teaching activities and interest in short (30-60 minute) adult education sessions. **Results:** Of a potential 360 active emergency physicians in our area, 120 responded to the questionnaire (33.3%), representing 12 area hospitals. Nearly half of respondents had been in practice over 10 years (48.44%). Respondents were mainly FRCP (50%) or CCFP-EM (47.50%) trained. 33.3% of respondents had masters degrees, of which 15% were MEd. Most physicians were involved in teaching medical students (98.33%), FRCP residents (80%) and family medicine residents (88.3%), though many were also teaching off-service residents, and allied health professionals. More than half of respondents (60%) were interested in attending short sessions to improve their skills as adult educators. The topics of most interest were feedback and evaluation, time-efficient teaching, the learner in difficulty, case-based teaching and bedside teaching. **Conclusion:** Emergency physicians in our area have a wide variety of experience and training in medical education. They are involved in teaching learners from a range of training levels and backgrounds. Physicians who responded to our survey expressed an interest in additional formal teaching on adult education topics geared toward emergency medicine.

Keywords: education

P027

Nursing duties and accreditation standards and their impacts: the nursing perspective

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Introduction: With ongoing medical advances and an increase in elderly and complex patients presenting to the Emergency Department

(ED), there is a requirement for nurses to continue to gain new knowledge and skills to provide optimal patient care. Quality initiatives are frequently introduced with the goal of improving patient safety and the effectiveness of care delivery; some being provincial, while others are new requirements from Accreditation Canada. We sought the perspectives of emergency nurses regarding the importance of key ED processes and standards, and their impact on patient care and nurse efficiency. **Methods:** All Registered Nurses and Licensed Practical Nurses throughout the Edmonton Zone EDs were invited to complete an online survey consisting of 23 statements on nursing attitudes (10 on nursing duties) and beliefs (11 on the importance of Accreditation standards and their impacts; two that involved selecting the 5 most important nursing activities). The survey was constructed through an iterative approach. Response options included a 7-point Likert scale ('very strongly disagree' to 'very strongly agree'). Median scores and interquartile ranges were determined for each survey statement. **Results:** A total of 433/1241 (34.9%) surveys were submitted. Respondents were predominantly Registered Nurses (91.4%), female (88.9%), and worked 0-5 years overall in the ED (43.7%). Overall, respondents were favourable ('agree' or 'strongly agree') towards the Accreditation Canada standards and other quality initiatives. They were, however, 'neutral' towards universal domestic violence screening, and whether there is a difference between Best Possible Medication History (BPMH) and med reconciliation. The top five nursing activities in terms of perceived importance were: vital sign documentation, recording of allergies, listening to patients' concerns, hand hygiene, and obtaining a complete nursing history. Best Possible Medication History and the screening risk tools followed these. **Conclusion:** Despite their heavy workload, nurses strongly agreed on the importance of med reconciliation, falls risk, and skin care, but felt that improved documentation forms could support efficiency. Nursing perspective is valuable in informing future attempts to standardize, streamline, and simplify documentation, including the design and implementation of a provincial clinical information system.

Keywords: nursing duties, accreditation standards, quality initiatives

P028

The prevalence of pathological findings identified by next day abdominal ultrasound in patients discharged from the ED

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Introduction: Abdominal pain is the most common complaint in the emergency department (ED), accounting for approximately 7% of all visits. Of the patients discharged from the ED with this complaint, 25% will carry a diagnosis of undifferentiated abdominal pain and many will subsequently have an outpatient ultrasound for further assessment. The objective of this study was to determine the proportion of outpatient ultrasounds with findings requiring intervention within 14 days. **Methods:** This was a retrospective chart review of non-pregnant patients aged 18 to 40 years, presenting to an academic ED (annual census 65,000) with an abdominal complaint for whom the emergency physician arranged an outpatient (next day) abdominal ultrasound from November 2014 to November 2015. Data was abstracted by trained research personnel independently and in duplicate and inter-rater agreement was calculated for 25% of charts. **Results:** Of the 315 included patients, 261 (82.9%) were female and mean (SD) age was 28.5 (5.9) years. 28 (8.9%) patients had ultrasounds requiring intervention within 14 days. Of these, 8 (28.6%) had appendicitis, 6 (21.4%) had cholecystitis, 5 (17.9%) had gynecological, 5 (17.9%) had urological and 4 (14.3%) had gastrointestinal diagnoses. However, 15 (53.6%) patients requiring intervention within 14 days had symptoms which had improved or resolved at the time of the US. Of the 287 (91.1%) patients not requiring intervention, 92 (32.1%) had unchanged, 120 (41.8%) had improved, 52 (18.1%) had resolved and 5 (1.7%) had worsened symptoms at the time of follow-up. Of the non-intervention patients, 13 (4.5%) required alternative imaging (CT scan). **Conclusion:** The large majority of patients with abdominal pain discharged from the ED with planned next day US were found to have either no pathology or pathology that did not require further ED management. However, 8.9% of patients had pathological findings requiring intervention within 14 days and half of these had symptoms that had resolved or improved at the time of the US. Next day US imaging remains a viable option for identifying patients with serious pathology not appreciated at the time of their ED visit.

Keywords: abdominal pain, outpatient ultrasound, pathological findings

P029

Paramedic and nurse-staffed rural collaborative emergency centres: the rate of relapse for discharged patients

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Introduction: Collaborative Emergency Centres (CECs) provide access to care in rural communities. After hours, registered nurses (RNs) and paramedics work together in the ED with telephone support by an emergency medical services (EMS) physician. The safety of such a model is unknown. Relapse visits are often used as a proxy measure for safety in emergency medicine. The primary outcome of this study is to measure unscheduled relapses to emergency care. **Methods:** The electronic patient care record (ePCR) database was queried for all patients who visited two CECs from April 1, 2012 to April 1, 2013. Abstracted data included demographics, time, acuity score, clinical impression, chief complaint, and disposition. Records were searched for each discharged CEC patient to identify unscheduled relapses to emergency care, defined as presenting back to EMS, CEC, or any other ED within the Health Authority within 48 hours of CEC discharge. **Results:** There were 894 CEC visits, of which 66 were excluded due to missing data. The dispositions from CEC were: 131/828 (15.8%) transferred to regional ED; 264/828 (31.9%) discharged home; 488/828 (58.9%) discharged with follow up visit booked; and 11/82 (1.2%) left the CEC without being seen. There was 37/828 (4.5%) visits which relapsed back to emergency care, all of whom were discharged from CEC or left without being seen: 3/828 (0.4%) relapsed back to EMS (two taken to regional ED and one to CEC); 16/828 (1.9%) relapsed to regional ED (by walking-in); and 18/828 (2.2%) had a relapse to the CEC (walk-in). 516/828 (62.3%) CEC visits were resolved in a single visit. **Conclusion:** This study was based on only two of the 7 operating CECs due to accessing paper-based charts for multiple health regions. We also acknowledge the limitations of using relapse as a proxy for safety, and that low volumes and acuity will make detection of adverse events challenging. Albeit a proxy measure, the rate of patients who relapse to emergency care was under 5% in this case series of two CECs. Most patients had their concern resolved in a single visit to a CEC. Further research is underway to determine the effectiveness, optimal utilization and safety of this collaborative model of rural emergency care.

Keywords: paramedic, health system design, collaborative practice

P030

Multisource feedback for emergency medicine residents: different, relevant and useful information

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Introduction / Innovation Concept: Feedback provided to residents by physicians emphasize the medical expertise competency and may limit the attention paid to other CanMEDS competencies. Recent years have seen the emergence of the concept of multisource feedback, a process through which different members of the care team assess and provide feedback to residents. This approach is considered one of the best for providing relevant feedback on competencies that are less often addressed by physicians. To date, very few studies have explored emergency residents' perceptions following feedback from their physicians, nurses with whom they have worked, and patients they have treated. **Methods:** In the emergency department of a tertiary-care university hospital, 10 emergency medicine residents participated, on a voluntary basis, in individual and semi-structured group interviews, three months after having received multisource feedback. Two researchers then qualitatively analyzed the data collected in those interviews. Thematic content analysis using QDA Miner identified dominant themes in the residents' perceptions. **Curriculum, Tool, or Material:** Multisource feedback tool: Three questionnaires were designed to gather assessment from different sources: physicians, nurses, and patients. The questionnaires were adapted from those created by Joshi and colleagues for use in a study of residents' competency in interpersonal and communication skills. During a nine months period, the residents distributed questionnaires to physicians, nurses, and patients with whom they felt they had enough interactions during their clinical shifts. Data from the questionnaires were compiled by two educators that prepared individual feedback reports for each resident. An educator was asked to conduct individual meetings with each resident to present the feedback report and discuss its content. **Conclusion:** Each source provided relevant comments that differed significantly in their content. Physicians focused primarily on medical expertise, whereas nurses addressed competencies related to management, collaboration, and communication, and patients commented on the competencies of professionalism and communication. Residents concluded that obtaining feedback from nurses and patients was not only acceptable but useful in their training. Several reported modifying certain behaviours after receiving the multisource feedback. Multisource feedback appears to have obvious teaching potential to provide feedback on competencies other than medical expertise in emergency residents.

Keywords: Multisource feedback

P031

Using machine learning algorithms for predicting future performance of emergency medicine residents

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Introduction: Background: Medical education is transitioning from a time-based system to a competency-based framework. In the age of Competency-Based Medical Education, however, there is a drastically increased amount of data that needs to be interpreted. With this data, however, comes an opportunity to develop predictive analytics. Machine learning is a method of data analysis that automates analytical model building. Using algorithms that iteratively learn from data, machine learning allows computers to find hidden insights without being explicitly programmed where to look. Machine learning has been successfully used in other fields to create predictive models. **Objective:** This study evaluates the application of neural network as a machine learning algorithm in learning from historical data in emergency residency program and predicting future resident performance. **Methods:** We analyzed performance data for 16 residents (PGY1-5) who were assessed at end of each shift. Performance was graded in each of the CanMEDS Roles with scores from 1 to 7 by different attending physicians who observed residents during the shift. We transformed sequences of scores for each resident to a fixed set of features and combined all of them in one dataset. We considered scores under 6 as "At Risk Resident" and scores 6 or more as "Competent Resident", and then we separated the dataset into training and testing sets using K-Fold cross validation and trained an artificial Neural Network in order to make decision about the future situation of residents in a specific CanMEDS Role and general performance. **Results:** We used 5-fold cross validation to evaluate the model, one round of cross-validation involves partitioning the whole data into complementary subsets, performing the training phase on the training set, and validating the analysis on the testing set. To reduce variability, multiple rounds of cross-validation are performed using different partitions, and the validation results are averaged over the rounds. Results of cross validation show that accuracy of model was 72%, sensitivity was 81% and specificity was 43%. **Conclusion:** Machine learning algorithms such (as Neural Network) have the ability to predict future resident performance on a global level and within specific domains (i.e. CanMEDS roles). Used appropriately, such information may be a valuable for monitoring resident progress.

Keywords: prediction, neural network, machine learning

P032

Identifying the bleeding and thrombosis learning needs of the Free Open Access Medical education (FOAM) community

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Introduction: Developing structured online educational curricula that meet learner needs is challenging. Thrombosis and bleeding are areas of innovation and change in emergency medicine. We aimed to determine the learning needs of the Free Open Access Medical education (FOAM) community with the subsequent goal of developing structured curricula to meet them. **Methods:** A Massive Online Needs Assessment (MONA) was conducted to determine the perceived and unperceived educational needs in thrombosis and bleeding. The survey was designed by a multidisciplinary team of experts and was open from September 20 to December 10, 2016. The survey requested limited demographic information and contained questions to identify topics of interest. Respondents' baseline knowledge and unperceived needs were assessed using 5 case scenarios containing 3 questions each. Knowledge gaps were defined *a priori* as topics where <50% of participants answered correctly. **Results:** We received 198 complete responses by staff physicians (n = 109), residents (n = 46), medical students (n = 29) and allied health professionals (n = 14) from 20 countries. 116/198 responses were from people working in emergency medicine. Topics of interest to participants included choice of anticoagulants, interruption of anticoagulation, management of bleeding and monitoring anticoagulation. Knowledge gaps were identified in 4 main areas including interruption of anticoagulation, management of bleeding (including reversal of anticoagulation and massive transfusion), inherited thrombophilia, and screening for malignancy in acute thrombosis.

Conclusion: We have identified six priority topics to cover in our future online Thrombosis and Bleeding curriculum by surveying the online medical community. Although perceived and unperceived needs showed high congruence, two priority topics were only identified by assessing unperceived needs.
Keywords: free open access medical education, needs assessment, curriculum planning

P033

To choose or not to choose: evaluating the impact of a Choosing Wisely knowledge translation initiative on urban and rural emergency physician guideline awareness

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Introduction: Choosing Wisely is an innovative approach to address physician and patient attitudes towards low value medical tests; however, a knowledge translation (KT) gap exists. We aimed to quantify the baseline familiarity of emergency medicine (EM) physicians with the Choosing Wisely Canada (CWC) EM recommendations. We then assessed whether a structured KT initiative affected knowledge and awareness. **Methods:** Physicians working in urban (tertiary teaching hospital, Saint John, NB) and rural (community teaching hospital, Waterville, NB) emergency departments were asked to participate in a survey assessing awareness and knowledge of the first five CWC EM recommendations before an educational intervention. The intervention consisted of a 1-hour seminar reviewing the recommendations, access to a video cast and departmental posters. Knowledge was assessed by asking respondents to identify 80% or more of the recommendations correctly. Physicians were surveyed again at a 6-month follow up period. The Fisher exact test was used for statistical analyses. A sample size of 36 was required to detect a 30% change with an alpha of 0.05 and a power of 80%. **Results:** At the urban site, 16 of 25 (64%) physicians responded to the pre- and 14 of 26 (53.8%) responded to the post-intervention survey. Awareness of the EM recommendations did not increase significantly (81.3% pre; 95% CI 56.2-94.2 vs. 92.9% post; 66.4-99.9; $p = 0.60$). There was a weak trend towards improved knowledge with 62.5% (38.5-81.6) of physicians responding correctly initially, and 85.7% (58.8-97.2; $p = 0.23$) after the intervention. At the rural site, 8 of 11 (72.7%) physicians responded to the pre- and post-intervention survey. There was a trend towards improved awareness, (25% pre; 6.3-59.9 vs. 75% post; 40.1-93.7; $p = 0.13$), with 50% (21.5-78.5) responding correctly pre, and 87.5% (50.8-99.9; $p = 0.28$) after the intervention. **Conclusion:** We have described the current awareness and knowledge of the CWC EM recommendations. Limited by our small sample size, we report a trend towards increased awareness and knowledge at 6 months following our KT initiative in a rural setting where there was a low baseline awareness. At the urban site where baseline knowledge was high, changes seen were less significant. Further work will look at the effectiveness of our initiative on physician practice.
Keywords: Choosing Wisely, physician awareness, knowledge translation

P034

Pediatric emergency department return visits: a proactive approach to quality improvement

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Introduction: Emergency Department (ED) return visits leading to admission (RVs) are a well-recognized quality metric that can potentially signal gaps in patient care. Routine capture, investigation and monitoring of monthly ED RVs provides a better understanding of patient and visit- level factors associated with a return, which can then inform system-level quality improvement (QI) opportunities. The objective of this study is to develop a sustainable database that routinely tracks and analyzes pediatric ED RVs in a large Canadian children's hospital to understand recurring themes and inform QI initiatives. **Methods:** Using a computerized record system, all 72-hour RVs are collected and reviewed for patient and visit-level variables. Clinicians receive monthly notification of their RVs and assist with completing root cause analyses. Ongoing cumulative analyses using descriptive statistics and t-test analysis are reviewed to identity trends and predictors of RVs. Targeted solutions are sought to address system-level themes through educational, quality, safety and administrative avenues. **Results:** The RV database contains almost three years of data analyzing approximately 1,500 cases, equaling 0.75% of our annual ED patient volumes. RVs have higher acuity scores on both their index and return visit ($P = 0.001$) and children under 12 months of age have significantly higher rates of return (24% vs 16%, $P < 0.001$). A consultation service was involved during 31% of the index ED visits, with the top three consultants being Hematology/Oncology (23%), General Surgery (12%), and Neurology (8%). The root cause of the majority of RVs were related to disease progression (65%), while 8% were call-backs for positive blood cultures or discrepant results, and 6% were categorized as a misdiagnoses. Completed quality improvement initiatives to date include the ED Sickle Cell Optimization Program, the Culture Follow-up and Escalation Algorithm, and the Young Infant Fever Pathway and Order Set. **Conclusion:** Routine monitoring and investigation of ED RVs provides a proactive approach to seeking improvement opportunities. With a better understanding of specific patient and visit-level factors associated with RVs, future system-level quality improvement initiatives can be targeted.
Keywords: return visits, quality improvement, pediatrics

P035

Development of a province-wide audit program for return visits to the emergency department

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Introduction: Routine auditing of charts of patients with an emergency department (ED) return visit (RV) resulting in hospital admission can uncover quality and safety gaps in care. This feedback can be helpful to clinicians, administrators, and leaders working to improve clinical outcomes, increase patient satisfaction, and promote high-value care. Health Quality Ontario (HQO) has been tasked by Ontario's Ministry of Health and Long-Term Care (MOHLTC) to manage the newly created ED RV Quality Program (RVQP), which mandates EDs participating in the Pay-for-Results (P4R) program to audit a minimum of 25-50 RVs/year. The goal of the first-ever ED-specific province-wide Quality Improvement (QI) initiative of this kind is to promote a culture of QI that will lead to improved patient care. **Methods:** Participating hospitals receive quarterly confidential reports from Access to Care (ATC) that show their and other hospitals' rates of RVs, as well as identifying information for patients meeting RV inclusion criteria at their ED (within 72 hrs of index visit, or within 7 days with specific diagnoses). HQO has partnered with QI experts and ED physician-leaders to develop various guidance materials. These materials have been disseminated through various media. Hospitals are

conducting audits to identify underlying quality issues, take steps to address the underlying causes, and submit reports to HQO. A taskforce will then analyze clinical observations, summarize key findings and lessons learned, and share improvements at a provincial level through an annual report. **Results:** Since its launch in April 2016, 73 P4R and 16 voluntarily enrolled non-P4R hospitals (which collectively receive approximately 90% of ED visits in the province) are participating in the RVQP. ED leaders have engaged their hospital's leadership to leverage interest and resources to improve patient care in the ED. To date, hospitals have conducted thousands of audits and have identified quality and safety gaps to address, which will be analyzed in February 2017 for reporting shortly thereafter. These will inform QI endeavours locally and provincially, and be the largest source of such data ever created in Ontario. **Conclusion:** The ED RVQP aims to create a culture of continuous QI in the Ontario health care system, which provides care to over 13.8 million people. Other jurisdictions can replicate this model to promote high-quality care.
Keywords: quality improvement, patient safety, return visits

P036

A comprehensive quality improvement initiative to prevent falls in the emergency department

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Introduction: Patients from all population groups visit the emergency department (ED), with increasing visits by elderly patients. Patient falls in the ED are a significant safety concern, and they can lead to serious injuries and worse outcomes. Toronto Western Hospital's ED Quality Improvement (QI) team identified as a problem our assessment and management of patients at risk for falls. The aim of this project was to develop a comprehensive and standardized approach to patients at risk of falls in the ED, including implementing timely interventions for fall prevention. **Methods:** A literature review of existing tools was completed to develop our own reliable and valid fall risk screening tool for ED patients. QI methods were used to devise a comprehensive strategy starting with detection at triage and implementation of action-driven steps at the bedside, through multiple PDSA cycles, randomized audits, surveys, and education. Repeated measurements were undergone throughout the project, as were staff satisfaction surveys. **Results:** The chart audits showed a five-fold increase in the completion rate of the fall risk screening tool in the ED by the end of the QI initiative (from 10% to 50%). Constructive feedback by an engaged team of nurses was used to iteratively improve the tool, and there was mostly positive feedback on it after various PDSA cycles were completed. The various component of this novel and useful ED-based falls screening tool and bundle will be presented in tables and figures for other leaders to replicate in their EDs. **Conclusion:** We developed a completely new ED-specific fall risk screening tool through literature review, front-line provider feedback, and iterative PDSA cycles. It was used for the identification, prevention, and management of ED patients with fall risk. We also contributed to a positive change in the culture of a busy ED environment towards the promotion of patient safety. Education and feedback continue to be provided to the ED nurses for reflective practice, and we hope to continue to improve our tool and to share it with other EDs.
Keywords: quality improvement, patient safety, falls

P037

The Ontario Emergency Department Return Visit Quality Program: a provincial initiative to promote continuous quality improvement

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Introduction: Analyzing the charts of patients who have a return visit to an emergency department (ED) requiring hospital admission (termed 'RV') is an efficient way to identify adverse events (AEs). Investigating these AEs can inform efforts to improve the quality of care provided. The ED RV Quality Program (RVQP) is a new initiative supported by Ontario's Ministry of Health and Long-Term Care and managed by Health Quality Ontario. It aims to promote a culture of continuous quality improvement through routine audit/investigation of RVs. **Methods:** The provincial program is mandatory for high-volume EDs and requires auditing of some 72-hour RVs and all 7-day RVs involving 'sentinel diagnoses' (subarachnoid hemorrhage [SAH], acute myocardial infarction [AMI], or pediatric sepsis [PS]). A standardized audit template is followed that includes assessment of the type/severity and underlying causes of AEs, and potential actions for improvement. **Results:** 73 high-volume EDs and 16 smaller EDs (collectively receiving 90% of all ED visits in Ontario) are participating in the program. Nine months' data have been released to date, comprising 33,956 RVs (1.05% of 3,235,751 ED visits). Of these, 233 RVs (0.69%) were for a sentinel diagnosis (SAH = 11, AMI = 191, PS = 31). The most common presenting complaint on the index visit was abdominal pain (18%). The most common discharge diagnosis following RV admission was acute appendicitis (3.8%). **Conclusion:** The ED RVQP aims to improve the quality of care provided in Ontario's EDs by requiring hospitals to conduct audits of RVs and plan actions for improvement when quality gaps are identified. Participating hospitals have completed hundreds of audits to date.
Keywords: quality improvement, patient safety, return visits

P038

Does the pediatric emergency department have a role in pediatric palliative care?

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Introduction: Very little is known regarding the emergency department's (ED) role in the care of paediatric patients with complex chronic and life-limiting illnesses. In fact, the provision of paediatric palliative care (PPC) in the paediatric ED has, of yet, never been explored. This study aims to explore pediatric emergency medicine healthcare professionals' perspectives regarding their role in PPC and to compare these to other health care professionals' understandings of the ED's role in PPC. **Methods:** Interdisciplinary semi-structured focus groups were held with healthcare providers from pediatric emergency medicine, pediatric palliative care, pediatric complex care and pediatric intensive care. Exploratory open-ended questions introduced naturally occurring discussions and interactions. Data was transcribed in full and analysed using NVivo© software. Data analysis was performed by thematic analysis and theoretical sampling. **Results:** From January to October 2016, 58 participants were interviewed; most were female nurses and physicians. ED providers seek to maintain continuity of care and uphold pre-established wishes throughout PPC patients' ED visits by listening and supporting the patient and family, evaluating the clinical situation, communicating with primary care teams and organising rapid admissions to wards. Some ED providers recognized having no choice to provide palliative care approach under certain circumstances despite thinking it might not be part of their culture and role. Each interdisciplinary team demonstrated particular values and cultures, influencing their understandings of the ED's role in PPC; continuity of care is complicated by these distinct philosophies. Limitations to providing PPC in the ED are related to unsuitable physical environments, lack of

uninterrupted time, efficiency expectations, unknown patients, provider lack of knowledge and moral distress. Solutions were directed at improving communication between teams and humanizing care to develop a sensibility to quality PPC in the ED. **Conclusion:** Although the perspective of pediatric ED's role in caring for PPC patients is heterogeneous, several barriers to providing high quality emergency PPC can be overcome. Future studies will explore the experiences of PPC families presenting to the ED.
Keywords: paediatric palliative care, emergency department, ethics

P039

Potential impact on receiving hospital of a prehospital triage system for refractory cardiac arrest: a simulation study

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Introduction: Extracorporeal cardiopulmonary resuscitation (E-CPR) has been used successfully to increase survival in patients suffering from out-of-hospital cardiac arrest (OHCA). However, few OHCA patients can benefit from E-CPR since this procedure is only performed in dedicated centers. Prehospital triage systems have helped decrease mortality from other acute conditions, by directly transporting patients to dedicated centers, often bypassing primary care centers. Our study aimed to quantify the possible impact of a prehospital triage system on the proportion of E-CPR eligible patients transported to E-CPR centers. **Methods:** We used a registry of adult OHCA collected between 2010 and 2015 from the city of Montréal, Canada. Included patients were adults with non-traumatic witnessed OHCA refractory to 15 minutes of resuscitation. Using this cohort, we created 3 scenarios in which potential E-CPR candidates could be redirected to E-CPR centers. We used strict eligibility criteria in our first pair (e.g. age <60 years old, initial shockable rhythm), intermediate criteria in our second pair (e.g. age <65 years old, at least one shock given) and inclusive criteria in our third pair (e.g. age <70 years old, initial rhythm ≠ asystole). These 3 scenarios were compared to their counterpart in which patients would be transported to the closest hospital. The proportions of patients who would have been transported to an E-CPR centers were compared using McNemar's test. To obtain a power of 99%, expecting 1% of discordant pairs and using a unilateral alpha of 0.83% (after Bonferroni correction), we needed to include at least 1000 patients. **Results:** A total of 3136 patients (2054 men and 982 women) with a mean age of 69 years (standard deviation 15) were included. In each simulation, prehospital redirection would have significantly increased the proportion of patients transported to an E-CPR center (pair 1: 1.3% vs 3.8%, $p < 0.001$; pair 2: 2.6% vs 7.3%, $p < 0.001$; pair 3: 7.6% vs 29.8%, $p < 0.001$). **Conclusion:** In an urban setting, a prehospital triage system could triple the number of patients with refractory OHCA who would have an access to E-CPR. This implies that centers with E-CPR capability should prepare themselves accordingly for such a system to effectively improve survival following OHCA.
Keywords: out-of-hospital cardiac arrest, prehospital system, extracorporeal resuscitation

P040

Epidemiology of gun related injuries among Canadian children and youth from 2005-2013: a CHIRPP study

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Introduction: Gun related injuries were last reported by the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) in 2005. Since that time, Canadian gun control is less stringent and non-powder guns are increasingly popular. We aim to describe trends in pediatric gun related injuries and deaths since 2005. **Methods:** This is a retrospective review of CHIRPP data. The dataset included pediatric (age 0-19 years) gun-related injuries and deaths reported by participating CHIRPP emergency departments (ED) from 2005-2013. Variables were tested using Fisher's exact test and simple linear regression. **Results:** There were 421 records of gun-related injuries in the database. Three hundred and twenty-nine occurred from use of non-powder guns, 85 occurred from use of powder-guns, and in 7 cases the type of gun was not clear. The number of gun-related injuries per 100 000 ED visits remained stable from 2005-2013 with a male predominance (n = 366, 87%). Most injuries resulted from non-powder guns and were unintentional. Injuries most often occurred in the context of recreation (n = 181) and sport (n = 51). One hundred fifty four eye injuries were reported, 98% of which were from a non-powder gun. Forty-six individuals required admission to hospital and 2 died in the ED. Nine of 10 intentional self-harm injuries were inflicted with a powder gun. **Conclusion:** This study describes the injuries and circumstances in which pediatric gun-related injury and death occur in Canada. Unintentional injuries caused by non-powder guns were most common. Though less fatal than powder guns, non-powder guns can still cause life-altering eye injuries. This evidence can inform injury prevention programs to target specific circumstances in which the pediatric population is most vulnerable.
Keywords: guns, epidemiology, injury prevention

P041

The nursing shift: measuring the effect of inter-professional education on medical students in the emergency department

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Introduction / Innovation Concept: Inter-professional education (IPE) involves 'occasions when two or more professions learn with, from and about each other to improve collaboration and the quality of care'. Current literature has found IPE to increase knowledge and skills, improve attitudes towards other professions, and to promote superior clinical outcomes. Health Canada has collaborated to form accreditation standards to support IPE in Canadian medical schools. The proposed educational innovation termed the 'nursing shift,' based out of Kelowna General Hospital's Department of Emergency Medicine, in partnership with UBC's Southern and Island Medical Programs, endeavors to enhance IPE in our institution. **Methods:** This nursing shift was first trialed with third year medical students as a pilot rotation beginning in March of 2016. Based on overwhelmingly positive results obtained from narrative feedback, a formal rotation with the same structure will be implemented in the form of a prospective cohort study with 48 medical students from two UBC sites. One group will attend a nursing shift, while the other group will complete the standard emergency medicine rotation without this nursing shift. Impact will be measured using a mixed-method analysis where students will be asked to provide both quantitative feedback in the form of a questionnaire, and qualitative feedback in the form of a narrative response. The primary outcome will be quantitative score differences between the groups of students, and the secondary outcome will be qualitative results for those who completed the nursing shift. **Curriculum, Tool, or Material:** The innovative educational concept consists of an 8-hour nursing shift where medical students spend the first 4 hours at triage with a nurse learning about

patient intake. The remaining 4 hours are in the emergency department where students collaborate with a nurse on a number of tasks including preparing and administering medications, starting intravenous lines, and inserting Foley catheters. **Conclusion:** Healthcare systems are shifting to a more collaborative team oriented approach, and IPE has been shown to prepare students for this changing workplace. We seek to understand third year medical students' experience of the nursing shift, and to evaluate any changes in attitudes towards inter-professional collaboration after engaging in this intervention. Evaluation of this novel implementation will enable us to assess and optimize the nursing shift, and if it is well received, encourage widespread adoption.
Keywords: inter-professional education, undergraduate medical education, emergency medicine

P042

Are we ready for a gunman in the emergency department? A qualitative study of staff perceptions of personal health risks, workplace safety, and individual and institutional readiness to respond to "code silver"

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Introduction: Hospital-based gun violence is devastatingly traumatic for everyone present and quite tragically on the rise. The Ontario Hospital Association (OHA) has recently designated active shooter situations as "Code Silver" and advised member hospitals to develop policies and train health care workers on how best to respond. Given that emergency departments (ED) are particularly susceptible to opportunistic breach by an active shooter and staff members are likely to be called upon as first responders, the impact of a Code Silver on ED functioning and staff members may be particularly severe. We hypothesized that there may not be a simple, one-size-fits-all-hospital-staff solution about how best to prepare ED physicians and staff to respond to a Code Silver situation. **Methods:** In order to inform and support future staff training initiatives related to Code Silver and other disaster situations in hospitals, we conducted a robust qualitative study to investigate perspectives and behaviour related to personal safety at work and Code Silver in particular among the multi-disciplinary ED staff at a single tertiary care centre in Toronto, Ontario. Participants for in-depth interviews and focus groups were recruited using a combination of stakeholder and maximum variation sampling strategies. Data analysis occurred in conjunction with data collection and standard thematic analysis techniques were employed. **Results:** Initial data analysis has revealed the following thematic concepts: the ubiquitous banality of personal health risk as an expected, acceptable feature of everyday life at work for ED staff, the perception of active shooters as a transgressive threat that violates the boundaries of professional responsibility, and the perceived fallacy of "readiness" to respond to disastrous situations. A fulsome analysis will be ready for presentation in June. **Conclusion:** Knowledge from this study indicates that ED staff members have unique and specific training needs in relation to an active shooter situation, and gives us deeper insight into potential areas of focus for training and opportunities for knowledge translation on the topic of Code Silver for EDs across the country.
Keywords: workplace violence, code silver, policy

P043

Outcomes associated with prehospital refractory ventricular fibrillation

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Introduction: When ventricular fibrillation (VF) cannot be terminated with conventional external defibrillation, it is classified as refractory VF (RVF). There is a paucity of information regarding prehospital or patient factors that may be associated with RVF. The objectives of this study were to determine factors that may be associated with RVF, the initial ED rhythm for patients with prehospital RVF, and the incidence of survival in patients who had RVF and were transported to hospital. **Methods:** Ambulance Call Records (ACRs) of patients with out of hospital cardiac arrest between Mar. 1 2012 and Apr. 1 2016 were reviewed. Cases of RVF ($\geq$5 consecutive shocks delivered) were determined by manual review of the ACR. ED and hospital records were analyzed to determine outcomes of patients who were in RVF and transported to hospital. Descriptive statistics were calculated and all variables were tested for an association with initial ED rhythm, survival to admission, and survival to discharge. **Results:** Eighty-five cases of RVF were identified. A history of coronary artery disease (47.10%) and hypertension (50.60%) were the most common comorbidities in patients transported to the ED with RVF. Upon arrival to the ED, 24 (28.2%) remained in RVF, 38 (44.7%) had a non-shockable rhythm, and 23 (27.1%) had return of spontaneous circulation. Thirty-four (40%) survived to admission, while only 18 (21.2%) survived to discharge. Pre-existing comorbidities, time to first shock, time on scene, and transport time were not statistically associated with initial ED rhythm, survival to admission or discharge. Patient age was statistically associated with improved rhythm on ED arrival ($p = 0.013$) and survival to discharge (58.24 yrs vs 67.40 yrs, Δ9.17, 95% CI 1.82 to 16.52, $p = 0.015$). **Conclusion:** The majority of patients with prehospital RVF have a rhythm deterioration by the time care is transferred to the ED. Of these patients with a rhythm deterioration, few survive to hospital discharge. Younger patients are more likely to remain in RVF and survive to discharge. Further research is required to determine prehospital treatment strategies for RVF, as well as patient populations that may benefit from those treatments.
Keywords: ventricular fibrillation, prehospital, return of spontaneous circulation

P044

Factors influencing laboratory test ordering by physicians and nurses in the emergency department

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Introduction: Understanding factors that influence laboratory test ordering in emergency departments (EDs) can help to improve current laboratory test ordering practices. The aim of this study is to compare patterns and influences in laboratory test ordering between emergency physicians and nurses at two ED sites, Halifax Infirmary (HI) and Dartmouth General (DG). **Methods:** A mixed-methods approach involving administrative data and telephone interviews was employed. Data from 211,279 patients at HI and DG EDs were analyzed. Chi-square analysis and binary logistic regression were used to determine significant factors influencing whether a test was ordered, as well as significant factors predicting likelihood of a nurse or a physician ordering a test. All significant associations had a p-value of <0.0001. Interviews were conducted ($n = 25$) with doctors and nurses in order to explore areas of potential influence in a clinician's decision-making process, and discuss what makes decision making difficult or inconsistent in the ED. These interviews were analyzed according to the Theoretical Domains Framework. The interviews were coded by two individuals using a consensus methodology in order to ensure accuracy of coding. **Results:** Overall, laboratory tests were more likely to be

ordered at DG than at HI (OR = 1.52, 95% CI: [1.48, 1.55]). Laboratory tests were more likely to be ordered by nurses at DG than at HI (OR = 1.58, 95% CI: [1.54, 1.62]). Laboratory tests were more likely to be ordered if the ED was not busy, if the patient was over 65, had a high acuity, had a long stay in the ED, required consults, or was admitted to hospital. Doctors were more likely to order a laboratory test in patients over 65, requiring consults or hospital admission, whereas nurses were more likely to order laboratory tests in patients with high acuity or long stays in the ED. Data from the interviews suggested differing influences on decision making between nurses and doctors, especially in the areas of social influence and knowledge. **Conclusion:** Currently, there is limited research that investigates behaviour of both emergency physicians and nurses. By determining barriers that are most amenable to behaviour change in emergency physicians and nurses, findings from this work may be used to update practice guidelines, ensuring more consistency and efficiency in laboratory test ordering in the ED.

Keywords: clinical assessment, laboratory testing, clinical decision making

P045

Human trafficking awareness, a learning module for improved recognition of victims in the emergency room

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Introduction / Innovation Concept: Estimates suggest that up to eighty-seven percent of human trafficking victims have come into contact with a healthcare provider during their exploitation and yet less than ten percent of emergency medicine (EM) physicians feel confident in identifying a victim. When provided with the relevant tools, medical personnel can aid in the recognition of victims and take the necessary steps in providing appropriate care when they present to the emergency department. Identifying this need for increased awareness in the urgent care setting, a module on human trafficking was implemented into the undergraduate medical education and departmental grand rounds. **Methods:** After identifying gaps in current medical education regarding screening for victims of human trafficking, a literature review was completed on the topic in medical education and utilized in constructing a list of objectives. These were then reviewed by community organizations that aid victims of trafficking and the Canadian Alliance of Medical Students Against Human Trafficking. Undergraduate medical students completed surveys prior to and following the learning module, in order to evaluate improvement in acquired knowledge. **Curriculum, Tool, or Material:** A one-hour lecture from ACT Alberta was given to undergraduate medical students as well as to residents and staff in departmental grand rounds. The session met the following objectives: defining human trafficking, recognition of victims, and identification of next steps in providing care. Additionally, an online module from Fraser Health was made available as an additional resource with case studies specific to emergency departments. The surveys consisted of 13 questions evaluating students' knowledge on human trafficking and its prevalence in emergency medicine. The questions were a combination of a Likert scale, multiple choice, and short answer. There was a large amount of positive feedback from the students and comparison of the surveys showed that their knowledge in identifying victims had significantly improved. **Conclusion:** Medical students, residents, and staff may come into contact with victims of trafficking in the emergency department and yet less than three percent of emergency physicians have had training on how to recognize a victim. Implementing human trafficking awareness will impact EM medical education by providing victims a greater chance of being recognized and offered help when they present to the emergency room.

Keywords: human trafficking, innovations in emergency medicine education, medical education

P046

The development of a validated checklist for bougie-assisted cricothyroidotomy

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Introduction: A cricothyroidotomy is a life-saving procedure and essential skill for EM physicians. The bougie-assisted cricothyroidotomy (BAC) is a newly describe technique that is both simple and reliable. There remains no consensus for the essential steps and ideal training strategy for the procedure. Using a modified Delphi process, we created an expert-derived checklist as a transferable educational tool for BAC instruction. **Methods:** A literature search was conducted to identify relevant articles describing the steps for BAC performance. These steps formed the first-iteration checklist for the modified Delphi process. Fourteen experts from general surgery, emergency medicine, otolaryngology, and anesthesia were recruited as participants for the Delphi process which consisted of three iterations. In the first two rounds, experts ranked each checklist step on a scale of 1-7, suggested additions, and provided comments. After each round the comments and rankings were integrated and steps with an average ranking of $\leq$3.0 were removed from the checklist for the next round. In the final round, consensus was sought by asking experts to indicate if this checklist was acceptable for teaching BAC to a novice learner. **Results:** A 22-item checklist was developed from a literature review. Following a modified Delphi methodology, the final BAC checklist contained 17 items. Internal consistency of the checklist was very good ($\alpha = 0.855$). In the third and final round, 86% of the participants agreed that the final iteration of the checklist. There was disagreement regarding "bougie hold up" as an appropriate method to confirm bougie position within the tracheal lumen. The checklist was modified, replacing "hold up" with digital palpation in the trachea as confirmation of successful bougie placement. With these modifications, consensus was achieved. **Conclusion:** Using a modified Delphi process, derived from existing literature and expert opinion, a 17-item BAC checklist was developed for novice instruction. This BAC checklist represents the first consensus-based set of steps for the procedure which may serve as a useful tool for trainee instruction and evaluation. Future research is required to test the validity of this checklist in training for a BAC and its applicability within competency-based medical education.

Keywords: airway, checklist, cricothyroidotomy

P047

Test characteristics of point of care ultrasound for the diagnosis of retinal detachment in the emergency department

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Introduction: The acute onset of flashes and floaters is a common presentation to the emergency department (ED). The most emergent etiology is retinal detachment (RD), which requires prompt ophthalmologic assessment. Previous studies of point of care ultrasound (POCUS) have reported high sensitivity and specificity for RD, but are

limited by small sample size, use of highly trained and experienced sonographers, and referral bias. Our primary objective was to assess the test characteristics of POCUS performed by a large heterogeneous group of emergency physicians (EPs) for the diagnosis of RD. **Methods:** This was a prospective diagnostic test assessment of POCUS performed by EPs with varying ultrasound experience on a convenience sample of ED patients presenting with the complaint of flashes or floaters in one or both eyes. Participating EPs completed a one hour didactic lecture and were expected to demonstrate appropriate performance of one practice scan before enrolling patients. After standard ED assessment, patients underwent an ocular POCUS scan targeted to detect RD. EPs recorded the presence or absence of RD on the data collection instrument based on their POCUS scan. After completing their ED visit, all patients were assessed by a retina specialist who was blinded to the results of the POCUS scan. We calculated sensitivity and specificity with associated exact binomial confidence intervals (CI) using the retina specialist's determination of the final diagnosis as the criterion standard. **Results:** A total of 30 EPs, consisting of 21 staff physicians and 9 residents, participated in this study. These EPs performed a total of 128 POCUS scans. Of these scans, 13 were excluded. Of the remaining 115 enrolled patients, median age was 60 years, and 64% were female. The retina specialist diagnosed RD in 16 (14%) cases. The sensitivity and specificity of POCUS for detecting RD was 75% (95% CI 48% to 93%) and 94% (95% CI 87% to 98%), respectively. The positive likelihood ratio was 12.4 (95% CI 5.4 to 28.3), and negative likelihood ratio was 0.27 (95% CI 0.11 to 0.62). **Conclusion:** In a heterogeneous group of EPs with varying ultrasound experience, POCUS demonstrates high specificity but only intermediate sensitivity for the detection of RD. A negative POCUS scan is not sufficiently sensitive to rule out RD in a patient with new onset flashes or floaters.

Keywords: point of care ultrasound, retinal detachment, emergency physician

P048

Profiling the burdens of working nights. Traditional 8-hour nights vs staggered 6-hour casino shifts in an academic emergency department

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Introduction: Emergency physicians (EP) often work at undesirable hours. In response to deleterious effects on quality of life for EPs, traditional 2300-0700 night shifts have been replaced at some centres with staggered 6-hour casino shifts (22:00-04:00 and 04:00-10:00). Though purported to allow for better sleep and recovery patterns, no evidence exists to support the benefits on sleep or quality of life that is used to justify a casino shift model. Using a before and after survey model, this study examines the impact of overhauling night work from a traditional 8-hour shift to casino shifts on the quality of life and job satisfaction of EPs working in an academic emergency department (ED). **Methods:** In 2010, an initial online, 37-item survey, was sent to all EPs working in the ED, just prior to the transition to casino shifts. 6 years following the transition, a slightly modified 37-item survey was again distributed to all current EPs working at that same centre. Participants rated their level of agreement on a 7-point Likert scale regarding questions related to night work. Results from the two surveys were compared. **Results:** 43 2010- and 47 2016-surveys were completed. In 2016, recovery to baseline function after a single early shift (22:00-04:00) was most common after 1 day at 52.4%, and after multiple early shifts was ≥2 days at 66.7%. Recovery after a single late shift (04:00-10:00) was most common at 1 day at 54.8%, and after multiple late shifts was ≥2 days at 59.5%. This was in contrast to 2010, when 55.8% recovered from a single traditional night shift after 1 day, and 95.3% required ≥2 days to recover from multiple traditional night shifts. In relation to casino shifts, 40.5% of respondents stated that night shifts are the greatest drawback of their job, compared to 79.1% previously. A minority of respondents felt that teaching (36.5%), diagnostic test interpretation (23.2%), and quality of handover (33.5%) were inferior on early and late night shifts compared to other shifts (74.4%, 58.1%, and 60.5% for traditional night shifts respectively).95.0% of respondents preferred casino over traditional night shifts. **Conclusion:** There were self-reported improvements in all domains following the implementation of casino shifts.

Keywords: casino shifts, night shifts, scheduling

P049

Modelling and manufacturing of a 3D printed trachea for cricothyroidotomy simulation

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Introduction: Most current cricothyroidotomy simulation models are either expensive or low fidelity and limit the learner to an unrealistic simulation experience. The goal of this project is to innovate current simulation techniques by 3D printing anatomically accurate trachea models. By doing so emergency cricothyroidotomy simulation can be accessible, high fidelity, cost effective and replicable. **Methods:** 3D modelling software was used in conjunction with a desktop 3D printer to design and manufacture an anatomically accurate model of the cartilage within the trachea (thyroid cartilage, cricoid cartilage, and the tracheal rings). The initial design was based on dimensions found in studies measuring the dimensions of tracheal anatomy. This ensured an appropriate anatomical landmark design was achieved. Several revisions of the model were designed and qualitatively assessed by medical and simulation professionals to ensure anatomical accuracy that exceeded that of the currently used, low cost, cricothyroidotomy simulation model in St. John's. **Results:** Using an entry level desktop 3D printer, a low cost tracheal model was successfully designed that can be printed in under 3 hours. Due to its anatomical accuracy, flexibility and durability, this model is ideal for use in emergency medicine simulation training. Additionally, the model can be assembled in conjunction with a membrane to simulate tracheal ligaments and skin for appearance. **Conclusion:** The end result is a high fidelity simulation that will provide users with an anatomically correct model to practice important skills used in emergency airway surgery, specifically land marking, incision and intubation. This design is a novel, easy to manufacture, replicable, low fidelity trachea model that can be used by educators with limited resources such as those in rural and remote areas.

Keywords: 3D printing, simulation, cricothyroidotomy

P050

A prospective cohort study to evaluate discharge care for patients with atrial fibrillation and flutter (AF/AFL)

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Introduction: Atrial fibrillation and flutter (AF/AFL) are the most common arrhythmias encountered in the emergency department (ED); however, little information exists regarding the preventive management of patients with AF/AFL by emergency physicians (EPs). This study explored whether patients with AF/AFL received the recommended thrombo-embolic (TE) prophylaxis at discharge from the ED; patients'

TE risks, bleeding risks, and TE prophylaxis upon discharge from the ED were examined following assessment for symptomatic acute AF/AFL. **Methods:** Patients ≥18 years of age identified by the EP as having a diagnosis of acute AF/AFL confirmed by ECG were prospectively enrolled from three urban Canadian EDs. Using standardized patient enrollment forms, trained research assistants collected data on the patient's demographics, TE risk (using the $CHADS_2$ and CHA_2DS_2-VASc score), bleeding risk (using the HAS-BLED score), and management both in the ED and at discharge. Treating physicians were surveyed on their use of risk scores when making TE prophylaxis decisions as well as their estimate of the patient's stroke and bleeding risk. Descriptive analyses were performed. **Results:** From a total of 196 patients, 62% were male and the mean age was 63 years (standard deviation [SD] ±14). Most patients had previous history of AF/AFL (71%); hypertension was documented in 40% of them and ≤10% had other risk factors (e.g., congestive heart failure, vascular disease, diabetes, previous stroke, transient ischemic attack). Based on the $CHADS_2$ score and previous management, there was opportunity for new or revised antiplatelet/anticoagulant treatment by EPs in 19% of the patients. Consultations were requested in 28% of the patients, and the majority (89%) were discharged with anticoagulant or antiplatelet agents. EPs expressed concerns that an increased risk of falls, lack of access to facilities for INR monitoring, and significant cognitive impairment would affect their willingness to prescribe anticoagulation. **Conclusion:** Most patients in the ED with acute AF/AFL are receiving the recommended TE prophylaxis; however, given the significant morbidity and mortality associated with AF/AFL, improved short-term prescribing practices for anticoagulants would benefit 1 in 5 ED patients. More research on barriers to EPs prescribing anticoagulants is required to improve clinician comfort in treating this high-risk population.

Keywords: emergency department care

P051

Does knowledge of the Canadian CT Head Rules impact the frequency of CT's ordered?

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Introduction: The Canadian Computed Tomography Head Rules (CCTHR) is a validated and well-known head injury clinical decision rule that allows Emergency Room Physicians (ERPs) to determine which patients are most likely to benefit from a diagnostic CT. However, this clinical decision rule is not uniformly adhered to and a number of preventable CT scans are ordered. Choosing Wisely Canada has ranked decreasing unnecessary head CT scans as the number one priority for Emergency Departments (ED). As such, the purpose of this study was to investigate if an educational intervention for ERPs would increase adherence to the CCTHR. **Methods:** In September 2015 the CCTHR were presented and discussed at three ED departmental meetings at Kelowna General Hospital (KGH) a large tertiary hospital in the interior of British Columbia, Canada. Educational materials were distributed to the ERPS and a CTTHR checklist was made available throughout the ED. Rates of adherence to the CCTHR criteria were calculated from MHI patients that were seen in the four years prior to the educational intervention and were compared to rates of adherence for patients 12 months post educational intervention. Only patients that agreed to participate in the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) were included in this analysis. Differences in adherence rates were tested using the chi-squared test. **Results:** 477 patients were included in the analysis for the pre-education cohort (control) and 257 for the post-education cohort(intervention). In the control cohort, 348 of the 477 (73%) of the patients were managed in accordance to the CCTHR compared to 194 of the 257 (75%) in the intervention cohort. There was no statistically significant difference in rates of adherence ($p = 0.457$).In the control cohort, 44 of the 321 (14%) of patients received a CT that did not meet any CCTHR criteria compared to 15 of the 163 (9%) in the intervention cohort. The overall CT imaging rate was 24% in each patient cohort. **Conclusion:** Although adherence rates between the two cohorts were not statistically different, a greater proportion of patients had a CTAS of 2 or 3 and met criteria in the intervention cohort suggesting a higher level of acuity. Imaging rates remained constant at 24%, which was lower than expected if there was full adherence to the CCTHR. Further study is required to determine if educational interventions can improve adherence to the CCTHR.

Keywords: minor head injury, computed tomography, Canadian Computed Tomography Head Rules

P052

The importance of structured ambulance radio patches during termination of resuscitation calls

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Introduction: Pre-hospital telecommunication (patches) requires a special type of conversation. Receiving and processing correct information is critical when making clinical decisions, such as a termination of resuscitation (ToR). In a study of radio patches, a common patch structure emerged from the data analysis. Use of this standard structure resulted in shorter and less confusing patches. We sought to understand patch structure to be able to target interventions to improve the quality and efficiency of communication needed for critical clinical decisions. **Methods:** We undertook a retrospective analysis of all ToR patches between physicians and paramedics from 4 paramedic services, recorded by the Ambulance Dispatch Centre between Jan 01-Dec 31, 2014. Four services used Primary Care Paramedics and 1 service also used Advanced Care Paramedics. MP3 patch recording files were anonymized, transcribed, and read multiple times by the authors. Transcripts were coded and analyzed using mixed methods-quantitative descriptive statistics and qualitative thematic framework analysis. **Results:** The data set was 127 ToR patches-466 pages of transcripts. 116 patches (91.3%) had a standard structure (SS): participant introduction, clinical data presentation, clarification of data, making the decision, exchange of administrative information, and sign off. Paramedics used a mean of 81 words (95CI 74,88) to present the 'clinical data'. Enough data was presented to meet ToR rule criteria in 52 cases (44.8%). Before making a decision to terminate resuscitation, physicians sought clarification in 100 cases (78.7%). After making the ToR decision, some physicians needed to justify their decision by seeking more data in 17 cases (13.4%). Exchange of non-clinical information (numbers, times, name spellings) took a mean of 200 words (95CI 172,228) and averaged 84 seconds or 35% of the average patch time. SS patches used a mean of 558 words, and lasted 234 sec (95CI 215,252). Non-SS patches used a mean of 654 words and lasted 286 sec (95CI 240,332). **Conclusion:** The most common patch structure consisted of participant introduction, data presentation, clarification of data, making the clinical decision, exchange of administrative information, and a sign off. Deviation from this SS resulted in longer patches. When a non-SS patch structure was used, the patching paramedic was tied up 25% longer and unavailable to provide patient care.

Keywords: paramedic, communication, termination of resuscitation

P053

Communication interruptum: cellphone technology problems in paramedic-physician communication

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Introduction: Approximately 15 years ago cell phones replaced portable VHF radios as the means of communication between paramedics and base hospital physicians. Cellphones, like VHF radio, do not allow voice transmission and reception to occur simultaneously. Radio use requires a learned technique to signal the end of each speaker's turn talking. These techniques are not used in normal cellphone conversation. Poor cellphone reception and poor technique result in breakdowns in communication. The literature about paramedic-physician telecommunication is almost nonexistent. There is an extensive literature in other industries, such as aviation, concerning problems in radio communication. This literature predicts that communication breakdowns are common and have critical consequences. We sought to determine how frequently problems attributable to cell phone technology arose in paramedic-physician communication. **Methods:** We conducted a retrospective analysis of all patch calls between physicians and paramedics from 4 municipal paramedic services from January 01-December 31, 2014. MP3 audio files, recorded during normal operating procedures by the Central Ambulance Communication Centre, were anonymized and transcribed. Transcripts were read multiple times by the authors and analyzed using mixed methods-qualitative thematic framework analysis and quantitative descriptive statistics. **Results:** 161 calls were identified. 155 tapes were usable for analysis. 127 (81.9%) patches involved termination of resuscitation orders, 28 (19.1%) were for advice or other orders. The data set consisted of 567 pages of transcripts. Communication problems were identified in 138 (89.0%) patches. Most had multiple problems. Technical problems included disconnections (13.5%), or difficulty hearing (56.8%)-indicated by phrases such as "what?", "I can't hear you". Disorganized cell phone technique was common-individuals interrupted each other (34.2%), and talked simultaneously (54.8%). Signalling the end of "talk turns"-using terms such as "10-4" or "over"-was never used. **Conclusion:** In addition to technical problems (poor transmission, disconnections), disorganized cell phone 'technique' caused a high incidence of communication problems. This is concerning because critical clinical decisions (e.g. ceasing resuscitation) depend on clear communication. Understanding the limitations of cellphone technology might improve communication.

Keywords: paramedic, cell phone technology, communication

P054

Do biomarkers need clinical attention among pre-frail injured seniors seen in the ED

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Introduction: Frailty is associated with functional decline and physiological impairments in seniors with minor injuries. Serum biomarkers have also been suggested as potential markers of these impairments in clinical studies. However, no study has addressed the usefulness of serum biomarkers among pre-frail seniors consulting emergency departments (ED) in order to detect these impairments. **Objectives:** The purpose of the present study was to explore the association between several serum biomarkers and the frailty status of seniors seen in ED for a minor injury who are at risk of functional decline and 2) assist professionals in clinical decisions while identifying frail seniors in whom interventions should be started in order to prevent potential functional decline. **Methods:** This cross-sectional study includes 190 seniors retrieved from the larger CETI cohort and 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). Then, patients were classified as "Robust" (CHSA-CFS levels 1 and 2) vs. "Pre-frail/Frail" (CHSA-CFS levels $\geq$3). Biomarkers (Albumin, Creatinine, C-reactive protein (CRP), Vitamin D, Ferritin, Glucose and Insulin-Growth Factor (IGF-1)) were obtained from blood samples. "Normal" vs. "Impaired" (low and/or high) clinical threshold values were used for statistical analyses. **Results:** The proportion of patients with clinically high creatinine levels (>105 µmol/L for male and >85 µmol/L for female) was higher in Pre-frails/Frails when compared to Robusts (P-value = 0.01). Also, regarding IGF-1, we observed that the proportion of patients with lower IGF-1 levels (<50 µg/L) was higher in patients showing Pre-frail/Frail status (P-value = 0.01). Finally, a significant correlation was found between frailty status and blood glucose (r = 0.22; P-value = 0.02) whereas a tendency was noted for CRP level (r = 0.14; P-value = 0.1). **Conclusion:** When compared to Robust seniors, Pre-frail/Frail individuals presenting to EDs tend to have physiological dysregulations that may help detect pre-frail status in community-dwellers. Larger prospective studies are needed to specify the usefulness and clinical implications of frailty biomarkers in the continuum of acute elder care.

Keywords: frailty, biomarkers, injury

P055

EMS boot camp: a real-world, real-time educational experience for emergency medicine residents

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Introduction / Innovation Concept: In 2014, Eastern Ontario paramedic services, their medical director staff and area community colleges developed an EMS Boot Camp experience to orient Queen's University and the University of Ottawa emergency medicine residents to the role of paramedics and the challenges they face in the field. Current EMS ride-alongs and didactic classroom sessions were deemed ineffective at adequately preparing residents to provide online medical control. From those early discussions came the creation of a real-world, real-time (RWRT) educational experience. **Methods:** Specific challenges unique to paramedicine are difficult to communicate to a medical control physician at the other end of a telephone. The goal of this one-day educational experience is for residents to gain insight into the complexity and time sensitive nature of delivering medical care in the field. Residents are immersed as responding paramedics in a day of intense RWRT simulation exercises reflecting the common paramedic logistical challenges to delivering patient care in an uncontrolled and dynamic environment. **Curriculum, Tool, or Material:** Scenarios, run by paramedic students, are overseen by working paramedics from participating paramedic services. Residents learn proper use of key equipment found on an Ontario ambulance while familiarize themselves with patient care standards and medical directives. Scenarios focus on prehospital-specific clinical care issues; performing dynamic CPR in a moving vehicle, extricating a bariatric patient with limited personnel, large scale multi-casualty triage as well as other time sensitive, high risk procedures requiring online medical control approval (i.e. chest needle thoracostomy). **Conclusion:** EMS Boot Camp dispels preconceived biases regarding "what it's really like" to deliver high quality prehospital clinical care. When providing online medical control in the

future, the residents will be primed to understand and expect certain challenges that may arise. The educational experience fosters collaboration between prehospital and hospital-based providers. The sessions provide a reproducible, standardized experience for all participants; something that cannot be guaranteed with traditional EMS ride-alongs. Future sessions will evaluate participant satisfaction and self-efficacy with the use of a standard evaluation form including pre/post self-evaluations.
Keywords: emergency medical services, resident education

P056

Rural versus urban pre-hospital and in-hospital mortality following a traumatic event in Québec, Canada

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Introduction: Trauma remains the primary cause of death in people under 40 in Québec. Although trauma care has dramatically improved in the last decade, no empirical data on the effectiveness of trauma care in rural Québec are available. This study aims to establish a portrait of trauma and trauma-related mortality in rural versus urban pre-hospital and hospital settings. **Methods:** Data for all trauma victims treated in the 26 rural hospitals and 32 Level-1 and Level-2 urban trauma centres was obtained from Québec's trauma registry (2009-2013). Rural hospitals were located in rural small towns (Statistics Canada definition), provided 24/7 physician coverage and admission capabilities. Study population was trauma patients who accessed eligible hospitals. Transferred patients were excluded. Descriptive statistics were used to compare rural with urban trauma case frequency, severity and mortality and descriptive data collected on emergency department (ED) characteristics. Using logistic regression analysis we compared rural to urban in-hospital mortality (pre-admission and during ED stay), adjusting for age, sex, severity (ISS), injury type and mode of transport. **Results:** Rural hospitals (N = 26) received on average 490 000 ED visits per year and urban trauma centres (N = 32), 1 550 000. Most rural hospitals had 24/7 coverage and diagnostic equipment e.g. CT scanners (74 %), intensive care units (78 %) and general surgical services (78 %), but little access to other consultants. About 40% of rural hospitals were more than 300 km from a Level-1 or Level-2 trauma centre. Of the 72 699 trauma cases, 4703 (6.5%) were treated in rural and 67 996 (93.5%) in urban hospitals. Rural versus urban case severity was similar: ISS rural: 8.6 (7.1), ISS urban: 7.2 (7.2). Trauma mortality was higher in rural than urban pre-hospital settings: 7.5% vs 2.6%. Reliable pre-hospital times were available for only a third of eligible cases. Rural mortality was significantly higher than urban mortality during ED stays (OR (95% IC): 2.14 (1.61-2.85)) but not after admission (OR (95% IC): 0.87 (0.74-1.02)). **Conclusion:** Rural hospitals treat equally severe trauma cases as do urban trauma centres but with fewer resources. The higher pre-hospital and in-ED mortality is of grave concern. Longer rural transport times may be a factor. Lack of reliable pre-hospital times precluded further analysis.
Keywords: trauma, rural, mortality

P057

Diagnosis for mild traumatic brain injury in three Canadian emergency departments: missed opportunities

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Introduction: Patients with mild traumatic brain injury (mTBI) often present to the emergency department (ED). Incorrect diagnosis may delay appropriate treatment and recommendations for these patients, prolonging recovery. Notable proportions of missed mTBI diagnosis have been documented in children and athletes, while diagnosis of mTBI has not been examined in the general adult population. **Methods:** A prospective cohort study was conducted in one academic (site 1) and two non-academic (sites 2 and 3) EDs in Edmonton, Canada. On-site research assistants enrolled adult (>17 years) patients presenting within 72 hours of the injury event with clinical signs of mTBI and Glasgow comma scale score ≥13. Patient demographics, injury characteristics, and ED flow information were collected by chart review. Physician-administered questionnaires and patient interviews documented the recommendations given by emergency physicians at discharge. Bi-variable comparisons are reported using Pearson's chi-square tests, Student's t-tests or Mann-Whitney tests, as appropriate. Multivariate analyses were performed using logistic regression methods. **Results:** Overall, 130/250 enrolled patients were female, and the median age was 35. Proportions of successfully diagnosed mTBI varied significantly across study sites (Site 1: 89%; Site 2: 73%, Site 3: 53%; $p > 0.001$). Patients without a diagnosis were less likely to receive a recommendation to follow-up with their family physician (OR = 0.08; 95% CI: 0.03, 0.21) or advice about return to work (OR = 0.17; 95% CI: 0.08, 0.04) or physical activity (OR = 0.08; 95% CI: 0.04, 0.17). Patients with missed diagnoses had longer ED stays (median = 5.0 hours; IQR: 3.8, 7.0) compared with diagnosed mTBI patients (median = 3.9 hours; IQR: 3.0, 5.3). In the adjusted model, patients presenting to non-academic centers had reduced likelihood of mTBI diagnosis (Site 2: OR = 0.21; 95% CI: 0.08, 0.58; Site 3: OR = 0.07; 95% CI: 0.02, 0.24). **Conclusion:** The diagnostic accuracy of physicians assessing patients presenting with symptoms of mTBIs to these three EDs is suboptimal. The rates of missed diagnosis vary among EDs and were associated with length of ED stay. Closer examination of institutional factors, including diagnosis processes and personnel factors such as physician training, is needed to identify effective strategies to heighten the awareness of mTBI presentations.
Keywords: mild traumatic brain injury, concussion, practice variation

P058

Morbid obesity association with return of spontaneous circulation from sudden cardiac arrest treated in a large, urban EMS system in the United States

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Introduction: Patient co-morbidities contribute to survivability from out-of-hospital sudden cardiac arrest. Many studies have been conducted regarding contributing factors to sudden cardiac arrest survival, though very few studies have been published detailing specific analysis of morbid obesity association with return of spontaneous circulation (ROSC) in adults treated by paramedics. **Methods:** Adults in sudden cardiac arrest with resuscitation initiated, including at least one defibrillation, between July 1, 2016 and December 1, 2016 were enrolled. Due to an increasing prevalence of morbid obesity in the United States adult population, a novel defibrillation strategy, involving weight-based joule settings and double sequential external defibrillation (DSED) was initiated in June 2016. As exact body weight is logistically difficult to obtain in the EMS care environment, a paramedic-estimated weight at

the time of resuscitation to be 100 kg or greater was deemed representative of "morbid obesity" for this analysis. All resuscitations were reviewed from electronic medical records (EMRs) completed by treating paramedics, alongside telemetry and defibrillation events recorded, transmitted, and analyzed in proprietary software (CODE-STAT, Physio-Control Corporation, Redmond, WA). ROSC was determined from both paramedic and hospital clinician EMRs reviewed by a paramedic researcher. **Results:** During the 5 month study period, paramedics involved treated 133 adults in sudden cardiac arrest involving perceived ventricular fibrillation that was treated with at least one defibrillation. 49/90 (54.4%) with weight <100 kg as estimated by paramedics at the time of resuscitative care achieved at least transient ROSC. Only 17/43 (39.5%) with estimated weight ≥100 kg achieved any ROSC, despite paramedics authorized to perform defibrillations at higher joule energy settings for such weight. The OR for ROSC if <100 kg estimated weight is 1.83 (95% CI 0.87-3.83), though given limited sample size $p = 0.11$. **Conclusion:** While survival from out-of-hospital sudden cardiac arrest in adults is multi-factorial, the presence of morbid obesity, defined as estimated weight ≥100 kg, trends towards less ROSC. Continued community health efforts to decrease the prevalence of morbid obesity in the adult population may confer improved ability to survive out-of-hospital sudden cardiac arrest.

Keywords: cardiac arrest, morbid obesity, return of spontaneous circulation

P059

Paramedic compliance with a novel defibrillation strategy in a large, urban EMS system in the United States

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Introduction: Emergency Medical Services (EMS) care confers distinct impact upon survivability from sudden cardiac arrest. Many studies have been conducted regarding EMS interventions for cardiac arrest, though fewer studies have been published detailing specific analysis of paramedic compliance with standing orders, particularly those involving a novel energy strategy in defibrillation. **Methods:** Adults in sudden cardiac arrest with resuscitation initiated, including at least one defibrillation, between July 1, 2016 and December 1, 2016 were enrolled. Education on a novel defibrillation strategy, involving weight-based joule settings and double sequential external defibrillation (DSED) was delivered in classroom and internet-accessed settings. Paramedics then performed hands-on practice in DSED. All resuscitations were reviewed from electronic medical records (EMRs) completed by treating paramedics, alongside telemetry and defibrillation events recorded, transmitted, and analyzed in proprietary software (CODE-STAT™, Physio-Control Corporation, Redmond, WA). All ECGs and defibrillation events were reviewed by an emergency physician to determine energy settings used by paramedics for determining the accuracy of compliance with protocol-based standing orders. **Results:** During the 5 month study period, the paramedics involved treated 133 adults in sudden cardiac arrest involving perceived ventricular fibrillation that was treated with at least one defibrillation. 76/90 (84.4%) with estimated weight <100 kg were treated with correct joule settings, though only 7/43 (16.3%) with estimated weight ≥100kg received all defibrillations at 360J as protocol-specified. 26/44 (59.1%) in refractory ventricular fibrillation, defined as requiring a fourth defibrillation, received DSED as protocol-specified. **Conclusion:** Paramedics, when specifically trained on a novel defibrillation strategy, involving both weight-based joule settings and use of DSED for refractory ventricular fibrillation, are inconsistently able to quickly and successfully incorporate that strategy in EMS resuscitation care. Further educational endeavours are warranted to achieve higher defibrillation strategy protocol compliance.

Keywords: cardiac arrest, ventricular fibrillation, paramedic

P060

Imaging practices of emergency physicians for low risk non-traumatic low back pain

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Introduction: Included in the first list of recommendations from the Choosing Wisely Canada (CW) Emergency Medicine (EM) group was to avoid ordering lumbosacral radiographs for patients with non-traumatic low back pain (LBP) in the absence of red flags. It has been suggested that these lumbosacral radiographs lead to unnecessary ionizing radiation and increase emergency department (ED) wait times without improving patient outcomes. This study evaluates lumbosacral imaging practices of emergency physicians (EPs) in four urban EDs. **Methods:** Data was retrospectively collected from patients, ages 18-60 and CTAS codes 2-5, who presented with non-traumatic LBP from April 1, 2014 to March 31, 2016 to four urban EDs. The time frame included both pre- and post-CW recommendation. Patients considered high risk, specifically with PTT >40 s or INR >1.2 s, neurology/neurosurgery/spine consults, admission to hospital, and history of cancer, were excluded. The primary outcome was to establish lumbosacral radiograph usage rates for non-traumatic LBP. The secondary outcome was to identify factors that influenced lumbosacral spine imaging. Factors analyzed included patient age, patient sex, ED wait times, physician age, physician experience, and physician sex. Statistical significance was determined by chi-squared analysis. **Results:** The data from 3140 low-risk patients showed that 16.5% of the patients received lumbosacral radiographs. Physician variation in X-ray ordering was 0% to 85.7% (IQR 4.6 to 25%). There was a significant difference between the X-rays ordered at each site (site 1 (23.1%) > site 2 (17.2%) > site 3 (14.9%) > site 4 (11.3%), $p < 0.001$). CCFP-EM licensed physicians (17.9%) ordered more X-rays compared to licensed physicians (13.7%, $p < 0.001$). Time of presentation, physician sex, and patient sex did not affect the imaging practices. There was a trend towards decreased ordering of X-rays (17.6% vs. 15.1%, $p = 0.06$) post-CW recommendation. **Conclusion:** Considerable variation exists in the ordering practices of Calgary EPs; however, on average they are choosing wisely in terms of ordering imaging for non-traumatic LBP.

Keywords: non-traumatic low back pain, lumbosacral imaging, Choosing Wisely

P061

Preventable adverse drug events in Canadian emergency departments

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Introduction: Adverse drug events (ADEs), unintended and harmful events associated with medications, cause or contribute to 2 million emergency department (ED) visits in Canada each year. Our **objective** was to determine the proportion of preventable ADEs by event type, severity, drug and drug class, and describe associated factors. **Methods:** We reviewed the charts of ADE patients enrolled in 1 of 3 prospective studies conducted in 3 tertiary care and 1 urban community ED. In the parent studies, researchers enrolled patients by applying a systematic selection algorithm to minimize selection bias, and physicians and

pharmacists evaluated patients prospectively to evaluate causal associations between the drug regimens and patient presentations. After completion of the prospective study, a research pharmacist and physician independently reviewed the charts of all ADE patients, abstracted data using an electronic form and applied 3 preventability algorithms. The main outcome was a probably or definitely preventable ADE defined as avoidable by adhering to best medical practice, appropriate monitoring, taking a history of prior ADEs, compliance with recommended therapy, and avoidance of errors. Reviewers discussed discordant ratings until reaching consensus. We used kappa scores to evaluate between rater agreement, and investigated risk factors for preventability using logistic regression. Sample size was based on enrolment into the parent studies. **Results:** We reviewed the charts of 670 patients diagnosed with 725 ADEs. We excluded 44 patients with incomplete assessments. The inter-rater agreement in categorizing ADEs as preventable was 0.51 (95%CI 0.42-0.59). We deemed 61% (95%CI 57-65%) of ADEs preventable. Of preventable events, 30% were due to non-adherence, 24% to adverse reactions, and 15% to an excessive dose, and 29% required hospital admission. Among preventable events, 8% were due to warfarin, 5% hydrochlorothiazide, 3% acetylsalicylic acid, and 3% insulin. On multivariate analysis, mental health diagnoses were associated with preventable ADEs (OR 2.1, 95% CI 1.3-3.3, $p = 0.002$). **Conclusion:** In this large multi-centre cohort, preventable events made up the majority of ADEs, and utilized substantial hospital resources. Strategies to reduce ED visits due to ADEs should target improving adherence behavior, and developing interventions for patients with mental health diagnoses and on high-risk medications.

Keywords: adverse drug events, patient safety, prevention

P062

SOS: Summer of Smoke–a mixed-methods, community-based study investigating the health effects of a prolonged, severe wildfire season on a subarctic population

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Introduction: Between June 15 and Aug 31st 2014, Canada's Northwest Territories (pop 44,000: Stats Can), a subarctic region which is over 2°C warmer than it was in the 1950's, experienced an unprecedented number of forest fires, with 385 fires and approximately 3.4 million hectares of forest affected. This resulted in one of Canada's most severe and prolonged urban smoke exposures for the capital city of Yellowknife and surrounding Aboriginal communities. Our objective was to obtain a big-picture sense of the health impact of the Summer of Smoke on the population of these communities through a mixture of quantitative and qualitative analysis. **Methods:** We analyzed PM2.5 levels, salbutamol dispensations, clinic and hospital cardiorespiratory variables, and in-depth video interviews with community members from Yellowknife, N'Dilo, Dettah and Kakisa. **Results:** 49% of days June15-Aug31 in 2014 had a PM2.5 over 30 mcg/m3, as compared to 3% in 2012 and 9% in 2013 and 2015. Max daily PM 2.5 in 2014 was 320.4 mcg/m3. There was a 22% increase in outpatient salbutamol dispensations in 2014 compared to the average of 2012, 2013 and 2015. More cough, pneumonia and asthma were seen in clinics compared to 2012-2015 ($P < 0.001$). There was a 42% increase in respiratory ER visits in 2014 compared to 2012-13, but no change in cardiac variables. The respiratory effect was most pronounced in children 0-4 (114% increase in ER visits). Qualitative analysis demonstrates themes of fear, isolation, lack of physical activity, alteration of traditional summertime activities for both aboriginal and non-aboriginal subjects, elements of resilience and expectation for future smoky summers in the context of a changing climate. **Conclusion:** Prolonged wildfire seasons have a profound effect on overall wellbeing. Responses to help minimize mental and physical impacts such as the creation of clean-air community shelters, recreation programming, initiatives to support community cohesion, and "go outside when it is not smoky" messaging require further study.

Keywords: wildfires, respiratory, mental health

P063

Perceptions and reflections of Ethiopian emergency medicine graduates regarding the Toronto Addis Ababa Academic Collaboration in Emergency Medicine (TAAAC-EM) Curriculum: a qualitative evaluation study

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Introduction: The first-ever EM postgraduate training program in Ethiopia was launched at Addis Ababa University in 2010. EM faculty from the University of Toronto were invited to design and implement an EM rotation-based curriculum with tri-annual teaching trips to support the overall AAU EM program. To date, three cohorts of EM specialists ($n = 15$) have graduated from the three-year program. After six years of implementation, we undertook a qualitative evaluation of the TAAAC-EM curriculum. **Methods:** Data collection took place in 2016 in Ethiopia via in-person graduate interviews ($n = 12$). Participants were interviewed by a trained research assistant who used a semi-structured interview guide. Standard interview, transcription and analysis protocols were utilized. Qualitative software (QSR-NVIVO 9) was used for thematic grouping and analysis. **Results:** Graduates of AAU's EM residency training program reported very positive experiences with the TAAAC-EM curriculum overall. All graduates acknowledged the positive impact of TAAAC-EM's emphasis on bedside teaching, a unique component of the TAAAC-EM model compared to traditional teaching methods at AAU. Graduates felt that TAAAC-EM teachers were effective in creating a novel culture of EM at AAU and in role-modeling ethical, evidence-based EM practice. When asked about specific areas for program improvement, the following themes emerged: 1) a desire to shift delivery of the didactic clinical epidemiology curriculum to the senior residency years (PGY2-3) to coincide with completion of a required residency research project; 2) a desire for increased simulation and procedural teaching sessions and 3) the need for more nuanced context specificity in the curriculum delivery to incorporate local guidelines and practice patterns. A lack of educational supports during non-TAAAC-EM visits was also identified as an area for further work. **Conclusion:** Interviewing graduates of AAU's EM residency training program proved important for determining areas of curriculum improvement for future trainees. It also provided critical input to TAAAC-EM strategic planning discussions as the partnership considers expanding its scope beyond Addis Ababa.

Keywords: emergency medicine education, postgraduate medical education, global health partnership

P064

Coastal family practice residency: simulation curriculum needs assessment survey

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Introduction / Innovation Concept: Medical simulation is becoming increasingly useful for healthcare education. Simulation-based crisis

resource management (CRM) has been shown to produce improvements in skill acquisition, communication and team behaviors. Simulation has become a key component of most Family Practice (FP) residency programs and many programs are moving towards developing formal simulation curriculums. The Coastal FP Residency is a relatively new and unique program with a large emphasis on rural medicine. Graduates have gone on to practice in remote areas with less access to supports for critically ill patients. Therefore, an effective simulation curriculum, focused on Emergency Medicine, is of great importance to this program. **Methods:** To develop our curriculum, Kern's framework for medical education was selected given its prior success in similar endeavors. The first step of this approach involves a needs assessment, which we accomplished in the form of an online survey. The questionnaire included pre-defined topics pertaining to the training needs of FP Residents destined for Rural Practice with respect to technical skills, CRM skills, specific medical conditions and categories of medical conditions. Classification of answers included multiple choice, 5-point Likert scales as well as an option for free-text answers. The survey was distributed to pre-identified participants including stakeholders/educators within the Coastal FP residency program as well as simulation education leads for FP residencies throughout British Columbia (BC). Current residents, as well as program graduates were also asked to complete the survey. **Curriculum, Tool, or Material:** The results of this survey were used to develop formal goals and objectives which were in turn used to write or adapt 24 cases for the curriculum. Cases from categories (e.g. Pediatrics) rated as "Extremely Important" on the Likert scale were included proportionally more in the curriculum. The cases were also designed to assess / practice a higher proportion of CRM elements considered important and to address commonly identified difficulties in resuscitation. Cases were developed, where possible, using local or national guidelines and are currently in the stage of peer review (by a minimum of two peers). **Conclusion:** The curriculum will be implemented in July 2017 and we will transition towards the evaluation phase. Our goal is to develop and distribute formalized needs assessments to rural FP residencies across BC so that they may develop dynamic, formal curriculums of their own.

Keywords: innovations in emergency medicine education, simulation, curriculum development

P065

The history of emergency medicine in Ottawa

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Introduction / Innovation Concept: There is a paucity of peer-reviewed works investigating the History of Emergency Medicine (EM) in Canada, and none examining a single centre. This study analyzed the academic and clinical evolution of EM in the City of Ottawa from its origins to present. **Methods:** The study comprised primary and secondary historical research and an oral history methodology. A literature review was performed on the following databases: PubMed, Medline, EMBASE, JSTOR, Web of Science, Historical Abstracts; five medical history journals were also searched. Data were collected from City of Ottawa Archives, Archives of the Sisters of Charity of Ottawa, The Ottawa Hospital Libraries, University of Ottawa Libraries, RCPSC and CFPC Archives, Historical Society of Ottawa documents, Ottawa newspaper archives, and professional correspondences. The oral history component consisted of formal interviews with seven practicing and retired Emergency Physicians in Ottawa. Ethics approval was not required though consent was obtained from respondents. **Curriculum, Tool, or Material:** The literature review yielded the following: PubMed: 218 results, 180 excluded for non-relevance, 3 papers included in analysis. Historical Abstracts: 1 result, overlap with PubMed. Other databases and medical history journals yielded no papers. Along with extensive archival data, these results were used to construct a detailed timeline of EM history in Ottawa and Canada more broadly. Residency training in EM in Ottawa was initiated in 1972 at the impetus of the Board of the Ottawa Civic Hospital. Two main themes recurred in the interviews: resistance from existing specialties to EM becoming a specialty, and early Emergency Rooms staffed by the least trained people treating the least differentiated patients. Early EM physicians were not viewed positively by other specialists. **Conclusion:** Pioneering EM physicians were forced to validate the specialty as distinct, rigorous, and credible. In Ottawa this was achieved by developing strong core academics and research. Nationally, this has been instrumental in establishing EM as a viable standalone academic specialty. Modern consult pushback may have evolved from existing specialists fighting against the creation of EM combined with their negative perception of EM physicians. These data could be incorporated into learning modules for EM residency academic programs, and the methods applied to other centres.

Keywords: innovations in emergency medicine education, history of emergency medicine, history of medicine

P066

Outcomes of non-operative versus operative management in pediatric acute uncomplicated appendicitis

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Introduction: The purpose of this study was to look at outcomes of pediatric patients with early, acute appendicitis who were treated with non-operative management (NOM) with antibiotics. Primary outcomes were subsequent appendectomy or Emergency Department (ED) visits. **Methods:** The method used for this study was a retrospective chart review of children under the age of 18, looking at outcomes of those who received non-operative management (NOM) for early acute appendicitis between April 2014-April 2015. The inclusion criteria included: (a) Age 0-17, (b) US or CT suggested acute uncomplicated appendicitis (c) Final diagnosis of appendicitis during April 2014-2015. Outcomes that were investigated were repeat ED visits and need for subsequent appendectomy. **Results:** Data extracted from the EMR found 209 charts with an ED diagnosis of appendicitis. Two charts (.9%) were excluded as they were duplicates. Sixty-seven patients (32%) were excluded after appendicitis was ruled out. One hundred and forty patients (67%) had a final diagnosis of appendicitis, 124 patients (88.6%) were taken directly to the operating room for appendectomy, 16 patients (11.4%) were treated with antibiotics instead of operative management. Three patients who received non-operative management had complex appendicitis, 13 had acute uncomplicated appendicitis. Six patients out of 13 (46%) were successfully treated with antibiotics with no repeat visits to the ED or Pediatric Surgery for appendectomy, 7 patients (54%) required appendectomy after initial treatment with antibiotics. Two patients who underwent appendectomy after initial NOM had no evidence of clinical appendicitis, one patient was taken to the OR based on parent preference and one patient had an episode of abdominal pain that prompted an interval appendectomy four weeks post the episode of abdominal pain. **Conclusion:** Treatment of acute uncomplicated appendicitis with NOM remains a management option in the pediatric population. Further studies and long term follow up are required to better identify appropriate patients for non-operative management versus operative management.

Keywords: appendicitis, non-operative management, antibiotics

P067

Factors associated with prolonged length of stay of admitted patients in a tertiary care emergency department

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Introduction: Extended length of stay (LOS) in emergency departments (EDs) and overcrowding are a problems for the Canadian healthcare system, which can lead to the creation of a healthcare access block, a reduced health outcome for acute care patients, and decreased satisfaction with the health care system. The goal of this study is to identify and assess specific factors that predict length of stay in EDs for those patients who fall in the highest LOS category. **Methods:** A total of 130 patient charts from EDs in Regina were reviewed. Charts included in this study were from the 90^{th}-100^{th} percentile of time-users, who were registered during February 2016, and were admitted to hospital from the ED. Patient demographic data and ED visit data were collected. T-tests and multiple regression analyses were conducted to identify any significant predictors of our outcome variable, LOS. **Results:** None of the demographic variables showed a significant relationship with LOS (age: $p = .36$; sex: $p = .92$, CTAS: $p = .48$), nor did most of the included ED visit data such as door to doctor time ($p = .34$) and time for imaging studies (X-ray: $p = .56$; ultrasound: $p = .50$; CT $p = .45$). However, the time between the request for consult until the decision to admit did show a significant relationship with LOS ($p < .01$).Potential confounding variables analyzed were social work consult requests ($p = .14$), number of emergency visits on day of registration ($p = .62$), and hour of registration (00-12 or 12-24-$p < .01$). After adjustment for time of registration, using hierarchical multiple regression, time from consult request to admit decision maintained a significant predictor ($p < .01$) of LOS. **Conclusion:** After adjusting for the influence of confounding factors, "consult request to admit decision" was by far the strongest predictor of LOS of all included variables in our study. The results of this study were limited to some extent by inconsistencies in the documentation of some of the analyzed metrics. Establishing standardized documentation could reduce this issue in future studies of this nature. Future areas of interest include establishing a standard reference for our variables, a further analysis into why consult requests are a major predictor, and how to alleviate this in the future.

Keywords: length of stay, optimization, access block

P068

Patient satisfaction following educational ultrasounds in the emergency department

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Introduction: Development of point-of-care ultrasound (POCUS) image-generating skills requires residents to practice on patients awaiting care in the emergency department (ED) for unrelated reasons. While patients are almost universally agreeable to the scans, there is the possibility that they feel pressured to do so and may have negative experiences that go unreported. The objective of this study was to determine the self-reported patient satisfaction and identify any concerns after educational ultrasounds performed in the ED. **Methods:** We conducted a survey of patients at a single academic ED. Patients were eligible for enrollment if they had volunteered for an ultrasound when study personnel were available. The survey was administered by a representative from the Patient Affairs Department who advised the patients that the results would remain anonymous and would have no impact on their care. The survey included patient demographics, questions about the consent process, communication by the trainee, adverse reactions and patient satisfaction. The primary outcome was the overall satisfaction level reported by the volunteer patients on a 5-point Likert scale. Secondary outcomes included identification of any discomfort or concerns about the process as expressed by patients. Simple descriptive statistics were used to report survey results. **Results:** Ninety-nine patients fully completed the questionnaire. Fifty (50%) were women. The age range was 18 to 99 years. Satisfaction among volunteers was high, with 94% of respondents giving a rating of 4 or 5 (five being an excellent experience). No patients gave a negative rating (1 or 2). Three (3%) patients felt "somewhat" pressured to volunteer. A majority of patients (72%) experienced no discomfort during the scan however 16% experienced some physical discomfort. Comments indicated that too much pressure applied with the ultrasound probe or cold ultrasound gel were the main sources of discomfort. Despite some discomfort 95 (95%) patients stated they would likely volunteer again if asked in the future. **Conclusion:** ED patients volunteering as models for residents learning POCUS expressed generally positive perceptions of their experience. While only a small minority of patients experienced some discomfort or felt pressured into participating, it is important to ensure that patients have a process to communicate any concerns about educational ultrasounds in the ED.

Keywords: ultrasound, point-of-care ultrasound, satisfaction

P069

Prehospital amiodarone use could improve favorable neurological recovery among patients with out-of-hospital shockable cardiac arrest

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Introduction: Amiodarone may be used for shock-refractory ventricular fibrillation (VF) or pulseless ventricular tachycardia (pVT), but the effect of prehospital use upon neurological outcomes still unclear. **Methods:** A prospective province-wide, population based observational study was conducted from January 2006 to March 2016. Adult emergency medical service-treated non-traumatic OHCA patients who received at least one electric defibrillation were included. Amiodarone was administered to patients with VF/ pVT by paramedics based on their clinical assessment, according to provincial guidelines. The outcome of interest was favorable neurological outcomes to hospital discharge, defined as modified Rankin scale of 3 or less. Multivariable logistic regression was performed to compare the proportion of patients with the primary outcome between amiodarone and non-amiodarone groups, further stratified by the number of electrical defibrillation. In addition, to mitigate the potential selection bias, the same logistic regression was conducted in 1:1 propensity score matched groups adjusting for baseline covariates. **Results:** Of 3,374 overall OHCA patients, 915 (27.1%) were managed with amiodarone. In the amiodarone group, 150 / 915 (16.4 %) patients had a favorable neurological outcome, compared to 455/2,459 (18.5%) in the non-amiodarone group (crude odds ratio [OR] 0.86, 95% CI 0.71 to 1.06). In the multiple logistic regression model, prehospital amiodarone was associated with increased probability of favorable neurological outcomes (adjusted OR 2.11, 95% CI 1.46 to 3.05). With stratification by the number of electrical defibrillation performed, amiodarone treated group showed higher probability of favorable neurological outcomes (1 or 2: adjusted OR 2.71, 95% CI 1.33 to 5.50, 3 and more: adjusted OR 1.67, 95% CI 0.99 to 2.39). Similarly, in 1:1 propensity matched cohort including 882 OHCA patients, the adjusted association persisted (adjusted OR 2.14, 95% CI 1.33 to 3.44). **Conclusion:** Prehospital administration of

amiodarone to non-traumatic OHCA patients was associated with better neurological recovery, especially in those who received fewer electrical defibrillations.
Keywords: cardiac arrest, out-of-hospital, amiodarone

P070

Mixed effectiveness of emergency department diversion strategies: a systematic review

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Introduction: Diverting patients away from the emergency department (ED) has been proposed as a solution for reducing ED overcrowding. The objective of this systematic review is to examine the effectiveness of diversion strategies designed to either direct patients seeking care at an ED to an alternative source of care. **Methods:** Seven electronic databases and grey literature were searched. Randomized/controlled clinical trials and cohort studies assessing the effectiveness of pre-hospital and ED-based diversion interventions with a comparator were eligible for inclusion. Two reviewers independently screened the studies for relevance, inclusion, and risk of bias. Intervention effects are reported as proportions (%) or relative risks (RR) with 95% confidence intervals (CI). Methodological and clinical heterogeneity prohibited pooling of study data. **Results:** From 7,306 citations, ten studies were included. Seven studies evaluated a pre-hospital diversion strategy and three studies evaluated an ED-based diversion strategy. The impact of diversion on subsequent health services was mixed. One study of paramedic practitioners reported increased ED attendance within 7 days (11.9% vs. 9.5%; $p = 0.049$) but no differences in return visits for similar conditions (75.2% vs. 72.1%; $p = 0.64$). The use of paramedic practitioners was associated with an increased risk of subsequent contact with health care services (RR = 1.21, 95% CI 1.06, 1.38), while the use of deferred care was associated with no increase in risk of subsequently seeking physician care (RR = 1.09, 95% CI 0.23, 5.26). While two studies reported that diverted patients were at significantly reduced risk for hospitalization, two other studies reported no significant differences between diverted or standard care patients. **Conclusion:** The evidence regarding the impact of pre-hospital and ED-based diversion on ED utilization and subsequent health care utilization is mixed. Additional high-quality comparative effectiveness studies of diversion strategies are required prior to widespread implementation.
Keywords: emergency department, diversion, pre-hospital

P071

Choosing Wisely in the emergency department: exploring the reach, support and potential for the Choosing Wisely Canada® campaign among emergency physicians

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Introduction: Choosing Wisely Canada® (CWC) launched in April 2012. Since then, the Emergency Medicine (EM) top-10 list of tests, treatments and procedures to avoid has been released and initiatives are on-going. This study explored CWC awareness and support among emergency physicians. **Methods:** A 60-question online survey was distributed to Canadian Association of Emergency Physicians (CAEP) members with valid e-mails. The survey collected information on demographics, awareness/support for CWC as well as physicians' perceived barriers and facilitators to implementation. Descriptive statistics were performed in SPSS (Version 24). **Results:** Overall, 324 surveys were completed (response rate: 18%). Respondents were more often male (64%) and practiced at academic/tertiary care hospitals (56%) with mixed patient populations (74%) with annual ED volumes of >50,000 (70%). Respondents were familiar with campaigns to improve care (90%). Among these respondents, 98% were specifically familiar with CWC and 73% felt these campaigns assisted them in providing high-quality care. Respondents felt that the top-5 EM recommendations were supported by high quality evidence, specifically the first 4 recommendations (>90% each). The most frequently reported barriers to implementation were: patients' expectations/requests (33%), the possibility of missing severe condition(s) (20%), and requirements of ED consultations (12%). Potential facilitators were identified as: strong evidence-base for recommendations (37%), medico-legal protection for clinicians who adhere to guidelines (13%), and support from institutional leadership (11%). **Conclusion:** CWC is well-known and supported by emergency physicians. Despite the low response rate, exploring the barriers and facilitators identified here could enhance CWC's uptake in Canadian emergency departments.
Keywords: emergency department, Choosing Wisely Canada, implementation

P072

Exploring definitions of "unnecessary care" in emergency medicine: a qualitative analysis of physician survey responses

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Introduction: Recently, campaigns placing considerable emphasis on improving emergency department (ED) care by reducing unnecessary tests, treatments, and/or procedures have been initiated. This study explored how Canadian emergency physicians (EPs) conceptualize unnecessary care in the ED. **Methods:** An online 60-question survey was distributed to EP-members of the Canadian Association of Emergency Physicians (CAEP) with valid emails. The survey explored respondents awareness/support for initiatives to improve ED care (i.e., reduce unnecessary tests, treatments and/or procedures) and asked respondents to define "unnecessary care" in the ED. Thematic qualitative analysis was performed on these responses to identify key themes and sub-themes and explore variation among EPs definitions of unnecessary care. **Results:** A total of 324 surveys were completed (response rate: 18%); 300 provided free-text definitions of unnecessary care. Most commonly, unnecessary ED care was defined as: 1) performing tests, treatments, procedures, and/or consults that were not indicated or potentially harmful ($n = 169$) and/or 2) care that should have been provided within a non-emergent context for a non-urgent patient ($n = 143$). Emergency physicians highlighted the role of system-level factors and system failures that result in ED presentations as definitions of unnecessary care ($n = 69$). They also noted a distinction between providing necessary care for a non-urgent patient and performing inappropriate/non-evidenced based care. Finally, a tension emerged in their description of frustration with patient expectations ($n = 17$) and/or non-ED referrals ($n = 24$) for specific tests, treatments, and/or procedures. These frustrations were juxtaposed by participants who asserted that "in a patient-centred care environment, no care is unnecessary" (Participant 50; $n = 12$). **Conclusion:** Variation in the definition of unnecessary ED care is evident among EPs and illustrates that EPs' conceptualization of unnecessary care is more nuanced than current

campaigns addressing ED care improvements represent. This may contribute to a perceived lack of uptake or support for these initiatives. Further exploring EPs perceptions of these campaigns has the potential to improve EP engagement and influence the language utilized by these programs.

Keywords: emergency department, unnecessary care, qualitative

P073

Single and dual vs. standard triple agent regimens for HIV post-exposure prophylaxis in the sexual assault victim population

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Introduction: Although Tenofovir/Emtricitabine was approved in 2012 as a single-agent regimen for pre-exposure prophylaxis, there have been no studies to our knowledge that demonstrate the efficacy of single and dual agent regimens in post-exposure prophylaxis. Our goal was to compare outcomes of post-exposure prophylaxis with single and dual agent regimens versus triple therapy in victims of sexual assault. **Methods:** This was a before and after cohort study of patients seen by the Sexual Assault and Partner Abuse Care Program (SAPACP) at the Ottawa Hospital. We reviewed charts of patients seen by the SAPACP from Jan. 1-Dec. 31 2013, when triple therapy was usual care, and Jan. 1-Dec. 31 2015, after the introduction of alternative regimens. Patients who were deemed high risk or who did not get initial treatment at the SAPACP were excluded. Our primary outcome was the number of patients who completed the entire 28-day post-exposure prophylaxis regimen. Secondary objectives were to assess HIV seroconversion rates and patient reported side effects. **Results:** Six hundred-thirty charts were reviewed, and 429 were included in the study. Baseline characteristics were similar between the two years. We found no significant difference in completion rates of HIV post-exposure prophylaxis between the two cohorts (50.5% vs. 51.6%). However, we did note a decrease in reported side effects in the 2015 cohort (72.2% vs. 17.6%, $p < 0.0001$). In our secondary analysis, we compared all patients in all years who received triple therapy ($N = 128$) versus those who received alternative single or dual agent regimens ($N = 47$). We found that the alternative regimen group had a higher completion rate (66.0% vs. 42.2%; $p = 0.03$), and a dramatic decrease in rate of reported side effects (19.1% vs. 53.9%; $p < 0.0001$). Specifically, we saw decreased reported rates of nausea (12.8% vs. 36.7 %), constipation (0% vs. 7.9%), diarrhea (2.1% vs. 21.1%), mood changes (0% vs. 10.9%), headache (2.1% vs. 16.4%), and fatigue (6.4% vs. 26.6%). There were no HIV seroconversions in either group. **Conclusion:** Our results suggest that single and dual agent HIV post-exposure prophylaxis regimens are better tolerated by patients and associated with higher rates of completion than triple therapy, and should be considered as stand-alone therapy in the sexual assault victim population.

Keywords: human immunodeficiency virus, post-exposure prophylaxis, assault

P074

Clinician gestalt in the evaluation of pulmonary embolism risk factors: the CEPERF study

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Introduction: Pulmonary Embolism (PE) is a difficult to diagnose presentation associated with significant morbidity and mortality. Despite development of risk stratification tools (RST), physician gestalt continues to play a large role in the diagnostic evaluation of PE. Implicit in this gestalt is the evaluation of PE risk factors (RF). It is unknown, however, if physicians are similar and accurate in their assessment of known PE RF. **Methods:** An online survey presented paired comparisons ($n = 55$) of 11 known PE RF to active Emergency Physicians ($n = 20$), Family Doctors ($n = 11$), and Residents (Family Medicine [$n = 20$]; Emergency Medicine [$n = 5$]). The Bradley-Terry Model converted the paired comparisons to rank order lists for the cohorts and these lists were compared. The perceived efficacy and use of RST and gestalt was also assessed across the cohorts. **Results:** The response rate was 72%. Emergency Physicians had the highest perception of gestalt as an effective method of risk stratification (7.4 ± 1.4 out of 10) while Family Medicine Residents had the lowest (5.1 ± 1.9). More than 95% of Emergency Physicians and Residents employed RST (PERC and Wells) compared to 46% of Family Physician respondents. Those who used RST utilized the tools in the majority of their clinical encounters (>75% of the time). There was good agreement between the cohorts in regards to their rank order lists (Tau-b $\geq$ 0.71). Age was identified as a RF which was consistently ranked lower than literature reported values amongst the cohorts. **Conclusion:** Physicians in various practice settings and levels of training rank PE risk factors similarly when forced to compare them. There are important RF, most notably age, which were identified in the current study that were consistently undervalued. This finding may highlight how RST are shaping perceptions of PE RF through their use and how age as a PE RF may warrant more attention in education and clinical assessments.

Keywords: pulmonary embolism, risk factors, gestalt

P075

Constructing entrustment: understanding clinical supervisor dynamics in the oral case presentation

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Introduction: The Oral Case Presentation (OCP) has been described as a unique form of inter-physician communication integral to the practice of medicine and represents the foundation of trainee-supervisor interactions. In recent years, entrustment has been identified as an essential element of trainee supervision and learning. Despite the growing body of knowledge concerning entrustment in medical education, the influence of trust on the educational dynamic surrounding the OCP remains unknown. The objectives of this study were to (1) describe the complex nature of the OCP from the perspective of the supervisor and (2) explore the central role the OCP plays in the dyadic relationship between supervisor and trainee during the delivery of patient care. **Methods:** Using a constructivist grounded theory approach, semi-structured interviews were conducted from 2015 to 2016 with a purposive sample of attending Emergency Medicine (EM) physicians from the University of Ottawa. Transcripts were reviewed independently by two investigators using line-by-line coding and constant comparative analysis. Emerging concepts were coded and key themes identified through consensus. Theoretical sampling occurred until thematic saturation was reached. **Results:** Twenty-one attending EM physicians participated in this study (71% male). The mean number of years in practice was 14. The mean percentage of shifts with a trainee assigned was 86%. Factors relating to entrustment were identified as the principal influences on both the content of the OCP and decisions relating to trainee supervision during the OCP process. These factors included the trainee level, the trainee-supervisor relationship, the context and the task. The OCP was also found to play several important roles as supervisors balanced the delivery of patient care and trainee education. These roles were related to communication, teaching and trainee assessment. **Conclusion:** The OCP

represents a core activity within the supervisor-trainee relationship in which trust plays a central role. Clinical supervisors value the OCP as a form of authentic assessment of skills and perceive it to be a key determinant in making entrustment decisions. Future studies designed to evaluate the utility of the OCP as an educational tool should consider entrustment as an essential element.
Keywords: entrustment, oral case presentation

P076

Calcium, magnesium and phosphorus dosing: impacts and relevance in the emergency department

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Introduction: With rising health care costs impairing access to care, the judicious use of diagnostic tests has become a critical issue for most jurisdictions. Among tests regularly performed in the emergency department (ED), calcium (Ca), magnesium (Mg) and phosphorus (P) laboratory testing represents an annual expenditure of more than $4 million for the Québec health care system. We then sought to determine the best indications for ordering these serum levels by identifying patient risk factors predicting abnormal results. **Methods:** We are conducting a retrospective cohort study in two academic hospitals of Québec City, one providing acute general care and the other providing specialized care to oncologic and nephrologic patients. We included 1000 patients who had serum Ca and/or Mg and/or P levels prescribed by an emergency physician between January 1st 2016 and May 1st 2016. We are collecting demographic (e.g. age) and clinical (e.g. comorbidities) characteristics identified from literature review as potential explanatory variables of an abnormal serum level. Predictive models of a positive test result will be derived from logistic regressions. **Results:** We have evaluated 143 patients. ED prevalence rates of hypo- and hyper-calcemia (10.1% and 4,3%), hypo- and hyper-magnesemia (13.0% and 7,2%), hypo- and hyper-phosphatemia (9.5% and 13,9%) were similar to those reported in literature. Preliminary bivariate analysis ($p < 0.05$) have shown that, for patients who had serum Ca/Mg/P levels prescribed, one in four complained of weakness, one in five complained of abdominal pain and one in five presented on physical examination an abnormal mental status. Acute and chronic renal failure appears to be a strong predictor of anomalies of any of those electrolytes. Neoplasia, metastasis, hallucinations, bone pain and confusion are more specifically associated with hypercalcemia. Use of corticosteroids is associated with hypocalcemia. **Conclusion:** Our bivariate analyses have identified potential risk factors of abnormal Ca/Mg/P results. Multivariate logistic regressions will be conducted on the complete planned cohort to further test these preliminary results.
Keywords: electrolytes, laboratory testing, emergency department

P077

Observance des médecins face aux indications de tomodensitométrie cérébrale chez les patients ayant subi un TCC léger et facteurs associés à la non-observance

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Introduction: Lors d'un traumatisme cranio-cérébral léger, les complications hémorragiques sont rares et ne nécessitent qu'exceptionnellement une intervention neurochirurgicale (<1%). Dans le but de limiter les radiations inutiles et les coûts, *Choosing Wisely* s'est récemment positionnée avec CAEP afin de recommander l'usage de la *Canadian CT Head Rule* (CCHR) suite un à TCCL. L'objectif principal de cette étude vise à évaluer l'observance des médecins d'urgence concernant l'utilisation de la règle CCHR chez les patients ayant subi un TCCL. L'objectif secondaire consiste à identifier les facteurs associés au risque de non-observance dans cette situation clinique. **Methods:** Des analyses univariées et multivariées ont été effectuées sur les données de 854 patients ayant subi un TCCL et ayant été recrutés dans les 24 heures suivant leur visite dans un centre tertiaire québécois de traumatologie. Des analyses descriptives ont permis d'estimer la proportion de médecins d'urgence ayant utilisé les critères de la règle CCHR et ceux n'ayant pas été observants. Nous avons ensuite évalué les facteurs potentiellement associés au risque de non-observance. **Results:** 62.9% des patients avec TCCL ont subi une TDM au département d'urgence. La non observance globale des médecins face à la règle était de 29.9%. De plus, la proportion de TDM effectuée sans indication selon la règle est égale à 20% (177/854). Les facteurs suivants semblent associés au risque de surutilisation de la TDM: la prise d'acide acétylsalicylique (RR = 1.8, [IC 1.3-2.6]), la présence de céphalée décrite par le patient au moment de l'évaluation (RR = 1.5, [IC 1.2-1.9]), et l'âge (55-64 ans versus moins de 55 ans) (RR = 1.6 [IC 1.2-1.9]). **Conclusion:** L'évaluation de l'observance des médecins face à ces recommandations, combinée à l'identification des facteurs en cause lors de la non-observance favoriseront une meilleure orientation des interventions de transfert de connaissances dans le futur en plus d'améliorer la qualité des soins et l'efficience des ressources.
Keywords: mild traumatic brain injury, Canadian CT Head Rule, compliance

P078

Derivation and validation of a non return to work predictive model three months after a mild traumatic brain injury

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Introduction: Mild traumatic brain injury (mTBI) is a common problem and until now, ED physicians don't have any tool to predict when the patient will return to work. The purpose of this study is to develop and validate a clinical decision rule to identify the ED patients who are at risk of non-return to work or to school three months after a mTBI. **Methods:** Patients were recruiting in five Level I and II Trauma Centers ED in the province of Québec. All patients were referred for a systematic telephone follow-up after three months. Information about their return to work/school, partial or complete, was collected. Log binomial regression was used to develop a predictive model and the validation of this model was performed on a different prospective cohort. **Results:** 13,7% of the patients did not return to work/school at three months. The final model was derived from a prospective cohort of 398 patients and included three risk factors: motor vehicle accident (2 points), loss of consciousness (1 point) and headache during the emergency department assessment (1 point). With a one-point threshold, this model has a sensitivity of 97% and a negative predictive value (NPV) of 98%. However, the specificity is only 23% and the positive predictive value (PPV) is 17%. The area under the curve is 0.786. Validation of the model was performed with a new prospective cohort of 517 patients, and demonstrated a sensitivity of 86% and a NPV of 91%. **Conclusion:** Although this model is not very specific, its high sensitivity and NPV indicate to the clinician that mTBI patients who don't have any of the three criteria are at low risk of prolonged work stoppage after their trauma.
Keywords: mild traumatic brain injury, predictive model, non-return to work

P079

Manual pressure (the modified peace sign) as an aid to sonographic aortic visualization-a pilot study

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Introduction: Point-of-care-ultrasound is an established tool in the early diagnosis of abdominal aortic aneurysm (AAA), with a reported pooled sensitivity of 97.5% and pooled specificity 98.9%. Despite these impressive numbers, body habitus and bowel gas often render emergency department (ED) PoCUS for AAA inconclusive. We devised a manual aid "the modified peace sign technique" to improve visualization of the aorta, consisting of placing the divided fingers of the free hand of the sonographer around the probe to increase gas dispersion and improve the view of the obscured aorta. We tested the technique on volunteers during a training course when the initial scan was indeterminate due to inability to view the aorta from sub-xiphoid to bifurcation. **Methods:** In our pilot study, 7 physicians were asked to make a best attempt to perform an aortic scan. If they were unable to visualize the aorta, they were asked to use the modified peace sign technique. Participants recorded the number of times which they used the technique and the frequency that the technique allowed for a complete aortic scan, previously unobtainable. All scans were supervised by certified PoCUS physicians. **Results:** The technique was used a total of 25 times. Following failure to complete an aortic scan using their best attempt, participants were subsequently able to obtain a complete aortic scan 70% (95% CI 48 to 83%) of the time using the modified peace sign technique. **Conclusion:** In our pilot study, the modified peace sign technique had an estimated effect size of 70% improvement for visualization of the aorta in volunteers. Further studies are required to validate the technique in clinical practice.

Keywords: point of care ultrasound (PoCUS), aorta, quality

P080

A descriptive analysis of prehospital midazolam as a chemical restraint in combative patients

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Introduction: Paramedics are often required to manage violent or combative patients. In order to do so safely, chemical sedation may be required. There are a number of pharmacologic agents which may be used. However, there is a paucity of evidence as to the optimal agent. **Objective:** To provide a descriptive analysis of a single base hospital's experience with combative patients and to determine the efficacy and any adverse events (AEs) in the prehospital setting, associated with midazolam use in these patients. **Methods:** A retrospective chart review of ambulance calls from 2 urban centers, from January 2012 to December 2015 was completed. All cases of combative patients were filtered and manually examined. Patients were excluded if they were 17 or younger. A priori data points were abstracted by trained research personnel from the ambulance call record. **Results:** Of approximately 350,000 calls over the study period, there were 269 patients that were combative. Of these, 186 (69.1%) received midazolam for sedation. Multiple doses were required in 33.3% of patients. Depending on route of administration, the average total dose administered was 6.27 mg (SD 3.98 mg) intramuscular, 10.7 mg (SD 4.00 mg) intranasal and 4.95 mg (SD 3.81 mg) intravenous. Midazolam was documented as effective in treating the combativeness in 133 (71.6%), ineffective in 28 (15.1%), and not documented in 25 (13.4%) calls. AEs post midazolam administration, defined as hypotension, bradypnea, bradycardia, or need for airway intervention, were encountered in 3 (1.61%) calls (respiratory rate of 8, hypotension of 88/59 that responded to intravenous fluid and asymptomatic bradycardia of 59). There was a trend of increasing number of combative patients each year over the study period, with a significant difference in the number of combative calls requiring midazolam administration between 2012 and 2015 (50.0% vs 72.8%, $p = 0.007$). **Conclusion:** Prehospital use of midazolam for combative patients appears to be safe, with minimal AEs. However, midazolam was ineffective in 15.1% and a third of all patients required multiple doses, prolonging the combative period and compromising paramedic and patient safety. Further research is warranted for this cohort's emergency department (ED) sedation needs and any associated AEs within 1 hour of ED arrival.

Keywords: combative, midazolam, emergency medical services

P081

Combative patients given prehospital midazolam as a chemical restraint: adverse events and efficacy in the emergency department

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Introduction: Paramedics are required to manage combative patients. In order to do so safely, chemical sedation may be required. Advanced Care Paramedics in our EMS system utilize midazolam for chemical restraint. Our previous research has shown that midazolam appears to have few prehospital adverse events (AEs) associated with its use. However, it required multiple dosages in 33.3% of patients and was deemed ineffective in 15.1% of patients that received it in the prehospital setting. **Objective:** To determine Emergency Department (ED) AEs associated with the prehospital use of midazolam in combative patients and determine the efficacy of this agent as a chemical restraint during the first hour of the ED stay. **Methods:** A retrospective chart review of paramedic calls from 2 urban centers, from January 2012 to December 2015 was completed. All cases of combative patients were examined. Patients were excluded if they were 17 or younger. Ambulance call records were linked to the patient's ED chart. ED charts were reviewed and a priori endpoints were extracted. **Results:** Of approximately 350,000 calls, there were 269 patients that were combative. Of these, 186 (69.1%) received midazolam in the prehospital setting. During the first hour of their ED stay, 68 (36.5%) required further sedation, while 118 (63.4%) patients did not. Of the 186 patients who received midazolam in the prehospital setting there was one death and one AE in the ED (defined as hypotension, bradypnea, or need for airway intervention). After further review of the charts, both AEs were deemed likely resulting from underlying pathology and not related to the use of midazolam. The average ED Length of stay (LOS) was 7.6 hours for all patients. A total of 82 (44.1%) were admitted to hospital with a mean in hospital LOS of 13.1 days. **Conclusion:** Prehospital use of midazolam for combative patients appears to be safe, with no reported delayed AEs. 36.5% of this cohort required further sedation within 1 hour of their ED arrival. This supports previous findings that midazolam was ineffective in 15.1 % of prehospital combative patients. Further study is required to determine midazolam's efficacy and AE profile compared to other prehospital agents in order to ensure optimal safety of both patients and paramedics.

Keywords: combative, midazolam, emergency medical services

P082

Current state of POCUS usage in canadian emergency departments

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Introduction: Point of care ultrasound (POCUS) has many applications in Emergency Medicine which are proven to improve patient outcomes. Training programs and guidelines for its use are available but its utilization metrics across Canadian Emergency Departments are unknown. This study aims to provide a comprehensive national assessment of POCUS usage, with a key component comparing training with patterns of use. **Methods:** A survey was distributed via email to all staff adult emergency physician members of the Canadian Association of Emergency Physicians (CAEP). The survey included questions related to training, attitudes towards POCUS, POCUS utilization, and barriers to POCUS use. Standard descriptive statistics were calculated, and differences in mean POCUS usage between groups were measured using a one-way analysis of variance (ANOVA). **Results:** The survey received 189 responses from emergency physicians from across Canada, 81% of which viewed POCUS as "useful and essential". Respondents indicated that on average, POCUS was used during 71% (SD 29%) of shifts and on 23% (SD 17%) of patients. POCUS was most commonly used for basic applications, including thoracoabdominal trauma (FAST), cardiac assessment in arrest (trans-abdominal), and assessing for pericardial effusion. The most commonly cited barrier to wider POCUS adoption was a lack of training, with 41% of respondents identifying this as an issue. Correspondingly, formal POCUS training and certification were associated with significantly higher POCUS usage: usage rates ranged from 11.5% (SD 10.5%) of patients for those with formal training but no certification to 39.5% (SD 16.4%) of patients for those with a POCUS fellowship ($p < 0.001$). **Conclusion:** The presented results from this survey provide an initial overview of the current state of POCUS usage in Canadian Emergency Departments. In summary, a higher level of training was associated with higher POCUS usage, and over a third of the respondents cited lack of training as a barrier to adoption; this suggests that efforts to facilitate POCUS utilization should focus on improving access to formal training and certification. Future work will involve further evaluation of additional barriers preventing POCUS usage in the ED, with the goal of providing information that will encourage changes that support widespread POCUS adoption.

Keywords: point of care ultrasound, ultrasound, point of care

P083

IV fluid resuscitation of sepsis patients in London, ON: a retrospective chart review

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Introduction: The Surviving Sepsis Campaign (SSC) suggests that hypovolemic patients, in the setting of hypoperfusion, be administered 30 mL/kg crystalloid fluid within the first 3 hours of presentation to hospital. More recent evidence suggests that fluid resuscitation within 30 min of sepsis identification is associated with reduced mortality, hospital length of stay and ICU days. This study describes Emergency Department (ED) fluid resuscitation of patients with septic shock and/or sepsis-related in-hospital mortality, prior to implementation of a sepsis medical directive. **Methods:** Retrospective chart review of adult patients (18+ years), presenting to two tertiary care EDs between 01 Nov 2014 and 31 Oct 2015, with >=2 SIRS criteria and/or ED suspicion of infection and/or ED or hospital discharge sepsis diagnosis. Data were abstracted from electronic health records. Patients with septic shock, or who expired in the ED/hospital, were selected for manual chart review of clinical variables including: time, type and volume of ED IV fluid administration. **Results:** 13,506 patient encounters met inclusion criteria. In-hospital mortality rates were 2% (sepsis), 11.5% (severe sepsis), and 24.1% (septic shock). Of patients hypotensive at triage, fluids were administered to 33/50 (66.00%) septic shock patients, and 22/43 (51.16 %) patients who eventually expired. For all septic shock and expired patients (943), median time to IV fluid initiation was 60.50 minutes [29.75 to 101.25] for septic shock and 77.00 minutes [36.00 to 127.00] for expired patients. Median volume of fluid administered was 1.50L [1.0 to 2.00] for septic shock and 1.00L [1.00 to 2.00] for expired patients. Of septic shock and expired patients, IV fluid administration and body weight data was available for 148 encounters (15.6%). Within this group, 19 (12.8%) received no IV fluid. 90 (60.8%) received 0.1-75% of their recommended IV fluid volume. 25 (16.9%) received 75.1-125%, and 14 (9.4%) received >125.1% of their recommended fluid volume. **Conclusion:** In this study, severe forms of sepsis were often treated with <30 mL/kg crystalloid fluid. Fluids were administered outside of the recommended 30 min, but within the 3 h, time windows. In-hospital mortality was consistent with published data. Future research will examine a broader data set for IV fluid resuscitation in sepsis, and will measure the impact of a fluid resuscitation in sepsis medical directive.

Keywords: sepsis, resuscitation, crystalloid

P084

"iPads on!"-Does the provision of iPad devices within an emergency department improve the frequency of access to departmental web KT resources?

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Introduction: Barriers to implementing effective Knowledge Translation (KT) in Emergency Departments include lack of awareness, lack of time and limited access to resources. In our teaching hospital emergency department (ED), we implemented a new department website (www.sjrhem.ca) to provide improved access to our KT resources. Having published the website, we wanted to know if the addition of conveniently situated pre-configured iPads would increase access to the website from within the department. **Methods:** The website was developed and first published in April 2014. Two iPads (Apple Inc.) were preconfigured with icons linking directly to targeted pages on our website, including the physician schedule, academic calendar. The iPads were securely located at physician charting desks in October 2014. We used Google analytics to record of webpage visits for 25 weeks before and after the installation of the iPads. Comparisons of mean weekly visits were made using the Student T test (GraphPad Prism). **Results:** The mean weekly page views for the website increased after the installation of the iPads from a baseline of 103 (95%CI 83.9-121) to 198 (181-215); an increase of 95% (71-120; $p < 0001$). Limiting analysis to devices utilising our hospital IP address we saw a 403% increase in mean weekly page views from 6.4 (4.35-8.45) to 32.2 (26.7-37.8; $p < 0001$). There was a clear step increase in website access from the date of iPad installation. Comparing the increases in average weekly views for those pages with direct link iPad icons (Clinical 11.4 before, 16.6 after, 46%, Schedule 30, 39, 30%, Calendar 10.7, 46.3, 330%, Home 84.1, 115.4, 37%) to the top accessed pages without iPad icons (Research 4.3, 6.2, 44%, Ultrasound 4.9, 9.8, 100%) did not, other than for the calendar page, demonstrate an observable difference. However, when analysed by views originating the hospital IP address, the pages

with iPad icons were responsible for 88% of landing pages. Over the last two years the department iPads were responsible for 17% of our page views, with 6 of the department guideline pages featuring in the top 20 pages viewed. **Conclusion:** Provision of preconfigured iPad devices within the clinical environment of a busy ED significantly increases access from within that environment to a department website.
Keywords: knowledge translation, tablet device, department website

P085

Dental complaints in the emergency department: a national survey of Canadian EM physicians

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Introduction: Dental complaints and emergencies are a common emergency department (ED) issue that has not been extensively studied. This study aimed to provide an evaluation of Canadian practice patterns and clinical training relating to dental emergencies in the ED. **Methods:** We conducted an electronic survey inviting 1520 Canadian emergency medicine (EM) physicians from CAEP's physician distribution network. Thirty-three questions were asked regarding ED physician training with dental emergencies, practice patterns and comfort with dental care, current available ED dental resources, and how dental care may be improved in Canadian EDs. Standard descriptive statistics were calculated. **Results:** Survey response rate was 15.1%. Respondents were predominantly male (62.8%) with a mean 15.3 years (SD: ±9.8) of practice, and were primarily CCFP-EM (50.7%) or FRCP-trained (25.6%) in either tertiary (48.0%) or community (36.3%) teaching hospitals. They received broad training on dental issues, but this was limited in scope to ≤1 day of residency (61.4%). A combined majority (59.6%) felt their residency left them somewhat to very unprepared for treating dental complaints, and <40% of physicians reported feeling comfortable with specific, common dental emergency procedures, with the exception of avulsed tooth storage (61.1%). For pain management and local trauma exploration, 36.9% felt somewhat to very uncomfortable performing oral and facial nerve blocks. Many respondents do not have access to any dental emergency supplies (48.0%), or do not know if they have any access (14.2%). Furthermore, 18.9% have no access to any professional support for help with dental emergencies requiring advanced management. Respondents believe dental emergency consultant support is an issue at their centre (62.5%). EM physicians want more training with dental emergencies (79.5%) and improved access to dental-specific emergency materials in their departments (63.7%). The greatest barriers to providing good ED dental care were cost to patients (72.7%), physician comfort treating complaints (54.7%), and clear follow-up with outpatient dental professionals (54.3%). **Conclusion:** ED physicians feel relatively unprepared by their residency training to treat dental complaints, and professional dental support is an issue in the majority of EDs. Dental care may be improved with more access to training, to dental ED resources and professional support.
Keywords: dentistry, dental complaints, emergency

P086

Effectiveness of interventions to decrease imaging among emergency department low back pain presentations: a systematic review

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Introduction: Low back pain (LBP) is an extremely frequent emergency department (ED) presentation. Although LBP imaging often results in no change to the ED management, does not identify abnormalities, and has documented risks (e.g., radiation exposure), advanced imaging (i.e., computed tomography [CT], magnetic resonance imaging [MRI]) for patients with LBP has become increasingly frequent in the ED. The objective of this review was to identify and examine the effectiveness and safety of interventions aimed at reducing imaging in the ED for LBP patients. **Methods:** Six bibliographic databases and grey literature were searched. Comparative studies assessing interventions aimed at reducing ED imaging for adult patients with LBP were eligible for inclusion. Two reviewers independently screened study eligibility, completed data extraction, and assessed the quality of included studies. Due to a limited number of studies and significant heterogeneity, a descriptive analysis was performed. **Results:** The search yielded 510 unique citations of which three before-after studies were included. Quality assessment identified potential biases relating to comparability between the pre- and post-intervention groups, reliable assessment of outcomes, and an overall lack of information on the intervention (i.e., time point, description, intervention data collection). The interventions to reduce lumbar spine imaging varied considerably. Study interventions included: 1) clinical decision support (i.e., a specialized X-ray requisition form), which reported a 47.4% relative reduction of lumbar spine radiography referrals; 2) clinical decision guidelines, which reduced referrals by 43.8%; and 3) multidisciplinary protocols, which reported a reduction in the MRI referral rate by 26.1%. Despite reductions in simple imaging, CT use increased in two of the three studies. **Conclusion:** LBP has been identified as a key area of imaging overuse (e.g., *Choosing Wisely* recommendation). Yet, evidence of interventions' effectiveness in reducing imaging for ED patients with LBP is sparse. While there is some evidence to suggest that interventions can reduce the use of simple imaging in LBP in the ED, unintended consequences have been reported and additional studies employing higher quality methods are strongly recommended.
Keywords: diagnostic imaging, low back pain, intervention

P087

Cellulitis and erysipelas management at an academic emergency department: current practice vs the literature

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Introduction: Cellulitis and erysipelas are common presentations for the general practitioner. Antibiotic therapy targeting beta-hemolytic streptococci and *Staphylococcus aureus* is the mainstay of treatment for children and adults with these infections. Although evidence-based Canadian guidelines for appropriate management exist, inconsistent practices persist. Our objective was to determine the level of adherence to current evidence by emergency physicians at two academic hospitals in Kingston, Ontario. **Methods:** We conducted a retrospective chart review of 200 randomly selected electronic medical records. Records belonged to patients with a discharge diagnosis of cellulitis or erysipelas who were seen in the emergency departments of Kingston General Hospital or Hotel Dieu Hospital between January 1 and June 30, 2015. We manually collected data describing patient demographics, medical history, and medical management. **Results:** There were 707 total visits to the emergency departments in the study period for cellulitis or erysipelas. In our random sample, for those diagnosed with cellulitis, 44% received oral cephalexin alone, which was the most common form of therapy for uncomplicated infection. Of all the patients who received any antibiotics, 36% received at least one dose of parenteral antibiotics, despite only 6.7% showing systemic signs of illness. Emergency physicians chose ceftriaxone for 88% of the patients who received parenteral antibiotics. **Conclusion:** There was wide variation in antibiotic selection and route of administration for

patients with cellulitis or erysipelas. Ceftriaxone was chosen for most patients receiving parenteral antibiotics, but it may not have been the most effective antibiotic in some cases. Overuse of antibiotics is common, and we believe medication choice should be justified based on disease severity, spectrum of activity, and regional antibiotic resistance patterns, among other factors. In conclusion, we found that emergency physicians could more closely align management plans with current guidelines to improve management of uncomplicated infection and reduce unnecessary administration of parenteral antibiotics.
Keywords: antibiotics, cellulitis, erysipelas

P088

Emergency department utilization of point-of-care ultrasound in the assessment and management of shock

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Introduction: Recent studies have shown that point of care ultrasound is a valuable tool in the assessment and management of shock in the Emergency Department (ED). Despite proven utility, data is limited on the current utilization and quality assurance of POCUS in ED management of shock. The aim of this study was to determine the rate of POCUS use, characterize data collection methods and determine rate of quality assurance in both the ED and Intensive Care Unit (ICU) of a tertiary care academic center. **Methods:** The study included all patients who visited the ED from Jan-Jun 2015 that were transferred to the ICU, and were in shock, as determined by sBP <90, diagnostic code or vasopressor use. Patient charts, as well as wirelessly archived ultrasound studies were reviewed to determine which patients had POCUS performed, and how the results were recorded. By reviewing formal worksheets archived online, it could be determined if a management change was recommended, if studies were over-read for quality assurance and if improvement was recommended to image acquisition or interpretation. **Results:** Both departments used POCUS in roughly half of patients presenting in shock (53% ED, 41% ICU) with no statistical difference in usage (Δ12, 95% CI −0.01 to 0.25; $p = 0.06$). Most ED studies (87%), had some form of documentation either on paper or online, however few (9%) had a formal worksheet completed. In comparison 71% of ICU studies had a worksheet. There was no difference in the number of performed scans that were saved electronically (66% ED vs 71% ICU; Δ5%, 95%CI −0.13 to 0.21; $p = 0.60$).In the ICU the majority (77%) of the formal reports recommended a management change as a direct result of scan findings. Furthermore, of worksheets submitted for quality assurance (88%), over half the reviews (55%) suggested an improvement in image acquisition or interpretation. **Conclusion:** To our knowledge, our study is the first to demonstrate that POCUS is only utilized in about half of the shock cases in ED and ICU. Given that the majority of the formally reported studies in the ICU that were over-read for quality assurance found areas for potential improvement and given that the majority of ED studies were reported informally, it stands to reason that POCUS operators in the ED could benefit from a formalized quality assurance program. Future studies should explore potential barriers to implementation of such a program.
Keywords: point of care ultrasound, shock, critical care

P089

Does the use of ultrasound improve diagnosis during simulated trauma scenarios?

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Introduction: Point of care ultrasound (US) is a key adjunct in the management of trauma patients, in the form of the extended focused assessment with sonography in trauma (E-FAST) scan. This study assessed the impact of adding an edus2 ultrasound simulator on the diagnostic capabilities of resident and attending physicians participating in simulated trauma scenarios. **Methods:** 12 residents and 20 attending physicians participated in 114 trauma simulations utilizing a Laerdal 3G mannequin. Participants generated a ranked differential diagnosis list after a standard assessment, and again after completing a simulated US scan for each scenario. We compared reports to determine if US improved diagnostic performance over a physical exam alone. Standard statistical tests ($\chi 2$ and Student t tests) were performed. The research team was independent of the edus2 designers. **Results:** Primary diagnosis improved significantly from 53 (46%) to 97 (85%) correct diagnoses with the addition of simulated US ($\chi 2 = 37.7$, 1df; $p = < 0.0001$). Of the 61 scenarios where an incorrect top ranked diagnosis was given, 51 (84%) improved following US. Participants were assigned a score from 1 to 5 based on where the correct diagnosis was ranked, with a 5 indicating a correct primary diagnosis. Median scores significantly increased from 3.8 (IQR 3, 4.9) to 5 (IQR 4.7, 5; $W = 219$, $p < 0.0001$).Participants were significantly more confident in their diagnoses after using the US simulator, as shown by the increase in their mean confidence in the correct diagnosis from 53.1% (SD 22.8) to 83.5% (SD 19.1; $t = 9.0$; $p < 0.0001$)Additionally, participants significantly narrowed their differential diagnosis lists from an initial medium count of 3.5 (IQR 2.9, 4.4) possible diagnoses to 2.4 (IQR 1.9, 3; $W = -378$, $p < 0.0001$) following US. The performance of residents was compared to that of attending physicians for each of the above analyses. No differences in performance were detected. **Conclusion:** This study showed that the addition of ultrasound to simulated trauma scenarios improved the diagnostic capabilities of resident and attending physicians. Specifically, participants improved in diagnostic accuracy, diagnostic confidence, and diagnostic precision. Additionally, we have shown that the edus2 simulator can be integrated into high fidelity simulation in a way that improves diagnostic performance.
Keywords: point of care ultrasound (PoCUS), trauma, simulation

P090

Electronic invitations received from predatory journals and fraudulent conferences: a 6-month young researcher experience

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Introduction: Predatory publishing is a poorly studied emerging threat to scientists. Junior researchers are preferred targets as they are under academic pressure to publish but face high rejection rates by many medical journals. **Methods:** All electronic invitations received from predatory publishers and fraudulent conferences were collected over a 6-month period (28th April to 27th October 2016) following the first publication of a junior researcher as a corresponding author. Beall's list was used to identify predatory publishers and James McCrostie's criteria to assess if a conference should be considered as predatory. The content of electronic invitations was analyzed and is presented with descriptive statistics. **Results:** A total of 162 electronic invitations were received during the study period. Seventy-nine were invitations to submit a manuscript. Few invitations disclosed information related to publication fees (9, 11.4%) or mentioned any publication guidelines (21, 26.6%). Most invitations reported accepting all types of manuscripts (73, 92.4%) or emphasized on a deadline to submit (62, 78.4%). These invitations

came from 22 different publishers lead by OMICS with 27 invitations (34.2%). Seventy-two invitations to be a speaker (55, 73.4%) or attend (17, 23.6%) a predatory conference were received. These conferences were held most frequently in the USA (25, 34.7%), United Kingdom (15, 20.8%) or United Arab Emirates (8, 11.1%) with only eight mentioning registration fees (11.1%). Forty-one conferences (57.0%) were unrelated to the author's affiliations or research interests. Finally, five invitations to be a journal's guest editor, five invitations to become a member of a journal editorial board and one invitation to contribute to the creation of a new journal were received. **Conclusion:** Young researchers are frequently exposed to predatory publishers and fraudulent conferences. An electronic invitation was received almost daily following the first publication as a corresponding author. Academic institutions worldwide need to acknowledge and educate young researchers of this emerging problem.

Keywords: predatory journal, predatory conference, young researcher

P091

Evaluation of pain management in medical transfer of trauma patients by air

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Introduction: Medical transport services are essential in the regionalization of trauma care. Given the limited number of designated trauma centers, transport times can be prolonged, with patient care managed by paramedics for the duration of their transfer. Pain management is a paramount component, but oligoanalgesia can occur. The primary objective of this study was to evaluate pain management practices during transport of trauma patients by air. **Methods:** We conducted a 12-month review of ORNGE electronic paramedic records. ORNGE is the exclusive provider of air and land transport in Ontario, Canada. Cases from 1 January 2015 to 31 December 2015 were screened. Patients were identified according to inclusion (≥18 years old requiring transportation to designated trauma center) and exclusion criteria (GCS < 14; intubation; accompanied by a nurse or physician). Information was collected in a standardized, piloted data form used by a single trained data extractor. Demographics, injury description, and transportation parameters were recorded. Outcomes included pain assessment according to changes on a 10-point numeric rating scale (NRS), patterns of analgesia administration, and analgesia-related adverse events (AEs). Results were reported as mean, (standard deviation), [range], or percentage. **Results:** Of 600 potential records, 372 patients met our inclusion criteria with the following characteristics: age 47.0 [19-92] years; 70.4% male; 97.0% blunt injury. Duration of transport was 82.4 (46.3) minutes. Pain was initially assessed in 90.0% of patients. Overall, NRS at baseline was 4.9 (2.8). Of the 62.4% who received analgesia, NRS at baseline was 5.9 (2.5). Fentanyl was most commonly administered (78.5%) at 44.3 [25-60] mcg. NRS after the first dose of analgesia decreased by 1.1 (1.6) points. A total of 73.7% of patients received further analgesia, equal to 2.4 [1-19] additional doses. While 23.4% of patients had no change in NRS after the first dose of analgesia, subsequent doses resulted in no change in NRS in over 65% [65.4-71.3] of patients. A total of 43 AEs (6.7%) were recorded after 638 doses of analgesia, and the most common AE was nausea (39.5%). **Conclusion:** The majority of patients were assessed for pain. Although the first analgesia administration had minimal effect on NRS, subsequent doses appeared to have even less of an impact. AEs were infrequent.

Keywords: transport, analgesia, pain

P092

Exercise prescription in the emergency department: patient perceptions

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Introduction: The positive health outcomes of exercise have been well-studied, and exercise prescription has been shown to reduce morbidity in several chronic health conditions. However, patient attitudes around the prescription of exercise in the emergency department (ED) have not been explored. The aim of our pilot study is to explore patients' willingness and perceptions of exercise being discussed and prescribed in the ED. **Methods:** This study is a survey of patients who had been previously selected for exercise prescription in a pilot study conducted at a tertiary care ED. This intervention group were given a standardized provincial written prescription to perform moderate exercise for 150 minutes per week. Participants answered a discharge questionnaire and were followed up by a telephone interview 2 months later. A structured interview of opinions around exercise prescription was conducted. Questions included a combination of non-closed style interview questions and Likert scale. Patients rated prescription detail, helpfulness and likelihood on a Likert scale from 1-5 (1 being strongly disagree and 5 being strongly agree). Median values (+/-IQRs) are presented, along with dominant themes. **Results:** 17 people consented to exercise prescription and follow up surveys. 2 were excluded due to hospital admission. 15 participants were enrolled and completed the discharge survey. Two-month follow up survey response rate was 80%. Patients rated the detail given in their prescription as 5 (+/-1). Helpfulness of prescription was rated as 4 (+/-2). Likelihood to continue exercising based on the prescription was rated as 4 (+/-2). 11/12 participants felt that exercise should be discussed in the Emergency Department either routinely or on a case-by-case basis.1 participant felt it should not be discussed at all. **Conclusion:** Our study demonstrates that most patients are open to exercise being discussed during their Emergency Department visit, and that the prescription format was well-received by study participants.

Keywords: exercise prescription, health promotion, behaviour

P093

Sound check: quality in point of care ultrasound in rural and regional Saskatchewan through participatory action research

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Introduction: In the rural setting, Point-of-Care Ultrasound (POCUS) can dramatically impact rural acute care. In Saskatchewan, many rural clinicians have undertaken POCUS training, but widespread integration into rural emergency care remains elusive. We aimed to explore of the obstacles limiting adoption and their possible solutions to inform the development of a robust and innovative rural POCUS program in Saskatchewan. **Methods:** We conducted a mixed methods Participatory Action Research (PAR) study using surveys and focus groups. Our rural co-investigators identified 4 key realms relating to rural POCUS use: equipment, access to training, quality assurance (QA), and research. These guided the design of an online survey sent out to rural clinicians throughout Saskatchewan. Results of the survey informed the development of three approaches (centralized, hub-and-spoke, and decentralized) to training, QA, and research which were discussed at focus group sessions held at Saskatchewan's Emergency Medicine Annual Conference (Regina, SK. 2016). The focus groups were facilitated by the study

investigators. Responses were analyzed using a simple thematic analysis to identify relevant themes and subthemes. **Results:** 34 rural clinicians responded to the online survey. There was general agreement that POCUS is valuable in rural acute care, training is difficult to access and should be standardized, and that QA and research are desired but impractical in the current environment. 11 rural clinicians attended the focus groups. Analysis of focus groups yielded seven distinct themes/needs: infrastructure needs, peer networks, common standards, both local and regional training opportunities, academic support, access to resources, and culture change. Seventeen sub-themes were identified and noted as having either a positive or negative and direct or indirect effect on the above themes. Broadly speaking, participants supported a distributed "spoke-hub" model where training, research and QA occurs within distributed, regional hubs with support from academic sites. **Conclusion:** The adoption of POCUS for emergency care in rural Saskatchewan faces significant opportunities and obstacles. There is interest on the part of rural clinicians to overcome these challenges to improve patient care.

Keywords: ultrasound, emergency, rural

P094

Meeting patient expectations in the emergency department: preliminary findings from the preparing emergency patients and providers study

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Introduction: Effective communication to develop a shared understanding of patient expectations is critical in establishing a positive medical encounter in the emergency department (ED). However, there is limited research examining patient/caregiver expectations in the ED, and their impact on the beliefs, attitudes and behaviours during and after an ED visit. The objective of this study is to examine patient/caregiver expectations and satisfaction with care in the ED using a patient expectation questionnaire and a follow up survey. **Methods:** As a part of a larger 3-phase study on patient/caregiver expectations in adult and pediatric EDs, a 7-item, paper-based questionnaire was distributed to all patients and/or caregivers who presented to one of four EDs in Nova Scotia with a Canadian Triage and Acuity Scale (CTAS) score of 2 to 5. A follow-up survey was distributed to all willing participants via email to determine their satisfaction with care received in ED. Descriptive statistics were used to analyze responses. **Results:** Phase 1 was conducted from January to September 2016. In total, 24,788 expectation questionnaires were distributed to ED patients/caregivers, 11,571 were collected (47% response rate), and 509 patients were contacted for a follow-up survey. Preliminary analysis of 4,533 questionnaires shows the majority of patients (67.1%) made the decision by themselves to present to the ED, while others were advised by a family/friend (22%). Respondents were most worried about an injury (17.8%) followed by illness (15.6%) and expected to talk to a physician (69.9%) and receive an x-ray (39.3%). The majority of physicians (53.3%) reported the expectation tool helped in caring for the patient and 87.5% felt they met patient expectations. There were 147 patient/caregiver responses to a follow-up survey (29% response rate) and 87.1% of responders reported that ED clinicians met their expectations. **Conclusion:** Patient/caregivers have a variety of concerns, questions, and expectations when presenting to the ED. Obtaining expectations early in the patient encounter may provide opportunities for improved communication between clinicians and patients while enhancing satisfaction with care received. Further analysis is needed to determine the impact of the expectation questionnaire on productivity in the ED.

Keywords: patient satisfaction, emergency department, communication

P095

Wellness, sleep and exercise in emergency medicine residents: an observational study

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Introduction: Burnout is well documented in residents and emergency physicians. Wellness initiatives are becoming increasingly prevalent, but there is a lack of data supporting their efficacy. In some populations, a relationship between sleep, exercise and wellness has been documented, but this relationship has not been established in emergency medicine (EM) residents or physicians. We aim to determine whether exercise and sleep quality and quantity as measured by a Fitbit are associated with greater perceived wellness in EM residents. **Methods:** Fifteen EM residents from two training sites wore a Fitbit during a 4-week EM rotation. The Fitbit recorded data on sleep quantity (minutes sleeping)/quality (sleep disruptions) and exercise quantity (daily step count)/quality (daily active minutes performing activity of 3-6 and >6 metabolic equivalents). Participants completed an end-of-rotation Perceived Wellness Survey (PWS) which provided information on six domains of personal wellness (psychological, emotional, social, physical, spiritual and intellectual). Associations between PWS scores and the Fitbit markers were evaluated using a Mann-Whitney-U statistical analysis. **Results:** Preliminary results indicate that residents who scored $\geq 50^{th}$ percentile for sleep quantity had significantly higher PWS scores than those who scored $\leq 50^{th}$ percentile (median PWS 17.0 vs 13.0 respectively, $p = 0.04$). There was no significant correlation between PWS scores, sleep interruptions, daily step count and average daily active minutes. Postgraduate Year PGY1 and PGY2-5 report median PWS scores of 13.9 and 17.2 respectively. **Conclusion:** To our knowledge, this is the first study to objectively measure the quality and quantity of sleep as well as exercise habits of EM residents using a Fitbit device. Our data indicates a significant relationship between better sleep quantity and higher wellness scores in this population. We aim to enroll 30 residents in order to obtain a more robust data set. A larger sample size will increase statistical power and allow us to more extensively evaluate the use of exercise and sleep monitoring devices in the efficacy assessment of wellness initiatives.

Keywords: wellness, sleep, exercise

P096

A peer-reviewed instructional video is as effective as a standard recorded didactic lecture in medical trainees performing chest tube insertion: a randomized control trial

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Introduction: Online medical education resources are becoming an increasingly used modality and many studies have demonstrated their efficacy in procedural instruction. This study sought to determine whether a standardized online procedural video is as effective as a standard recorded didactic teaching session for chest tube insertion. **Methods:** A randomized control trial was conducted. Participants were taught how to insert a chest tube with either a recorded didactic teaching session, or a New England Journal of Medicine (NEJM) video. Participants filled out a questionnaire before and after performing the procedure on a cadaver, which was filmed and assessed by two blinded evaluators using a standardized tool. Thirty 4^{th} year medical students

from two graduating classes at the Schulich School of Medicine & Dentistry in London, ON were screened for eligibility. Two students did not complete the study, and were excluded. There were 13 students in the NEJM group, and 15 students in the ATLS group. **Results:** The NEJM group's average score was 45.2% (±9.6) on the pre-questionnaire, 67.7% (±12.9) for the procedure, and 60.1% (±7.7) on the post-questionnaire. The didactic group's average score was 42.8% (±10.9) on the pre-questionnaire, 73.7% (±9.9) for the procedure, and 46.5% (±7.5) on the post-questionnaire. There was no difference between the groups on the pre-questionnaire (Δ +2.4%; 95% CI: −5.2, 10.0), or the procedure (Δ −6.0%; 95% CI: −14.6, 2.7). The NEJM group had better scores on the post-questionnaire (Δ +11.15%; 95% CI: 3.7, 18.6). **Conclusion:** The NEJM video was as effective as video-recorded training for teaching the knowledge and technical skills essential for chest tube insertion. Participants expressed high satisfaction with this modality. It may prove to be a helpful adjunct to standard instruction on the topic.

Keywords: chest tube, medical education, clinical medicine videos

P097

High-risk clinical features for acute aortic syndrome

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Introduction: Acute aortic syndrome (AAS) is a rare clinical syndrome with a high mortality encompassing acute aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer. The objective of our study was to assess the diagnostic accuracy of high risk historical, examination and basic investigative features for AAS, in confirmed cases of AAS and a low risk control group in order to address the spectrum bias in previous diagnostic accuracy studies. **Methods:** We performed a historical matched case-control study: participants were adults >18 years old presenting to two tertiary care emergency departments (ED) or one regional cardiac referral center. Cases: new ED or in-hospital diagnosis of non-traumatic AAS confirmed by computed tomography or echocardiography. Controls: triage diagnosis of truncal pain (<14 days) and an absence of a clear diagnosis on basic investigation. Cases and controls were matched in a 4:1 ratio by sex and age. A sample size of 165 cases and 660 controls was calculated based on 80% power and confidence interval of 95% to detect an odds ratio of greater than 2. **Results:** Data were collected from 2002-2014 yielding 194 cases of AAS and 776 controls (mean age of 65(SD 14.1) and 66.7% male). Of the 194 cases of AAS, 32 (16.5%) were missed on initial assessment. Chest pain unspecified (20.7%), abdominal pain unspecified (9.9%) and acute coronary syndrome (8.7%) were the top diagnoses in the control population. Absence of acute onset pain (Sensitivity 95.9% negative likelihood ratio (LR-) 0.07(0.03-0.14)), and a negative D-dimer (Sensitivity 96.7%, LR- 0.05(0.01-0.18)) can help rule out AAS. Presence of tearing/ripping pain (Specificity 99.7%, LR + 42.1 (9.9-177.5), a history of aortic aneurysm (Specificity 97.8%, LR + 6.35(3.54-11.42)), hypotension (Specificity 98.7%, LR + 17.2 (8.8-33.6)), pulse deficit (Specificity 99.3, LR + 31.1(11.2-86.6)), neurological deficits (Specificity 96.9%, LR + 5.26(2.9-9.3)), and a new murmur (Specificity 97.8%, LR + 9.4(5.5-16.2)) can help rule in the diagnosis of AAS. **Conclusion:** Patients with one or more high-risk feature should be considered high risk, whereas patients with no high risk and multiple low risk features are at low risk for AAS. Further research should focus on a combination of these factors to guide who warrants further investigation thus reducing miss rate, morbidity and mortality.

Keywords: acute aortic syndrome

P098

Addiction medicine training in Canadian emergency medicine residency programs: a needs assessment survey

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Introduction: Emergency department visits related to substance use are becoming more serious and increasingly costly in Canada. Emergency physicians must be able to effectively screen, manage, refer, and advocate for these complex patients. This study sought to describe the current state of addiction medicine training in Canadian emergency medicine (EM) residency programs and to assess the need for a formal curriculum. **Methods:** All Royal College and College of Family Physicians EM Program Directors (PDs) were asked to participate in a ten-question needs assessment survey on addiction medicine training for residents. Questions were developed through consensus after reviewing the relevant literature and conducting a formal pilot survey with staff physicians experienced in survey methodology. Responses were collected securely using the Research Electronic Data Capture (REDCap) database. **Results:** 19 out of 31 (62%) eligible PDs completed the survey. The importance of addiction medicine training received a median score of 69.5 (IQR = 74.0) on a scale of 1-100. Most programs devoted two hours or less per year of formalized teaching on individual topics (such as opioids, alcohol, harm reduction) over the past two academic years. The two most common teaching modalities used were didactic lectures (15/19, 78.9%) and case-based tutorials (12/19, 63.2%). Case-based tutorials were identified as the most effective teaching method (12/19, 63.2%). Topics highlighted as most important to include in a curriculum were: screening for substance use disorders and referral for further treatment (14/19, 73.7%), social determinants of health (14/19, 73.7%), alcohol, opioid, and stimulant intoxication and/or withdrawal (14/19, 73.7% each), and management of patients on opioid agonist therapy (14/19, 73.7%). The most commonly perceived barriers to implementing such a curriculum were insufficient curriculum time (10/19, 52.6%) and lack of qualified teaching staff (7/19, 36.8%). **Conclusion:** This needs assessment provides an understanding of the current state of addiction medicine training for EM residents in Canada. A case-based addiction medicine workshop is currently being developed to address identified curriculum gaps. Integrating this curriculum longitudinally into a time-constrained academic schedule is an important next step.

Keywords: addiction medicine, resident curriculum, medical education

P099

Age related rates of abnormal CT findings in otherwise low risk minor head injury patients over 65

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Introduction: The Canadian CT Head Rules (CCTHR) is the gold standard clinical decision rule for minor head injuries (MHIs) & has been shown to have 100% sensitivity in identifying patients that would have an abnormal CT scan. Within the CCTHR age 65 + is considered to be an independent risk factor for abnormal head CT. However, a previously published Italian study indicated that the rate of pathological findings in otherwise low risk MHI patients under the age of 79 was less than 1% & significantly lower than those over the age of 80, which brings to question whether the traditional age cut off of 65 as a factor in the CCTHR is too conservative when considering the appropriateness for imaging. Therefore this study aimed to quantify the extent to which

low risk MHI patients between the ages of 65-79 present with abnormal CT findings or require neurosurgical intervention when compared to patients over 80 years of age as one of the criteria used in the CCTHR is the age threshold of 65. A secondary objective of this study was to explore abnormal CT rates across these age groupings for otherwise low risk patients on anticoagulants. **Methods:** A retrospective chart review was conducted on all patients over the age of 65 that received a head CT for a MHI in the Kelowna General Hospital ED between 2006-2016. The imaging results for all patients that had no other risk criteria of the CCTHR other than age were reviewed & rates of pathological findings were compared between patients ages 65-79 & 80+ for both patients on anticoagulants & those not on anticoagulants. Differences in rates by age were compared for statistical significance using the chi-squared & Fisher's exact test. **Results:** To date 248 patients have been reviewed & meet the criteria of being >65 & with no other CCTHR criteria. 65% of patients were female & 30% of patients were on anticoagulants. For the patients that were not on anticoagulants, 6 of the 75 (8%) individuals between 65-79 & 9 of the 94 (10%) of those over 80 had abnormal findings on CT ($p = 0.128$). **Conclusion:** Preliminary results of this study population indicate that there are a significant number of abnormal CT findings in patients under the age of 80 suggesting that patients ages 65-79 without any other CCTHR criteria may still benefit from a head CT. Chart reviews are ongoing & updated results including findings for anti-coagulated patients will be presented at CAEP 2017.

Keywords: Canadian CT Head Rules, minor head injury, elderly

P100

Iterative prototype development of a mobile tele-simulation unit for remote training: an update

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Introduction / Innovation Concept: Rural and remote practice of emergency medicine presents unique challenges, particularly when faced with infrequently encountered cases and procedures. Simulation-based training is a valuable tool in the acquisition and maintenance of knowledge and skills; however, simulators are often located in larger centers and they are not widely outside these centers due to geographic, cost and time constraints. Mobile tele-simulation has the potential to overcome barriers but challenges such as comfort, technical issues and ability to teach desired content via tele-simulation must be addressed. We are developing a mobile-tele-simulation unit (MTU) prototype that will enable emergency medicine practitioners and trainees to access simulation-based instruction in rural and remote settings. **Methods:** Through application of a mixed-methods approach with input of a multidisciplinary team we are iteratively developing an MTU prototype to assess key factors in design and function, including: technical issues, environmental features, and human factors. The Delphi method is being used to collect input from experts on key design components and feedback is also being collected from trainees after participating in trial deployments of the MTU in different educational and environmental settings. **Curriculum, Tool, or Material:** The effective application of the MTU in a variety of learning settings will be optimized through ongoing evaluation in the iterative design cycle. Feedback to ensure a quality learning experience in the MTU will direct features of physical design and technical performance that can be applied in deployment of the unit. In addition, challenges to the delivery of module content and instructional modality/ features of lessons to be executed will be important considerations as we move toward developing content that can effectively be taught using the MTU. **Conclusion:** To ensure effective use of tele-simulation in the delivery of a meaningful simulation experience to rural and remote trainees a number of important challenges must be overcome. We describe our evolving multi-disciplinary mixed-methods approach to develop an effective mobile tele-simulation unit.

Keywords: innovations in emergency medicine education, simulation, rural medicine

P101

Quality of life in patients discharged from the emergency department with atrial fibrillation or flutter (AF/AFL): a prospective cohort study

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Introduction: Following an emergency department (ED) presentation for acute atrial fibrillation and/or flutter (AF/AFL), patients often experience anxiety, depression and impaired health-related quality of life (QoL). Emergency physicians may prescribe appropriate thrombo-embolic (TE) prophylaxis upon discharge; however, the QoL of these patients is unclear. This study measured the QoL of patients with AF/AFL following discharge to determine the factors associated with QoL. **Methods:** Patients ≥18 years of age identified by the attending physician as having a diagnosis of acute AF/AFL confirmed by ECG were prospectively enrolled from three Edmonton, AB EDs. Using standardized enrollment forms, trained research assistants collected data on patient demographics factors and management both in the ED and at discharge. Patients' health-related QoL was assessed up to 20 days after their initial ED visit by a telephone interview based on six domains of the short-form 8 health survey. **Results:** From a total of 196 enrolled patients, 121 (62%) were male and the mean age was 63 years (standard deviation ±14). Most patients had previous history of AF/AFL (71%), and emergency physicians had the opportunity to treat or revise TE prevention therapy in 19% of the patients. The majority (89%) were discharged with prescriptions for antiplatelet or anticoagulant agents, and 188 (96%) were contacted by telephone at a median of 7 days. Most patients rated their overall health between good and excellent (70%); however, 30% assessed their health as fair or very poor. Many also reported having physical limitations (54%), difficulties completing their daily work (42%), bodily pain (32%) and limitations in social activities (32%). Finally, some patients reported having low energy (25%). At follow up, patients receiving adequate TE prevention rated their health to be similar to those without adequate TE prevention (30% vs 23%; $p = 0.534$). **Conclusion:** Overall, patients with acute, symptomatic AF/AFL seen in the ED have impairments in health-related QoL following discharge from the ED. Many factors contribute to this impairment; however, providing patients with appropriate TE prophylaxis at discharge did not explain these findings. Further research is required to explore the impact of AF/AFL on patient's health-related QoL after discharge from the ED.

Keywords: quality of life

P102

Education and training on mild traumatic brain injury among emergency department physicians: a systematic review

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Introduction: Mild traumatic brain injury (mTBI) is the most common emergency department (ED) brain injury presentation in Canada; however, an evidence-practice gap in mTBI management exists among ED

physicians, evidenced by significant practice variation. This review aimed to identify mTBI education and training directed at ED physicians and its relationship with practice patterns and physician knowledge. **Methods:** A comprehensive literature search of four bibliographic databases and the grey literature was performed using the keywords: concussion, mTBI, medical education, and continuing medical education. Included studies were required to report on mTBI education received by practicing ED physicians. Two independent reviewers screened unique citations for relevance and reviewed the full-texts of relevant articles. Two independent reviewers assessed methodological quality using the Methodological Index for Non-Randomized Studies. Data were extracted in duplicated onto standardized forms. Throughout the review process, discrepancies were adjudicated by an independent third party. **Results:** A total of 409 unique results were retrieved, and five studies were included. None of the included studies were of high methodological quality. Included studies assessed mTBI educational toolkits (n = 3), conference presentations and academic journal articles (n = 1), and pediatric fellowship training (n = 1). Training primarily occurred after residency (i.e., continuing professional development) and focused on awareness and management of mTBI. Three studies measured ED physicians self-reported knowledge uptake and retention, and all three studies reported positive changes in knowledge uptake including self-reported increases in appropriate return-to-school and return-to-play recommendations. An increase in appropriate return-to-school/sports recommendations was reported in one study, measured by surveying parents of children diagnosed with mTBI. **Conclusion:** After a systematic and comprehensive search, few studies on mTBI education or training targeting ED physicians were identified and focused on process change rather than outcomes, highlighting an evidence-practice gap that needs to be addressed to improve mTBI patient care. Existing mTBI knowledge translation, including EDP education, needs to be optimized to effectively disseminate evidence-based best-practices for mTBI management in the ED.

Keywords: medical education, concussion

P103

A human factors-based framework analysis for patient safety: the trauma resuscitation using in situ simulation team training (TRUST) experience

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Introduction: Effective trauma resuscitation requires a coordinated team approach, yet there is a significant risk for error. These errors can manifest from sequential system-, team- and knowledge based failures, defined as latent safety threats (LSTs). In situ simulation (ISS), a point-of-care training strategy, provides a novel prospective approach to identify factors that impact patient safety. This study quantified and formulated a hierarchy of LSTs during risk-informed ISS trauma resuscitations. **Methods:** At a Level 1 trauma centre, we conducted 12 multi-disciplinary, unannounced ISSs to prospectively identify trauma-related LSTs. Four, risk-informed scenarios were developed based on 5 recurring themes found within the trauma program's morbidity and mortality process. The actual, on-call trauma team participated in the study. Simulations were video recorded with 4 cameras, each positioned at a different angle. Using a framework analysis methodology, human factors experts transcribed and coded the videos. Thematic structure was established deductively based on existing literature and inductively based on observed ISS events. All LSTs were prioritized for future patient safety, systems and ergonomic interventions using the Healthcare Failure Mode and Effect Analysis (HFMEA) matrix. **Results:** We identified 893 LSTs from 12 simulations. LST analysis resulted in 8 themes subcategorized into 43 codes. Themes were associated with team-, knowledge- or system-related issues. The following themes emerged: situational awareness, provider safety, mental model alignment, team/individual responsibility, team resources, equipment considerations, workplace environment and clinical protocols. The HFMEA hazard scoring process identified 13 high priority codes that required urgent attention and intervention to mitigate negative patient outcomes. **Conclusion:** A prospective, video-based framework analysis represents a novel and robust approach to LST identification within trauma care. Patterns of LSTs within and between simulations provide a high degree of transparency and traceability for an inter-professional trauma program review. Hazard matrix scoring facilitates the classification and prioritization of human factors interventions intended to improve patient safety.

Keywords: trauma, simulation, patient safety

P104

Emergency department opioid overdose study: prevalence of adverse outcomes

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Introduction: The following adverse outcomes have been described in patients treated in hospital for opioid overdose: pulmonary edema, cardiac dysrhythmias, neurologic injury secondary to hypoxia, prolonged opioid toxicity, recurrent opioid toxicity. In addition, patients who take an overdose of fentanyl may develop fentanyl induced chest rigidity, a life-threatening complication that appears to be uniquely related to fentanyl. The prevalence of adverse outcomes and the clinical course of patients that develop these complications have been described in patients who have taken an overdose of heroin. However, in British Columbia there has been a dramatic increase in the number of patients who overdose on fentanyl and other ultrapotent opioids. The proportion of illicit drug overdose deaths in British Columbia for which fentanyl was detected was only 5% in 2012 but, by 2016, this proportion had increased to 62%. It is very important to know the prevalence of adverse outcomes and the clinical course of patients that develop these adverse outcomes in patients with an overdose of fentanyl or another ultrapotent opioid. **Methods:** We are completing a retrospective cohort study to evaluate the prevalence of the following adverse outcomes for patients treated in hospital for an opioid overdose: i) pulmonary edema, ii) cardiac dysrhythmias, iii) fentanyl induced chest rigidity, iv) neurologic injury secondary to hypoxia, v) prolonged opioid toxicity, vi) recurrent opioid toxicity. Health records of patients treated for opioid overdose in the emergency departments of six greater Vancouver hospitals from Jan 1, 2014 to Dec 31, 2016 are being reviewed. **Results:** All Institutional approvals have been obtained. The dataset of 3600 ED visits for opioid overdose has been obtained and 160 health records have now been reviewed as of January 8, 2017. We will describe the type and prevalence (with 95% confidence intervals) of complications sustained by these patients. **Conclusion:** The results of this study will guide management of opioid overdose in a setting were ultrapotent opioids are commonly ingested. All health records will have been reviewed and the data analysis completed by May 2017.

Keywords: opioid, overdose, fentanyl

P105

BC's public health emergency and naloxone administration by the BC Ambulance Service

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Introduction: In 2015, there were 476 apparent illicit drug overdose deaths, prompting BC's Provincial Health Officer to declare a public health emergency on 14 Apr 2016. Paramedics of BC's Ambulance Service (BCAS) are on the front lines in this crisis. Here we examine recent trends in the number of suspected overdose events attended by the BCAS and the use of naloxone, an opioid antagonist, by BCAS paramedics. **Methods:** The BC Centre for Disease Control receives a weekly data feed from BC Emergency Health Services that includes all records from the BCAS Patient Care Record where: naloxone was administered by paramedics; the primary impression code indicates poisoning or overdose; or, the originating call is associated with ingestion poisoning ('card 23'). Here, we report a descriptive analysis of these data for suspected drug overdose events during the period January 1, 2010 to September 30, 2016. **Results:** Between January 2010 and September 2016 BCAS paramedics attended 164,227 suspected overdose events; 12% of these events (n = 16,944) included naloxone administration by BCAS paramedics. Paralleling the rise in illicit drug overdose deaths in BC, naloxone administration by paramedics has been increasing rapidly, doubling from approximately 180/month in 2014, to 370/month in 2016. When naloxone was administered by paramedics, 90% of these patients were transported, whereas 77% were transported when naloxone was not administered. Administrations occurred most frequently on Friday and Saturday evenings. Almost half (46%) of all naloxone administrations by paramedics were recorded as being in a home or residence; 18% were recorded as occurring on a street or highway. The proportion of naloxone administrations among males has increased yearly. In 2010, 58% of naloxone administrations were in males compared to 69% in 2016. **Conclusion:** The number of overdose deaths in BC has risen drastically in recent years and the proportion of ambulance calls requiring administration of naloxone by BCAS has climbed correspondingly. The vast majority of overdose cases-especially those requiring naloxone-are transported to the emergency department. With the overdose crisis showing little sign of abating, the administration of naloxone by BC paramedics will continue to be a critical element of the provincial response.

Keywords: overdose, public health emergency, naloxone

P106

Does training with a modified high-fidelity manikin improve junior residents' ability to establish transcutaneous pacing in an advanced cardiovascular life support course?

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Introduction: Transcutaneous cardiac pacing (TCP), a skill taught in Advanced Cardiovascular Life Support (ACLS) courses, is recommended to treat unstable bradycardia. Training manikins currently available fail to reproduce key features of TCP and might be suboptimal to teach this procedure.The objective of this study was to measure the impact of a modified high-fidelity manikin on junior residents' TCP competency during an ACLS course. We hypothesized that the use of this high-fidelity manikin improves junior residents' performances. **Methods:** This prospective cohort study was conducted at the Université de Montréal in July 2015 and 2016. First-year residents undergoing their mandatory ACLS course were enrolled. The control group (2015) received the traditional curriculum, which includes hands-on teaching on Advanced Life Support manikins. The intervention group (2016) received a similar curriculum, but used a modified high-fidelity manikin that reproduces key features of TCP (e.g. use of multifunction pads, TCP induced patient twitching, ECG artifacts). Cohorts were tested with a simulation scenario requiring TCP. Performances were graded based on six critical tasks: turns on pacer function, applies multifunction pads, recognizes TCP is ineffective, achieves captures, verifies mechanical capture and prescribes sedation. Our primary outcome was successful use of TCP defined as having completed all tasks. Secondary outcomes were the success rates for each task. These were compared using Pearson's chi-squared test. We anticipated that the success rate of TCP would increase from 20% to 50%. To obtain a power of more than 90%, 48 participants were needed in both cohorts. **Results:** A total of 50 residents were recruited in both cohorts. No resident that received the traditional curriculum was able to successfully establish TCP while 18 residents trained on the modified high-fidelity manikin succeeded (0 vs 36%, $P < 0.001$). Furthermore, the latter were more likely to recognize when pacing was inefficient (12 vs 86%, $P < 0.001$), obtain ventricular capture (2 vs 48%, $P < 0.001$), and check for a pulse rate to confirm capture (0 vs 48%, $P < 0.001$). **Conclusion:** Successful use of TCP is a difficult skill to master for junior residents. A modified high-fidelity manikin during ACLS training significantly improves their ability to establish effective pacing.

Keywords: simulation, advanced cardiovascular life support, transcutaneous cardiac pacing

P108

Fast track in Calgary hospitals: measures for quality improvement

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Introduction: Fast track (FT) implementation in emergency departments (ED) has shown a decrease in patient wait times, length of stay (LOS), left without being seen rates, and has increased patient satisfaction. The objective of this study was to analyze the demographics and presenting complaints of patients presenting to FT in Calgary EDs using local administrative databases to understand the current selection of FT patients, as well as to uncover potential throughput efficiencies through LOS analysis. **Methods:** Sunrise Clinical Manager data was pulled from the Foothills Medical Center (FMC), Peter Lougheed Center (PLC), and Rockyview General Hospital (RGH) EDs between October 2015 and September 2016. Based on consensus achieved by the Calgary FT-Minor Treatment Sub-committee, data was descriptively analyzed based on the following criteria: (1) triage profiles of the Calgary ED sites; (2) site admission rates by complaint, Canadian Triage and Acuity Scale (CTAS), vitals, and age; (3) LOS for orthopedic patients admitted from FT/Minor; and, (4) LOS in FT for non-admitted back pain patients. **Results:** A total of 53911 patients were triaged to FT, with 16224 patients triaged to FMC, 18299 to PLC, and 19388 to RGH. 6.9% of FT patients were admitted to hospital at FMC, 4.8% at PLC and 4.8% at RGH. 14.4% of patients at FMC, 18.3% at PLC and 17.6% at RGH were CTAS 2; 40.9% of patients at FMC, 46.2% at PLC and 37.9% at RGH were CTAS 3; 34.0% of patients at FMC, 27.8% at PLC and 33.3% at RGH were CTAS 4; 10.7% of patients at FMC, 7.7% from PLC and 11.2% for RGH were CTAS 5. For FT patients 80 years or older, 10.4% were admitted at FMC, 13.1% at PLC and 9.4% at RGH. The top FT presenting complaints at all sites were lower extremity injury, upper extremity injury, and laceration/puncture. The annual FT bed hours for patients admitted to orthopedic surgery (consultation request to time of orthopedic admission) was 802.3 hours at

FMC, 441.1 PLC and 705.1 from RGH. The annual FT bed hours for patients with non-admitted back pain (FT bed to time of discharge) was 2144.3 hours from FMC, 3367.9 from PLC and 1134.9 from RGH. **Conclusion:** The efficiency of FT is based on streamlining low acuity patients with an expected rapid discharge from hospital. The results of this investigation will be presented to the FT-Minor Treatment Sub-committee in order to utilize current admission rates, patient profiles, and aggregate LOS to potentially improve throughput.

Keywords: quality improvement, fast track, emergency medicine

P109

Characterizing spontaneous improvements in vasovagal syncope

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Introduction: Syncope is responsible for up to 5% of emergency department visits. Vasovagal syncope (VVS) is the most common subtype and can have significant quality of life implications as it is often recurrent. Clinicians treating VVS have limited treatment options available to them and often struggle with prognostication. The aim of our study was to identify patient-specific determinants of VVS improvement or cessation. **Methods:** Patients (pts) from the Prevention of Syncope Trials (POST) 1 and 2 were included in this study. All patients had VVS according to tilt table testing or a diagnostic point score. Patients had fainted ≥1 time in the previous year and all were followed for up to 1 year after enrollment. Data are presented as median (IQR). Complete responders (CR) did not faint in follow-up; partial responders (PR) fainted ≥1/year less than prior year but did not stop; and non-responders (NR) did not improve or stop. **Results:** There were 392 patients: 126 males, median age 34 (23,50) who had fainted for 10 (3,22) years and followed for a median of 363 (148,376) days. There were 225 CR (57%), 120 PR (31%) and 47 NR (12%). PR subjects were younger: 27 (24,33) years compared to CR (36 (32,42)) years and NR (36 (29,47)) years ($p < 0.05$). Receiver operator characteristic analysis showed age predicted PR (AUC = 0.62). Lifetime fainting frequency was 0.67 (0.14,2.00) faints per year, increasing to 4 (2,10) faints in the pre-year and decreasing to 0 (0,1.9) faints in the post-year ($p < 0.0001$). Pts had similar syncope frequency in the distant past (PR, 1.14 faints/year; CR, 0.68 faints/year; NR, 0.58 faints/year) but PR pts worsened markedly prior to enrollment. PR subjects fainted much more in the prior year: 10 (6,18) faints compared CR (3 (2,3) faints, $p < 0.0001$) and NR (2 (2,4) faints, $p < 0.05$). Receiver operator characteristic analysis showed prior year faints predicted PR well (AUC = 0.81). There was no significant interaction with treatment (metoprolol in POST 1, fludrocortisone in POST 2). **Conclusion:** After specialist consultation, 57% of VVS patients stop fainting and 31% improve incompletely without a significant treatment effect. Patients who will improve incompletely can be accurately selected based on younger age and more frequent syncope. Older patients with less frequent syncope are 83% likely to stop fainting. These findings will help counsel pts and select candidates for medical therapy.

Keywords: syncope, prognosis, decision tool

P110

Acute mountain sickness in the Himalayas: preliminary report

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Introduction: Acute Mountain Sickness (AMS) is a high-altitude medical emergency that requires prompt treatment. If left untreated AMS can progress to high-altitude cerebral edema or pulmonary edema, both of which can be fatal. As the popularity of high altitude trekking increases in the Himalayas we were interested in determining what rates of AMS are on popular routes in this region. **Methods:** AMS was diagnosed using a standardized Lake Louise Symptom Score (LLSS) where scores 3-5 denoted mild AMS and >5 denoted severe AMS. Forms were distributed to trekkers prior to departure and symptoms scores were determined daily. Data on medical history and patient demographics were also collected. All data are expressed as mean ± SEM. **Results:** Preliminary results are reported from N = 17 (4 female) participants. Mean age was 43.7 ± 3.9y. Most subjects, 68.8%, had trekked above 2500 m in the past. Only 6.25% reported having no knowledge of AMS, with the others having limited or expert knowledge. 25% of subjects had previously suffered from AMS. Most subjects, 82.4%, took prophylactic AMS medication, acetazolamide; at a dose of 250 mg/d. Subjects trekked at a mean altitude of 3650 ± 85 m and ascended to a maximum altitude of 5012 ± 103 m. The mean LLSS was 1.48 ± 0.31 with a maximal LLSS of 4.76 ± 0.75. Within our sample, 70.86% suffered from AMS at some point during their trek. Of those who suffered from AMS, the mean number of days affected was 3.17 ± 0.61, and of those with severe AMS, mean number of days affected was 2.14 ± 0.7. **Conclusion:** Over 70% of trekkers to the Himalayas experience AMS for an average of 3d, despite the use of prophylactic medication that most participants take. Almost 95% of trekkers have working knowledge of AMS and most have prior experience trekking at high-altitude. Given the dangers of high altitude trekking, pre-departure education for patients, especially those with chronic diseases, alongside prophylactic medication for AMS may help mitigate the risk.

Keywords: altitude medicine, acute mountain sickness

P111

The social determinants of health in adults presenting to the ED with a mental health complaint

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Introduction: The social determinants of health (SDoH) can play a significant role in a person's overall wellbeing. This is especially true for adults with mental illness and mental health disorders. In this study, we describe the SDoH of patients presenting to an academic, inner-city emergency department (ED) with an acute mental health complaint (AMHC). **Methods:** We prospectively identified and enrolled a convenience sample of patients presenting to an ED with an annual census of 85,000 visits. Participants provided informed written consent, and completed a questionnaire package containing questions related to demographics and SDoH. As well, participants were asked to complete four mental health, quality of life, and recovery validated patient-reported outcome measures. **Results:** A total 108 participants were enrolled in this study, of which 65% were male, aged 37.5 years (IQR 26.7-50.3), 56% Caucasian, and 22% Aboriginal. Depression was the primary diagnosis reported by 55% of participants, with 58.9% meeting the PhQ-9 cutoff for moderate-severe depression. The highest level of educational achievement for 44% of participants was high school or less, with 75% reporting being unemployed. Almost half (45%) reported engaging in less than two hours of structured activity each week. Thirty eight percent of participants reported living in their own apartment, with 25% reporting being homeless and 17% living in a single-room housing unit. The majority of participants (56%) sampled were not satisfied with their housing, and 67% were actively looking for new housing. Sixty percent of participants reported smoking cigarettes daily and 40% reported weekly cannabis use. A total of

11% of the sample reported that they did not have access to clean drinking water; 35% worried that their food would run out, and 47% reported cutting the size of meals due to a lack of money. **Conclusion:** This study lends evidence towards the circumstances in which patients presenting to the ED with an AMHC live and work. A considerable proportion of patients reported homelessness or being marginally housed, lack access to clean drinking water and sufficient food, and high rates of unemployment. Mitigating the effects of harmful social determinants is critical for optimal health of this population. Future work is needed to clarify the role of the ED in the surveillance, screening, and intervention of SDoH for this vulnerable patient group.

Keywords: social determinants of health, mental health

P112

Predicting patient admission from the emergency department using triage administrative data

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Introduction: Emergency department (ED) over-crowding and increased wait times are a growing problem. Many interventions have been proposed to decrease patient length of stay and increase patient flow. Early disposition planning is one method to accomplish this goal. In this study we developed statistical models to predict patient admission based on ED administrative data. The objective of this study was to predict patient admission early in the visit with goal of preparation of the acute care bed and other resources. **Methods:** Retrospective administrative ED data from the Thunder Bay Regional Health Sciences Centre was obtained for the period May 2014 to April 2015. Data were divided into training and testing groups with 80% of data used to train the statistical models. Logistic regression models were developed using administrative variables (i.e., age, sex, mode of arrival, and triage level). Model accuracy was evaluated using sensitivity, specificity, and area under the curve measures. To predict hourly bed requirements, the probability of admission was summed to calculate a pooled bed requirement estimate. The estimated hourly bed requirement was then compared to the historical hourly demand. **Results:** The logistic regression models had a sensitivity of 23%, specificity of 97%, and an area under the curve of 0.78. Although, admission prediction for a particular individual was satisfactory, the hourly pooled probabilities showed better results. The predicted hourly bed requirements were close to historical demand for beds when compared. **Conclusion:** I have shown that the number of acute care beds required on an hourly basis can be predicted using triage administrative data. Early admission bed planning would allow resources to be managed more effectively. In addition, during periods of hospital over capacity, managers would be able to prioritize transfers and discharges based on early estimates of ED demand for beds.

Keywords: admission, triage, overcrowding

P113

Comparison of age-adjusted and clinical probability-adjusted D-dimer for diagnosing pulmonary embolism

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Introduction: Diagnosing pulmonary embolism (PE) in the emergency department can be challenging due to non-specific signs and symptoms; this often results in the over-utilization of CT pulmonary angiography (CT-PA). In 2013, the American College of Chest Physicians identified CT-PA as one of the top five avoidable tests. Age-adjusted D-dimer has been shown to decrease CT utilization rates. Recently, clinical-probability adjusted D-dimer has been promoted as an alternative strategy to reduce CT scanning. The aim of this study is to compare the safety and efficacy of the age-adjusted D-dimer rule and the clinical probability-adjusted D-dimer rule in Canadian ED patients tested for PE. **Methods:** This was a retrospective chart review of ED patients investigated for PE at two hospitals from April 2013 to March 2015 (24 months). Inclusion criteria were the ED physician ordered CT-PA, Ventilation-Perfusion (VQ) scan or D-dimer for investigation of PE. Patients under the age of 18 were excluded. PE was defined as CT/VQ diagnosis of acute PE or acute PE/DVT in 30-day follow-up. Trained researchers extracted anonymized data. The age-adjusted D-dimer and the clinical probability-adjusted D-dimer rules were applied retrospectively. The rate of CT/VQ imaging and the false negative rates were calculated. **Results:** In total, 1,189 patients were tested for PE. 1,129 patients had a D-dimer test and a Wells score less than 4.0. 364/1,129 (32.3%, 95%CI 29.6-35.0%) would have undergone imaging for PE if the age-adjusted D-dimer rule was used. 1,120 patients had a D-dimer test and a Wells score less than 6.0. 217/1,120 patients (19.4%, 95%CI 17.2-21.2%) would have undergone imaging for PE if the clinical probability-adjusted D-dimer rule was used. The false-negative rate for the age-adjusted D-dimer rule was 0.3% (95%CI 0.1-0.9%). The false-negative rate of the clinical probability-adjusted D-dimer was 1.0% (95%CI 0.5-1.9%). **Conclusion:** The false-negative rates for both the age-adjusted D-dimer and clinical probability-adjusted D-dimer are low. The clinical probability-adjusted D-dimer results in a 13% absolute reduction in CT scanning compared to age-adjusted D-dimer.

Keywords: D-dimer, clinical decision rule, pulmonary embolism

P114

Critical objectives for a pediatric emergency medicine fellowship point of care ultrasound curriculum

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Introduction: Emergency Medicine Physicians have been incorporating Point-of-Care Ultrasound (POCUS) into their practice for over twenty years. Only recently has its use become more widespread in the practice of Pediatric Emergency Medicine (PEM). Recent guidelines have described the scope of applications for PEM physicians. However, no consensus exists as to which applications should be prioritized and routinely taught to PEM fellowship trainees and therefore expected of PEM graduates as they enter practice. The PEM POCUS Network, a multinational group of Physicians with POCUS expertise formed in 2014, set out to reach expert consensus as to which applications should be incorporated into PEM fellowship training curricula. **Methods:** A multinational group of PEM POCUS experts was recruited from the PEM POCUS Network via a screening process that identified PEM physicians who have performed over 1000 pediatric POCUS scans and met any of one of the following criteria: having 3 years or more experience teaching POCUS to PEM fellows, being local academic POCUS leaders or had completed a dedicated PEM POCUS fellowship. These experts rated each of the 60 possible PEM POCUS applications using a modified Delphi consensus building technique for their importance in inclusion into a PEM Fellowship curriculum. Consensus was reached when >80% of respondents agreed to include or exclude each item. **Results:** In the first round, 66 out of 92 (72%) PEM POCUS Network members responded to the survey email, of whom 45 met expert criteria and completed the first round. During round 1, consensus

was reached to include 18 of the 60 applications in a PEM fellowship curriculum and to exclude 2 applications from a PEM fellowship curriculum. Eighty-two percent (37 /45) of the experts completed Round 2 where 40 items were rated; consensus was reached to include 3 additional applications and exclude 5 applications. The decision was made not to carry on with future rounds after this stage, since no significant changes were observed between the two rounds, with regard to items that had not reached consensus. **Conclusion:** This project of the PEM POCUS Network reached consensus on 21 applications that should be included in a PEM Fellowship curriculum. This project will have significant impact on how PEM fellowships teach POCUS to their trainees.
Keywords: ultrasound, curriculum, consensus

P115

Limiting functional decline in seniors evaluated for minor injuries in the ED

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Introduction: In its prospective cohorts of independent seniors with minor injuries, the CETIe (Canadian Emergency Team Initiative) has shown that minor injuries trigger a spiral of mobility and functional decline in 18% of those seniors up to 6 months post-injury. Because of their effects on multiple physiological systems, multicomponent **mobility interventions with physical exercises** are among the best methods to limit frailty and improve mobility & function in seniors. **Methods:** Pilot clinical trial among 4 groups of seniors, discharged home post-ED consultation for minor injuries**. Interventions:** 2x 1 hour /week/12 weeks with muscle strengthening, functional and balance exercises under kinesiology supervision either at home **(Jintronix telerehabilitation platform)** or at community-based programs **(YWCA, PIED)** vs usual ED-discharge **(CONTROL). Measures:** Functional Status in ADLs (*Older American Ressources Scale*); Global physical & social functioning (*SF-12 questionnaire*), physical activity level (*RAPA* questionnaire) at initial ED visit and at 3 months. **Results:** 135 seniors were included (Controls: n = 50; PIED: n = 28; Jintronix: n = 27; YWCA: n = 18). Mean age was 72.6 ± 6.2 years, 45% were prefrail, 86% and 8% had a fall or motor vehicle-related injuries (e.g. fractures: 30%; contusions: 37%). Intervention could start as early as 7 days post-injury. Seniors in interventions (Home, YWCA or PIED) **maintained or improved their functional status** (84% vs 60%, $p \leq 0.05$)**, their physical** (73% vs 59%, p = 0.05) and **social** (45% vs 23%, $p \leq 0.05$) **functioning**. While 21% of CONTROLs improved their **physical activity level** three months post-injury, **46% of seniors in intervention did** ($p \leq 0.05$). **Conclusion:** Exercises-based interventions can help improve seniors' function and mobility after a minor injury.
Keywords: geriatric, minor injury, mobility

P116

A scoping review of factors affecting patient satisfaction with care in North American adult emergency departments

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Introduction: Patient satisfaction in the emergency department (ED) has been shown to be associated with patient compliance, likelihood to return, and likelihood to recommend the ED. Understanding the factors that affect patient satisfaction in the ED is important but remains poorly understood. This scoping review consolidates the information from the available literature to offer insight into which key factors influence patient satisfaction. **Methods:** A literature search using initial criteria identified 683 articles. These titles were subjected to inclusion/exclusion criteria and their relevance was independently reviewed by two authors. Consensus was reached on 24 articles to be included, and these were then classified according to study design (class I = observational studies, class II = focus group/qualitative studies, class III = reviews), as well as multiple other factors (ED type, volume of patients, sample size, population, type of study, methodology, study measures, statistical analysis, reliability and conclusions). Using these factors, 25 different ED care attributes were examined in the primary literature, and then narrowed to the 6 most commonly studied factors with 3 categories (wait times, communication/information received in the ED, and interpersonal skills of staff). **Results:** The impact of wait times (WT) on patient satisfaction in the ED was addressed in 58% of the articles and various studies have found that longer perceived WTs (the length of WTs as reported by patients) are associated with poorer patient satisfaction. Information delivery demonstrated statistically significant associations to both patient satisfaction and the likelihood of a positive recommendation. Interpersonal skills of the staff also demonstrated a strong association with patient satisfaction. **Conclusion:** The most common factors affecting patient satisfaction in the ED can be categorized under wait times, communication, and the interpersonal skills of the staff. However, the literature in this area is weak, and well-designed comparative studies of the relative importance of each of these factors are necessary to support evidence-based policy making and ultimately improve patient satisfaction.
Keywords: patient satisfaction, wait times, communication

P117

Emergency physicians are choosing wisely when transfusing patients with non-variceal upper gastrointestinal bleeding and hemoglobins >70 g/L

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Introduction: Acute non-variceal upper gastrointestinal bleeding (NVUGIB) is a common presentation to the Emergency Department (ED) associated with significant mortality and morbidity. Recent evidence suggests that overt-transfusion is associated with poor patient outcomes and that stable patients above a hemoglobin (hgb) above 70 g/L should be transfused judiciously. This retrospective health records review aims to determine the proportion of NVUGIB patients with hemoglobin greater than 70 g/L who were still appropriately transfused based on clinical parameters. **Methods:** A retrospective review was conducted on randomly selected patients that presented to one of two major tertiary hospitals with a primary diagnosis of NVUGIB who received blood products, despite a presenting hemoglobin >70 g/L. Standardized case report forms were developed through chart abstraction using a pilot-tested template. The appropriateness of transfusion was then adjudicated separately by a trained medical student and an emergency physician; discrepancies were resolved by discussion. **Results:** Following independent review of the charts, agreement was met on 94% (45/48) of the charts and after collective discussion 100% consensus was reached and all 48 patients' transfusion appropriateness and categorized into one of three groups: Appropriate, Potentially avoidable, and clearly avoidable. Only in 22.9% (11/48) of the cases was transfusion deemed to be clearly avoidable while emergency physicians appropriately transfused 45.8% (22/48) of patients based on clinical status and other factors. In 31.3% (15/48) of the cases,

transfusion was potentially avoidable in favor of other management options. We calculated the mean GBS for the appropriate, potentially avoidable, and clearly avoidable categories yielding 12.8, 12.7, and 10.2 respectively. Mortality occurred in 2 of the 48 cases (4%). **Conclusion:** In most instances, emergency physicians are effectively integrating hemoglobin thresholds and clinical status to determine if a patients with NVUGIB and hgb >70 require blood products.

Keywords: upper gastro-intestinal bleeds, transfusion, emergency medicine

P118

Effects of system design on laboratory utilization in the emergency department: the case for INR & aPTT

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Introduction: In the context of a shrinking healthcare budget, poor physician cost awareness, and continued over-utilization of low-value tests in the emergency department, we re-designed our computerized order entry system to reduce the use of coagulation testing. **Methods:** A hospital-based prospective pre-post analysis following de-bundling of INRPTT testing in two academic hospital emergency departments (annual visits 140,000). All participants aged 18 years or older undergoing evaluation and/or treatment at either of during the period of August 1, 2015 to July 24, 2016 were included. Primary outcome is coagulation testing utilization rates and associated costs. **Results:** Unbundling INR and aPTT testing resulted in significantly decreased bundled INRPTT testing relative to baseline (INRPTT tests per patient per day: 0.60 [95% CI: 0.57-0.62] vs. 0.98 [95% CI: 0.98-0.99], p = 0.000), with significantly increased targeted testing (INR tests per patient per day: 0.39 [95% CI: 0.37-0.42] vs. 0.00 [95% CI: 0.00-0.01], p = 0.000; PTT tests per patient per day: 0.33 [95% CI: 0.30-0.36] vs. 0.01 [95% CI: 0.00-0.01], p = 0.000). As a result of unbundling, there was a significant decrease in costs associated with coagulation testing relative to baseline (Cost per day: $958.52 [INRPTT $592.78 + INR $183.91 + PTT $181.83] vs. $1,074.50 [INRPTT $1,069.76 + INR $2.06 + PTT $2.68], p = 0.000), realizing estimated daily and yearly savings of $115.98 and $42,332.70, respectively. **Conclusion:** Compared to baseline practice patterns, unbundling coagulation testing resulted in the reduction of coagulation testing suggesting system design and user workflows to be an integral factor to provider practice patterns. Given the significant cost-savings, we recommend institutions carefully re-evaluate their system design and user workflows to optimize emergency department laboratory utilization.

Keywords: laboratory medicine, efficiency, cost analysis

P119

Health care utilization by patients presenting to the emergency department with mental health complaints

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Introduction: Emergency department (ED) visits for mental health and addiction related complaints are common and appear to be increasing. It is believed these patients come to the ED requiring urgent assessment either because they do not have a primary care or psychiatric healthcare provider or access to their provider is not available in a timely fashion. The objective of this study was to describe healthcare utilization in the previous 12 months by patients presenting to the ED with a mental health complaint. **Methods:** Between April-November 2016, a convenience sample of adult (≥18 years) patients presenting to an academic ED (annual census 65,000) with a mental health and/or addictions complaint were invited to complete a paper-based survey to determine their usage of ten different mental healthcare resources over the previous 12 months. The questionnaire was pilot-tested and peer-reviewed for feasibility and comprehension. **Results:** Of the 134 patients who completed the survey, mean (SD) age was 37.9 (15.7) years and 64 (47.8%) were male. Only 7 (5.2%) patients did not access any mental health resource in the previous 12 months, and the most commonly accessed resource was hospital EDs (102, 76.1%), with 24 (23.5%) of these patients using the ED at least 6 times. Patients also accessed a variety of other mental health resources, with 28 (20.9%) seeing their family physician, 20 (14.9%) seeing their psychiatrist/psychologist, and 61 (45.5%) seeing both in the previous 12 months. Only 6 (5.9%) patients used the ED exclusively for a mental health related complaint. By comparison, respondents accessed other specific mental health resources such as crisis centres (19, 14.2%), helplines (34, 25.4%), and peer-support groups (24, 17.9%) less often. **Conclusion:** These findings suggest that the ED is the most commonly used mental health resource for this population. However, these patients also frequently access family physicians and psychiatrists/psychologists, with community resources such as crisis centres, helplines, and peer-support being used less often. This suggests that lack of timely access to other mental health resources may be the primary motivation for accessing the ED.

Keywords: mental health, health care utilization, emergency department

P120

Clinical decision rule evidence ranking and use in clinical practice

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Introduction: The 2007 SAEM Knowledge Translation consensus conference proposed areas of research in evidence-based clinical algorithms (EBCAs) using clinical decision rules (CDRs) and practice guidelines (CPGs). This project sought to explore the evidence awareness and utilization of various clinical decision rules (CDRs) in emergency medicine (EM) practice. This project sought to explore the evidence awareness and utilization of various clinical decision rules (CDRs) in emergency medicine (EM) practice. **Methods:** An international survey was administered via international EM organizations using modified Dillman methods. Categories of CDRs included imaging (7), infections (3), neurology (2), venous thromboembolism (VTE; 2), and other (2). Evidence levels were queried using *JAMA User's Guide* CDR rating scales (Levels I-IV). Confidence with supporting evidence and utilization of CDRs in practice were assessed on 7-point Likert scales. Correlation of evidence understanding and practice utilization were calculated using Spearman *rho* methods. **Results:** The majority of respondents (n = 378) were Canadian (72%), <15 years full practice (64%), residency trained (90%), and trained in CDR methods (73%). Evidence ratings were deemed high for all CDRs, although confidence in evidence ratings and practice utilization were more variable for specific rules. Comfort with evidence ranking and utilization in clinical practice were highly correlated ($\rho < 0.0002$). **Conclusion:** Among Canadian residency CDR trained physicians, evidence ranking is strongly correlated with use in self-reported clinical practice. There is insufficient data from non-Canadian respondents to draw firm correlations. Their remains opportunity to fully disseminate high quality CDRs and encourage incorporation into EBCA practice.

Keywords: clinical decision rules, knowledge translation, levels of evidence

P121

Understanding health equity: a pilot project to collect socio-demographic information on emergency department patients at registration

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Introduction: There is strong evidence that socio-economic factors such as income, housing and ethnicity are linked to health outcome disparities for emergency department (ED) patients. However, lack of real-time patient data has limited our ability to identify, understand and address health disparities. During a 14-week period, we assessed the feasibility and acceptability of the systematic collection of patient-level equity data in a busy tertiary care urban ED. **Methods:** We assessed feasibility by directly observing impact on registration time, percentage of patients on which data was collected, and ambulance patient data collection. We also assessed acceptability to patients, registration staff and clinicians through structured interviews of patients systematically sampled, focus group and surveys of registration staff and survey of clinicians. **Results:** Over the course of the study, equity data was collected on 2017 patients. Capture rate peaked in week 7 with 51% of eligible patients offered the equity questions and 30% answering. Average patient registration time increased from 215 seconds to 345 seconds (60%). Data collection with ambulance patients did not appear feasible. Patients (n = 30) reported being comfortable with most questions except income (47% comfortable). 93% believed it could improve health services. However, a small number of patients voiced concern that the data could result in discrimination. Registration staff required sustained support and engagement, but some continued to feel uncomfortable with offering the questionnaire to some patients.
Conclusion: Large scale collection of equity data is feasible but requires additional resources and sustained staff and patient support. Patient participation rate is likely to remain relatively low and is likely to underestimate disadvantaged groups. Data collection at multiple points within an institution may improve capture rate.
Keywords: administration, equity, health policy

P122

Emergency department length of stay for alcohol intoxicated patients presenting with head injury

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Introduction: Excessive consumption of alcohol is associated with harm and responsible for up to 30% of emergency department (ED) visits. ED visits and length of stay (LOS) related to alcohol intoxication have increased over the last decade. The objective of this study was to compare the ED LOS of alcohol intoxicated and non-alcohol intoxicated patients presenting to the ED with acute head injury. **Methods:** This was a nested cohort analysis of patients screened for enrollment in a randomized controlled trial assessing minor traumatic brain injury (MTBI) discharge instructions in the ED of an academic tertiary care hospital (annual census 65,000). Patients aged 18 to 64 years presenting to the ED with a Canadian Emergency Department Information System (CEDIS) chief complaint of a head injury or suspected concussion occurring within 24 hours were eligible for study inclusion. Patients were identified as acutely intoxicated by their treating clinical providers. ED LOS for patients acutely intoxicated and those not intoxicated was compared using a Mann-Whitney U test using the Hodges-Lehmann method. Proportional differences were assessed using chi-square statistics. **Results:** A total of 164 patients were included in the analysis, 46 (28.0%) intoxicated and 118 (72.0%) not intoxicated. Median (IQR) ED LOS was 2.9 (1.5, 6.6) hours for intoxicated and 1.8 (1.3, 2.9) hours for non-intoxicated patients (Δ1.1 hours; 95% CI: 0.4, 1.8). Arrival by ambulance was higher in the intoxicated (73.9%) compared to the non-intoxicated (29.7%) group (Δ44.3%; 95% CI: 27.6, 57.1). Patients were more likely to have experienced assault in the intoxicated (34.8%) compared to the non-intoxicated (6.8%) group (Δ28.0%; 95% CI: 14.5, 42.8). There no difference in the proportion of patients who arrived after daytime hours, had a brain computed tomography, received analgesia in the ED, had another traumatic injury or had a history of psychiatric illness. **Conclusion:** One third of patients screened for a randomized controlled trial for MTBI were deemed ineligible for study inclusion due to acute alcohol intoxication. Alcohol intoxication was associated with prolonged ED LOS. Future studies specifically aimed at identifying factors that impact care on this frequent ED patient population are needed.
Keywords: length of stay, alcohol intoxication, head injury

P123

Measuring health-related outcomes: is social desirability bias an issue we should be exploring while conducting emergency department research?

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Introduction: Social desirability bias is a systematic error in self-report measures resulting from the desire of respondents to avoid embarrassment and project a favourable image of themselves to others. This bias may decrease the accuracy of self-reported health outcomes collected in health research compromise the validity of research findings. This study compared outcomes obtained by patient self-report vs. the same outcomes after undergoing verification and external adjudication, in trial involving patients with acute asthma. **Methods:** Cross-sectional analysis of outcome data obtained in a randomized controlled trial conducted in 6 Canadian emergency departments (ED). Adult patients were allocated to receive usual care (UC), opinion leader [OL] guidance to their primary care provider (PCP), or OL guidance + nurse case-management [OL + CM] for patients (NCT01079000). Asthma relapses and PCP follow-up visits were blindly assessed through patient self-report 30 and 90 days after their ED presentation for acute asthma. Each reported event was verified **through the provincial electronic medical record, the ED Information Systems, and by calling the PCPs' offices**. Two study investigators, blinded to the study interventions, independently reviewed and adjudicated the verified outcomes. Disagreements were resolved by consensus prior to un-blinding. **Results:** Overall, 367 patients were enrolled; more were female (64%) and the median age was 28 years. Overall, patient follow-up was obtained in 85% of cases. The proportion of asthma relapses occurring within the first 90 days were lower when considering patient self-report than when considering the adjudicated outcomes (17%[39/227] vs. 19%[70/367]). The proportion of PCP follow-up visits occurring within the first 30 days were higher when considering patient self-report than when considering the adjudicated outcomes (47%[139/290] vs. 40%[146/367]). The pattern was similar, regardless of the arm of the study (UC vs. OL vs. OL + CM arms); outcome disagreement did not influence the direction of magnitude of the treatment effect. **Conclusion:** Social desirability bias could have influenced the outcomes obtained by patient self-report in this

ED-based study. The direction of the bias was the same for both outcomes; however, the variation did not change the study results. This bias may play a role in studies with smaller sample sizes.
Keywords: asthma

P124

Determining ED staff awareness and knowledge of intimate partner violence and available tools

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Introduction: Domestic violence (DV) rates in smaller cities have been reported to be some of the highest in Canada. It is highly likely that emergency department staff will come across victims of intimate partner violence (IPV) in their daily practice. Elsewhere we have found low rates of IPV documentation as well as underutilization of current tools in the ED. The purpose of this study is to describe ED staff awareness and knowledge surrounding IPV, currently accepted screening questions, and available screening tools. **Methods:** To assess awareness and knowledge, a cross-sectional online survey was distributed to ED staff (LPNs, NPs, Physicians, Residents, RNs) via staff email lists three times between July and October 2016, with a response rate of 45.9% (n = 55). The primary outcomes were correct identification of appropriate IPV questions. Secondary outcomes included awareness of screening tools (HITS, WAST, PVS, AAS), whose role it is to question patients, and whether or not formal training has been received. **Results:** When asked to identify recommended questions for asking about IPV, staff were more likely to choose screening questions (75.3%; 95% CI 69.3% to 80.6%) compared to questions that are not recommended (23.8%; 95% CI 19.4% to 30.7%). However, 87.3% of respondents were not aware of current screening tools. 49.1% believed that all patients with typical injuries (ex. facial injury), should have further questioning about IPV, 20% believed that all patients with any injury, and 16.4% believed that all patients should be questioned about IPV. 89.1% also felt that it is both the physician and nurse's role to question patients about IPV. Finally, 81.8% of ED staff did not receive any formal training on domestic or intimate partner violence. **Conclusion:** The present study indicates that there may be a gap in education surrounding this high risk condition as seen by the lack of knowledge surrounding current tools, lack of consensus on who should be questioned, and lack of training. Therefore, introduction of a knowledge translation piece may be beneficial to both ED physicians and nurses.
Keywords: intimate partner violence, case finding, emergency department

P125

Willingness of ED staff to implement a brief intimate partner violence case-finding tool

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Introduction: Domestic violence (DV) rates in smaller cities have been reported to be some of the highest in Canada. It is highly likely that emergency department staff will come across victims of intimate partner violence (IPV) in their daily practice. However, elsewhere we have found a lack of knowledge of current tools as well as lack of training in ED staff. Furthermore, these findings may also be reflected by low rates of IPV documentation, especially in high-risk cases. The purpose of the current study is to determine if ED staff would be willing to implement a brief IPV screening tool, the Partner Violence Screen (PVS) in their daily practice. It consists of the 3 questions: Have you ever been hit, kicked, punched or otherwise hurt by someone within the past year, and if so, by whom? Do you feel safe in your current relationship? Is there a partner from a previous relationship that is making you feel unsafe now? **Methods:** A cross-sectional online survey was distributed to ED staff (LPNs, NPs, Physicians, Residents, RNs) via staff email lists three times between July and October 2016, with a response rate of 45.9% (n = 55). The survey included a 5-question Likert scale. The primary outcome was whether ED staff are willing to implement a new case-finding tool in their daily practice. The secondary outcome was to assess whether staff would find this tool beneficial in case-finding for IPV. **Results:** 43.6% of staff responded that they are likely to use the tool routinely, 29.1% were unsure, and 2.7% very likely. 7.27% and 3.64% stated their predicted use as unlikely and very unlikely, respectively. In addition, 43.6% of staff thought that the PVS would be beneficial in case finding for IPV, 40% were unsure, 12.7% thought very likely, 1.82% unlikely, and 1.82% very unlikely. **Conclusion:** These findings suggest that emergency department staff may be receptive to and find the introduction of the PVS beneficial in identifying cases of IPV. Future directions will include the introduction of this tool through a knowledge translation education piece in order improve the identification process for and awareness of a high-risk condition in a vulnerable population group.
Keywords: intimate partner violence, case finding, emergency department

P126

Are we transfusing wisely? An analysis of transfusion practices among hemodynamically stable patients with anemia in four hospitals

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Introduction: To help mitigated risks associated with red blood cell transfusions, CWC guidelines recommend practicing restrictively. Transfusion Medicine recommends using a Hgb threshold of 70 g/L, and ordering a single unit at a time (with reassessment after). The purpose of this study is to investigate Emergency Department (ED) compliance with these more restrictive thresholds among hemodynamically stable patients. **Methods:** A retrospective analysis was performed on data from all emergency visits to 4 adult urban ED sites from July 1 2014 to July 1 2016. We excluded unstable patients (CTAS1, temperature >38°C, HR >100 bpm, RR >20 rpm, systolic BP <90 mmHg, and O2 sat <85%) and certain others (patients without a Hgb level, patients who left without being seen, and orders cancelled via patient discharge). After applying exclusion factors, we examined transfusions ordered. Appropriateness was assessed using the stratified Choosing Wisely Canada Guidelines for Transfusion. As an adjunct, IV iron therapy data was also analyzed for the same period between July 1 2014 and July 1 2016, excluding patients who did not have a Hgb level. **Results:** We identified 1329 eligible patients (54% female), with a mean age of 68 and average first hemoglobin of 72 g/L. Across all groups, 16% of patients received only 1 unit of blood. 19% of transfused patients had a hemoglobin less than 60 g/L, 45% had a Hgb <70 g/L, 32% had a Hgb 70-80 g/L, 14% had a Hgb 81-90 g/L, and 8% had a Hgb >90 g/L. Over the same two-year period, 178 patients received IV iron. The average Hgb for those patients was 82 g/L. **Conclusion:** A retrospective analysis documents a significant likelihood of pRBC over-transfusion among Emergency Department physicians and an underutilization of IV iron therapy for certain hemodynamically stable and anemic patients. The development of audit and feedback

methods, and creation of a clinical pathway may help address the rate of over-transfusion.
Keywords: blood transfusion, Choosing Wisely, audit

P127

Paramedics perception of working in Nova Scotia's collaborative emergency centres

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Introduction: The Collaborative Emergency Centre (CEC) model of health care delivery was implemented in rural Nova Scotia in July 2011 without an identifiable, directly comparable precedent. It features interprofessional teams working under one roof with the goal of providing improved access to timely primary health care, and appropriate access to 24/7 emergency care. One important component of the CEC model is overnight staffing by a paramedic/registered nurse team consulting with an offsite physician via telephone. Our objective was to ascertain the attitudes, feelings and experiences of paramedics working within the CEC construct. **Methods:** We conducted a qualitative study, guided by the principles of grounded theory. Semi-structured telephone interviews were carried out by the principal investigator with paramedics with experience working in a CEC in the province of Nova Scotia. Interviews were recorded, transcribed and analyzed. Analysis involved an inductive and deductive grounded approach using constant comparative analysis. Data collection and analysis continued until thematic saturation was reached. **Results:** Fourteen paramedics participated in the study. The majority were male (n = 10, 71%), with a mean age of 44 years (STD = 8.8) and mean experience as a paramedic of 14 years (STD = 9.7). Four major themes were identified from the data: 1) leadership support, encompassing support from Emergency Health Services and Government prior to and after implementation of the model, 2) team work and collaboration, including interprofessional relationships among members of the healthcare team, 3) value to patients and the communities, and 4) professional and personal benefits of working in CECs. **Conclusion:** Paramedics have found working in CECs to be both professionally and personally rewarding. They perceive the CEC model to be of great value to the patients and communities it serves. Key lessons that might help future expansion of the model in Nova Scotia and other jurisdictions across the country include the importance of building and strengthening relationships between paramedics and nurses, and the need for greater feedback and support from leadership.
Keywords: collaborative emergency centres, qualitative, paramedics

P128

The novel application of eye-tracking for the cognitive task analysis of expert physician decision-making while leading real-world traumatic resuscitations

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Introduction: Resuscitation is a dynamic, complex and time-sensitive field which encompasses management of both critically-ill patients as well as large multidisciplinary teams. Expertise in this area has not been adequately defined, and to date, no research has directly examined the decision-making and cognitive processes involved. The evolving paradigm of competency-based medical education (CBME) makes better defining expertise in this field of critical importance to aid in the development of both educational and assessment methods. The technique of cognitive task analysis (CTA) has been used in a variety of fields to explicate the cognitive underpinnings of experts. Experts, however, often have limited insight and incomplete recall of their decision-making processes. We hypothesized that the use of eye-tracking, which provides the combination of first-person video as well as an overlying gaze indicator, could be used to enhance CTA to better understand the defining characteristics of experts in resuscitation. **Methods:** Over an 18-month period a sample of 11 traumatic resuscitations were obtained, each led by one of four pre-selected expert physicians outfitted with the Tobii Pro Eye-Tracking Glasses. After each resuscitation, the participant was debriefed using a cued-recall, think-aloud protocol while watching his or her corresponding eye-tracking video. A subsequent qualitative analysis of the resulting video and debrief transcript was performed using an ethnographic approach to establish emerging themes and behaviours of the expert physicians. **Results:** The expert participants demonstrated specific, common patterns in their cognitive processes. In particular, participants exhibited similar anticipatory and visual behaviours, dynamic communication strategies and the ability to distinguish between task-relevant and task-redundant information. All participants reported that this technique uncovered otherwise subconscious aspects of their cognition.
Conclusion: The novel combination of eye-tracking technology to supplement the CTA of expert resuscitationists enriched our understanding of expertise in this field and yielded specific findings that can be applied to better develop and assess resuscitation skills.
Keywords: eye-tracking, cognitive task analysis, expertise

P129

The Calgary Stampede: effects on emergency and urgent care department utilization during a Canadian mass gathering

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Introduction: The Calgary Stampede is a two-week mass gathering occurring annually in July. Clinicians have anecdotally noted increases in emergency department (ED) and urgent care (UC) visits, especially for complaints related to substance misuse and violence. Our objectives were: 1) to determine if there is an increase in overall visits to EDs and UCs during the Stampede, and 2) to determine if there are increases in presentations related to trauma, violence, or intoxication. **Methods:** This observational study used prospectively collected administrative data from five EDs and two UCs in Calgary. For the years 2013 to 2016, daily average data during Stampede dates were compared to the data from the 21 days immediately preceding and following the event. Dates were selected to incorporate a similar proportion of weekends and weekdays in the Stampede and non-Stampede periods. The primary outcome was daily average ED and UC utilization. Secondary outcomes included time of arrival, utilization by demographic groups, complaint category at triage, or International Statistical Classification of Diseases, 10th revision (ICD-10) diagnosis. **Results:** The study period included 263 380 individual ED and UC visits (34 492 Stampede and 228 888 non-Stampede visits). Daily average ED and UC visits increased by 2.1% ($p < 0.0001$) during the Stampede period. Increases in utilization were identified in specific subgroups: male, ambulance arrival, and nighttime arrival between 2000 and 0400 (all $p < 0.05$). The Stampede period saw a marked increase in CTAS 1 visits (16.2%, $p < 0.01$), triage complaints of lacerations (12.4%, $p < 0.0001$) and blunt trauma (19.4%, $p < 0.0001$), and the ICD-10 diagnosis of substance misuse (23.9%, $p = 0.01$). Visits triaged to the minor treatment areas increased by 9.5% ($p < 0.0001$), again most markedly at night (15.3%, $p < 0.0001$).

No differences were detected for triage complaints of altered level of consciousness, sexual assault, head or neck injury, limb injury, or social problems. **Conclusion:** The Calgary Stampede provokes appreciable changes in overall ED and UC utilization, with marked increases in nighttime visits, visits by men, trauma or substance abuse-related complaints, and minor treatment visits. This data may be useful in manpower planning to ensure optimal patient flow and service delivery during mass gatherings.
Keywords: mass gathering, utilization, stampede

P130

Learning through simulation-a debriefing faculty development course

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Introduction / Innovation Concept: Introduction of a new simulation program including structured debriefing represents a substantial challenge. Debriefing performance is critical for facilitating learning in simulation. However, many faculty members are unfamiliar with the debriefing process. Faculty receives no training for conducting impactful and safe debriefs. Consequently, they are uncomfortable and often disengaged. We designed, implemented, and evaluated an innovative faculty-debriefing curriculum. Do professional development efforts in simulation debriefing teaching result in improved engagement in simulation teaching by faculty, increased comfort with simulation teaching, and an acceptance of a critical thinking framework for simulation teaching? **Methods:** We designed the curriculum to include the flipped classroom and deliberate practice models. Participants (n = 26; 42% of Emergency Medicine Faculty) were pre-circulated course materials, and then attended a full day course to introduce the simulation setting, the equipment, and two practice scenarios. Each scenario was followed by a group debrief. Twenty-one participants (80.7% response rate) completed pre and post course surveys; we analyzed the data using descriptive statistics. **Curriculum, Tool, or Material:** Results: Descriptive findings from a pre-course and post-course survey were conducted. Prior to participating in the innovation, 75% had participated in simulation teaching at Western, but only 30% of this faculty being comfortable with this teaching format. 65% of participants had no formal simulation training and 95% had no training in debriefing. Results of the post-course survey revealed 100% satisfaction with the flipped classroom model; and 48% and 52% were extremely likely and very likely to attend future faculty development courses respectively. 100% of participants felt comfortable in participating in debriefing post simulation teaching with 50% feeling comfortable to do this independently without a co-debriefer. 100% of participants felt that the critical thinking framework that was presented in the course for a debriefing model would translate into their clinical teaching in the future. **Conclusion:** Faculty development has a critical role to play in promoting academic excellence and innovation. Faculty development programs must respond to the changes in medical education. This education project integrated a unique model of learning for faculty, engaged faculty, and increased their comfort level for teaching in simulated setting and utilizing structured debriefing.
Keywords: innovations in emergency medicine education, simulation, faculty development

P131

Risk factors for recurrent emergency department visits for hyperglycemia in patients with diabetes mellitus

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Introduction: Patients with poorly controlled diabetes mellitus may present repeatedly to the emergency department (ED) for management and treatment of hyperglycemic episodes, including diabetic ketoacidosis and hyperosmolar hyperglycemic state. The objective of this study was to identify risk factors that predict unplanned recurrent ED visits for hyperglycemia in patients with diabetes within 30 days of initial presentation. **Methods:** We conducted a one-year health records review of patients ≥18 years presenting to one of four tertiary care EDs with a discharge diagnosis of hyperglycemia, diabetic ketoacidosis or hyperosmolar hyperglycemic state. Trained research personnel collected data on patient characteristics and determined if patients had an unplanned recurrent ED visit for hyperglycemia within 30 days of their initial presentation. Multivariate logistic regression models using generalized estimating equations to account for patients with multiple visits determined predictor variables independently associated with recurrent ED visits for hyperglycemia within 30 days. **Results:** There were 833 ED visits for hyperglycemia in the one-year period. 54.6% were male and mean (SD) age was 48.8 (19.5). Of all visitors, 156 (18.7%) had a recurrent ED visit for hyperglycemia within 30 days. Factors independently associated with recurrent hyperglycemia visits included a previous hyperglycemia visit in the past month (odds ratio [OR] 3.5, 95% confidence interval [CI] 2.1-5.8), age <25 years (OR 2.6, 95% CI 1.5-4.7), glucose >20 mmol/L (OR 2.2, 95% CI 1.3-3.7), having a family physician (OR 2.2, 95% CI 1.0-4.6), and being on insulin (OR 1.9, 95% CI 1.1-3.1). Having a systolic blood pressure between 90-150 mmHg (OR 0.53, 95% CI 0.30-0.93) and heart rate >110 bpm (OR 0.41, 95% CI 0.23-0.72) were protective factors independently associated with not having a recurrent hyperglycemia visit. **Conclusion:** This unique ED-based study reports five risk factors and two protective factors associated with recurrent ED visits for hyperglycemia within 30 days in patients with diabetes. These risk factors should be considered by clinicians when making management, prognostic, and disposition decisions for diabetic patients who present with hyperglycemia.
Keywords: diabetes mellitus, risk factors, recurrent visits

P132

Development and implementation of an intubation registry within a Canadian tertiary-care hospital

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Introduction: Intubation is a high-risk procedure that is frequently performed within the ED. Few Canadian centres have a system in place to monitor intubation frequency, indications, methods used, operator characteristics, first-pass success, and adverse event rates. There are no published data on the frequency of success or complications of emergency airway management in Canada. An airway registry would be a valuable quality improvement (QI) tool for assessing the impact of practice changes such as pre-intubation checklists and for identifying patients with "difficult airways." We describe the development and implementation of an airway registry in a Canadian tertiary-care centre. **Methods:** We created a collaborative working group with staff from EM, ICU, Respiratory Therapy (RT), and Privacy. An airway data form was created. Over a 3 month trial period, the form was completed by RTs following each non-OR intubation. At our centre, RTs are present at every intubation outside of the OR. If a patient was intubated outside of the hospital, forms were completed using verbal handover. RTs also provided constructive feedback and after 3 months the form was revised and finalized. Medical student volunteers entered data from the

forms and from chart reviews into a secure online database created for this purpose. **Results:** We have enrolled 373 patients over the first 5 months with ongoing enrolment at the time of abstract submission. The airway form captures the seniority and discipline of the intubator, preparation, technique, and any airway manoeuvres that were used. The form also captures Cormack-Lehane airway grading, confirmation techniques, complications, and the option to identify the patient as a "Difficult Airway." Privacy permission was granted to include patient identifiers in the airway registry so that additional information from chart reviews could be obtained at a later date. Preliminary results will be presented at the conference. **Conclusion:** Our airway registry tracks intubation performance and may identify factors associated with adverse patient outcomes, which could prompt system-wide changes. Comparison of intubation performance to other Canadian institutions may be possible if similar airway registries are implemented. The development and implementation of an airway registry requires multi-disciplinary collaboration, engagement, and user feedback.

Keywords: intubation, airway, registry

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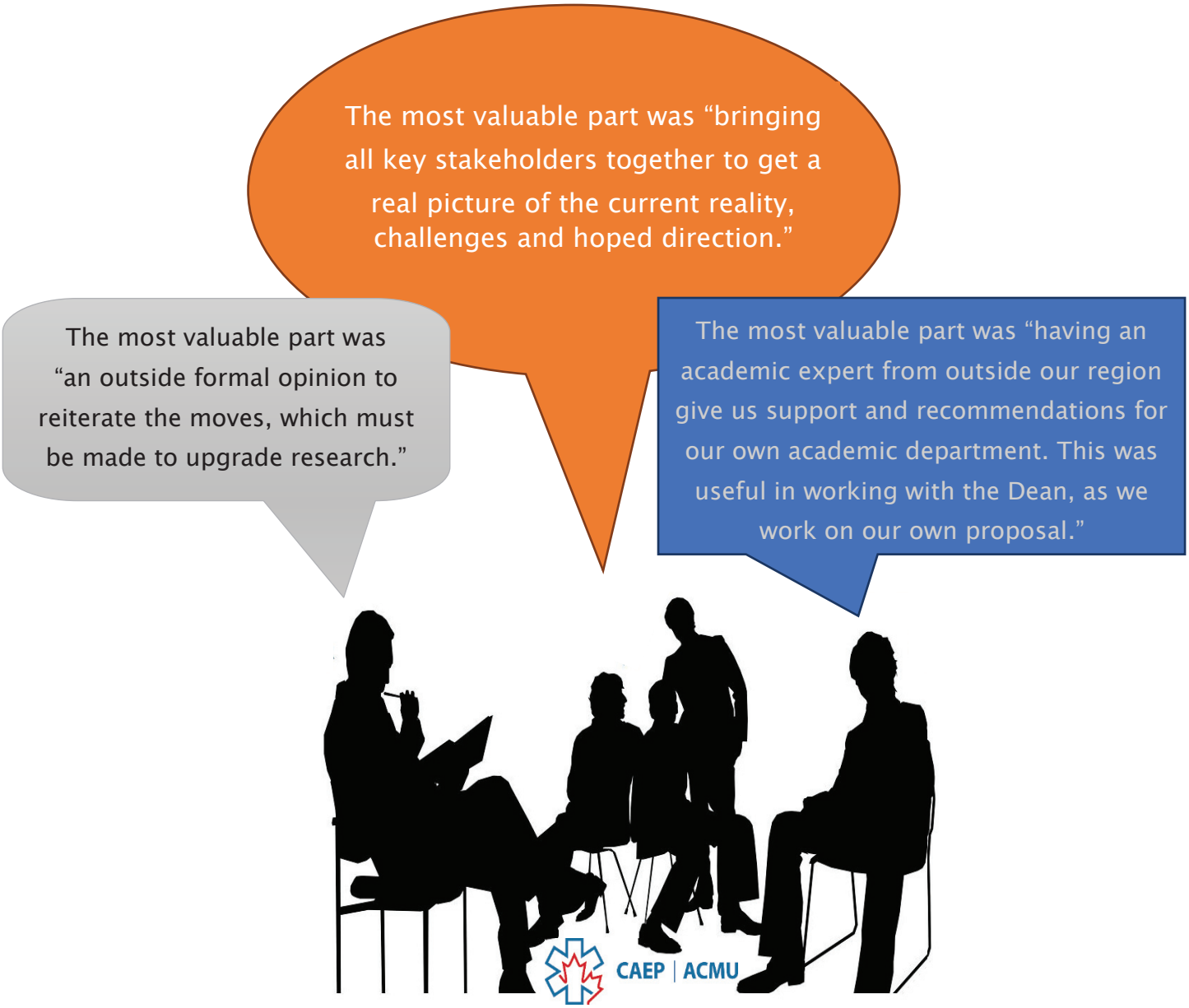

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