

direct observation, coupled with the social expectation that residents should be responsible for ensuring observations occur, was identified as a key barrier. Additionally, competing demands identified across multiple TDF domains emerged as an important and pervasive theme. **Conclusion:** This study identified key barriers and enablers to direct observation. The influencing factors identified in this study provide a basis for the development of potential strategies aimed at embedding direct observation as a routine pedagogical practice in residency training.

Keywords: direct observation, residency education, assessment

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Does spaced instructional design result in improved retention of pediatric resuscitation skills? A randomized education study

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Introduction: Survival from cardiac arrest has been linked to the quality of resuscitation care. Unfortunately, healthcare providers frequently underperform in these critical scenarios, with a well-documented deterioration in skills weeks to months following advanced life support courses. Improving initial training and preventing decay in knowledge and skills are a priority in resuscitation education. The spacing effect has repeatedly been shown to have an impact on learning and retention. Despite its potential advantages, the spacing effect has seldom been applied to organized education training or complex motor skill learning where it has the potential to make a significant impact. The purpose of this study was to determine if a resuscitation course taught in a spaced format compared to the usual massed instruction results in improved retention of procedural skills. **Methods:** EMS providers (Paramedics and Emergency Medical Technicians (EMT)) were block randomized to receive a Pediatric Advanced Life Support (PALS) course in either a spaced format (four 210-minute weekly sessions) or a massed format (two sequential 7-hour days). Blinded observers used expert-developed 4-point global rating scales to assess video recordings of each learner performing various resuscitation skills before, after and 3-months following course completion. Primary outcomes were performance on infant bag-valve-mask ventilation (BVMV), intraosseous (IO) insertion, infant intubation, infant and adult chest compressions. **Results:** Forty-eight of 50 participants completed the study protocol (26 spaced and 22 massed). There was no significant difference between the two groups on testing before and immediately after the course. 3-months following course completion participants in the spaced cohort scored higher overall for BVMV (2.2 ± 0.13 versus 1.8 ± 0.14 , $p = 0.012$) without statistically significant difference in scores for IO insertion (3.0 ± 0.13 versus 2.7 ± 0.13 , $p = 0.052$), intubation (2.7 ± 0.13 versus 2.5 ± 0.14 , $p = 0.249$), infant compressions (2.5 ± 0.28 versus 2.5 ± 0.31 , $p = 0.831$) and adult compressions (2.3 ± 0.24 versus 2.2 ± 0.26 , $p = 0.728$). **Conclusion:** Procedural skills taught in a spaced format result in at least as good learning as the traditional massed format; more complex skills taught in a spaced format may result in better long term retention when compared to traditional massed training as there was a clear difference in BVMV and trend toward a difference in IO insertion.

Keywords: education, resuscitation

LO39

Stress inoculation training: a critical review for emergency medicine

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Introduction: In high stakes, performance-oriented professions, the ability to execute in stressful situations is both a prerequisite and an intense focus of training. Stress Inoculation Training (SIT) is a three-step cognitive-behavioural intervention aimed at reducing stress that may play a role in helping EM teams prepare for high acuity events. We conducted a systematic review of literature in medicine and performance-oriented professions to inform the development of an EM-focused SIT curriculum. **Methods:** An electronic search of Ovid MEDLINE, Web of Science Core Collection, PsychINFO, ProQuest and Scopus was conducted. Inclusion criteria were studies investigating the impact of stress inoculation training on performance and anxiety reduction. Data extraction included recording of performance and anxiety domains measured in each study and the details of how the stress inoculation training was delivered. Screening of articles, data extraction, and summarization were conducted by two independent reviewers using a standardized data extraction tool. **Results:** Our search yielded 431 studies; 40 were screened for full-text review and 10 met inclusion criteria. A total of 930 trainees throughout the 10 studies were enrolled. Four studies consisted of students in varying disciplines, including law, technology, education, and general undergraduate students, and 4 studies were composed of military personnel. No papers directly examined the effect of stress inoculation training on performance in healthcare. A change in performance and a reduction in anxiety and/or stress was noted in 90% of studies. Training length, experience of trainer, or group size did not appear to impact outcomes. Notably, heart rate variability (HRV) did not appear to be affected throughout the studies included, while cortisol and subjective stress were consistently reduced. **Conclusion:** SIT is an effective tool for enhancing performance and reducing stress and anxiety in high intensity environments. Studies examining the effect of EM-focused SIT on individual, team and patient-orient outcomes are needed.

Keywords: human factors, patient safety, stress

LO40

Describing CCFP(EM) programs in Canada: a national survey of program directors

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Introduction: Enhanced skills training in emergency medicine (EM) for family physicians (CCFP(EM)) has existed since the 1970s. Accreditation standards define what every program must and should have, yet little is known on what is currently done across Canada. Our objectives were to: 1) describe major components of CCFP(EM) programs; and 2) determine how programs incorporate these components into their curriculum. **Methods:** A rigorous development process included expert content development and in-person pilot testing using Royal College Emergency Medicine Program Directors. An electronic survey questionnaire comprised of 63 questions was administered to all 17 CCFP(EM) program directors using a modified Dillman technique. Non-responders were sent a reminder email every 2 weeks over a 6-week period and an in-person reminder was given to non-responders at a face to face meeting 4 weeks after the initial survey was sent in June 2016. **Results:** All 17/17 (100%) program directors responded. There was considerable variation in administrative structure and financial support for each program. All programs provided ultrasound courses for basic skills (trauma, abdominal aortic aneurysm, intrauterine pregnancy). Variation exists for offering independent ultrasound certification (77%), advanced scanning (18%) and protected academic time for scanning (53%). All programs utilize high fidelity simulation. Some programs

use in situ simulation (18%) and hold a simulation boot camp (41%). Most centres required an academic project, most commonly a quality assurance project (53%) and/or a critical appraisal of the literature (59%). Publication or national conference presentations were required by 12% of programs. Competency based assessments use simulation (88%) and direct observations (53%). Only 24% of programs have a transition to practice curriculum. All programs maintain strong connections to family medicine. **Conclusion:** This study demonstrates diverse structures of CCFP(EM) programs across Canada. Programs are similar regarding the provision of ultrasound, simulation and protected teaching time. Variation exists in administrative structure and financial resources of each program, academic project requirements, and how programs perform competency based assessments.

Keywords: emergency medicine program, certification in the College of Family Physicians – emergency medicine, survey

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Competency-based learning of pediatric musculoskeletal radiographs
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Introduction: Pediatric musculoskeletal (MSK) image interpretation has been identified as a knowledge gap among emergency medicine trainees. The main objective of this study was to implement a validated on-line pediatric MSK radiograph interpretation system with a performance-based competency endpoint into pediatric emergency fellowship programs and examine the number of cases needed to achieve a competency threshold of 80% accuracy, sensitivity and specificity. We further determined proportion who successfully achieved competency in a given module and the change in accuracy from baseline to competency. **Methods:** This was a prospective cohort multi-centre study. There were seven MSK radiograph modules, each containing 200-400 cases (demo-<https://imagesim.com/course-information/demo/>). Thirty-seven pediatric emergency medicine fellows participated for 12 months. Participants did cases until they reached competency, defined as at least 80% accuracy, sensitivity and specificity. We calculated the overall and per module median number of cases required to achieve competency, proportion of participants who achieved competency, median time on case, and the mean change in accuracy from baseline to competency. **Results:** Overall, the median number of cases required to achieve competency was 76 (min 54, max 756). Between different body parts, there was a significant difference in the median number of cases needed to achieve competency, $p < 0.0001$, with ankle and knee being among the most challenging modules. Proportions of those who started a module and completed it to competency varied significantly, and ranged from 32.4% in the ankle module to 97.1% in the forearm/hand, $p < 0.0001$. The overall median time on each case was 34.1 (min 7.6, max 89.5) seconds. The overall change in accuracy from baseline to 80% competency was 13.5% (95% CI 12.1, 14.8), with the respective Cohens effect size of 1.98. The change in accuracy was different between modules, $p = 0.001$, with post-hoc analyses demonstrating that the ankle/foot radiograph module had a greater increase in accuracy relative to elbow ($p = 0.009$) and pelvis/femur ($p = 0.006$). **Conclusion:** It was feasible for pediatric emergency medicine fellows to complete each learning pediatric MSK learning module to competency within approximately one hour, with the exception of the ankle module. Learners who completed the modules to competency demonstrated very significant increases in interpretation skill.

Keywords: pediatrics, competency, education

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How I stay healthy in emergency medicine: a qualitative analysis of a blog-based survey of expert emergency physicians and their methods to maintain and improve their wellness

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Introduction: Emergency medicine (EM) is a demanding specialty with high rates of physician burnout. As emergency physicians, we must stay healthy to promote healthy living, optimize our ability to care for our patients, extend our careers, and be there for our families. While we all desire a healthy lifestyle, maintaining one in practice can be difficult. We sought to investigate the strategies emergency physician employ to maintain and improve health and wellness while mitigating the professions stressors. **Methods:** From April 2015 to July 2017, forty-three wellness champions from Canada, the USA, and Australia were identified using a snowball sampling technique. Each participant answered 5 introductory questions and 8 productivity questions pertaining to health and wellness. These were transcribed and loaded to a publicly accessible blog, ALiEM.com, as part of the Healthy in EM series. Two investigators reviewed the transcripts using inductive methods and a grounded theory approach to generate themes and subthemes using coding software, NVivo (Burlington, Massachusetts), until saturation was achieved. Consensus between investigators (JC, ZP) established the master code and audit trail. An external audit by investigators (TC, BT) not involved with the initial analysis was performed to ensure reliability.

Results: Major themes including diet, sleep, exercise and social activities were coded and further subcategorized along with perspectives, habits, personal philosophies, and career diversity. These themes translated across both professional and personal aspects of participants lives. For example, the pre-shift and post-shift strategies often included some form of regimented activities-of-daily-living that required discipline to adhere to at work and home. **Conclusion:** Our findings show the importance of homeostasis in the professional and personal realm among expert emergency medicine physicians. Among healthy emergency physicians, diet, sleep, and exercise patterns intertwined with perspectives, habits, personal philosophies, and social activities contributed to maintenance of wellness.

Keywords: wellness, burnout, job satisfaction

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Perceptions of airway checklists and the utility of simulation in their implementation emergency medicine practitioner perspectives

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Introduction: Checklists used during intubation have been associated with improved patient safety. Since simulation provides an effective and safe learning environment, it is an ideal modality for training practitioners to effectively employ an airway checklist. However, physician attitudes surrounding the utility of both checklists and simulation may impede the implementation process of airway checklists into clinical practice. This study sought to characterize attitudinal factors that may impact the implementation of airway checklists, including perceptions of checklist utility and simulation training. **Methods:** Emergency medicine (EM) residents and physicians working more than 20 hours/month in an emergency department from two academic centres were invited to participate in a simulated, randomized controlled trial (RCT) featuring three scenarios performed with or without the use of an airway