

# 2018

## The International Conference on Residency Education

La Conférence  
internationale sur la  
formation des résidents

Conference Research Abstracts  
Résumés de recherche de la conférence

#ICRE2018  #CIFR2018

The Learning Environment and Residency  
Education: The Evolution of Training

Le milieu d'apprentissage et la formation  
des résidents : une ère de changement



**ROYAL COLLEGE**  
OF PHYSICIANS AND SURGEONS OF CANADA  
**COLLÈGE ROYAL**  
DES MÉDECINS ET CHIRURGIENS DU CANADA

*Journal of*  
Graduate Medical Education

Available online / disponible en ligne, [www.jgme.org](http://www.jgme.org)

# **2018 International Conference on Residency Education**

## **La Conférence internationale sur la formation des résidents 2018**

Since 2012, the *Journal of Graduate Medical Education (JGME)* and the Royal College of Physicians and Surgeons of Canada have jointly selected the Top 3 Research in Residency Education papers from abstracts submitted to the annual International Conference on Residency Education (ICRE).

The submitted research paper abstracts provide a forum for those who use systematic scholarly methods to evaluate educational programs, identify new phenomena, define aspects of training, and assess competence.

Each year, more than 100 abstracts are submitted and undergo peer review. Three winning abstracts are announced prior to ICRE, and are presented at a juried session during the conference. A Top Research in Medical Education Award and 2 runner-up certificates are given out. Commencing with ICRE 2014, the selection of the Top 5 Resident Papers was included in the award process.

Winning abstracts are published in the December issue of *JGME*, and are available online to readers via the *Journal's* website ([www.jgme.org](http://www.jgme.org)).



## Table of Contents

<b>001–005</b>	Accreditation in residency education (ARE)
<b>006–013</b>	Admissions: Selecting residents (ASR)
<b>014–028</b>	Assessment: Cutting-edge tools and practical techniques (ACE)
<b>029–056</b>	Competency-based education (CB)
<b>057–065</b>	Faculty development (FD)
<b>066–074</b>	Implementing quality of care, patient safety, and resource stewardship improvement projects (QI)
<b>075–079</b>	Leadership education (LED)
<b>080–082</b>	Learning analytics (LA)
<b>083–090</b>	Learning environments: Exploring new avenues (LE)
<b>091–096</b>	Physician health and wellness (PHW)
<b>097–104</b>	Simulation in residency education (SIM)
<b>105–112</b>	Teaching and learning in residency education (TL)
<b>113–117</b>	The unique educational climate of the operating theatre (OT)
<b>118–125</b>	Using innovative technologies for medical education (TEC)

## Development of a digital platform for Canadian residency accreditation

K. Ho<sup>1</sup>, D. Laliberté<sup>1</sup>, S. Taber<sup>1</sup>, R. Almond<sup>2</sup>, A. MacLellan<sup>3</sup>, B. McGurn<sup>1</sup>, J. R. Frank<sup>1</sup>

<sup>1</sup>Royal College of Physicians and Surgeons of Canada, Ottawa, ON; <sup>2</sup>College of Family Physicians of Canada, Mississauga, ON; <sup>3</sup>Collège des médecins du Québec, Montréal, QC

**Introduction:** The Canadian residency accreditation system had not undergone a comprehensive review in more than 20 years. Focus groups highlighted the need for major transformative change to address challenges such as manual procedures and paper-driven processes. There was a need to modernize the accreditation system and to provide tools that help align the accreditation system to principles of competency-based medical education and continuous improvement.

**Methods:** The 3 Canadian accrediting colleges came together as the Canadian Residency Accreditation Consortium (CanRAC) to develop a new conjoint residency accreditation system. In consultation with expert stakeholders and leaders in residency education and accreditation, business requirements were compiled and used to evaluate and select a software vendor with expertise in accreditation. CanRAC is developing a modified off-the-shelf accreditation management system (CanAMS) to facilitate all aspects of the accreditation process.

**Results:** Following several years of planning, agile software development, consultation, and testing, the first version of the digital platform was successfully launched. CanAMS v1.0 is a unique cloud-based platform that provides tools to promote continuous improvement for institutions and programs, facilitates workflow and process management of accreditation activities, and supports secure data and evidence collection.

**Conclusions:** The CanAMS digital platform is a critical enabler of an accreditation system that drives continuous improvement. Not only does the CanAMS deliver tools to facilitate self-study and outcomes reporting, its workflows also ensure that all stakeholders contribute to a system providing institutions and programs with specific and timely feedback to enhance postgraduate residency accreditation in Canada.

## Rethinking accreditation: New national multi-institutional standards for Canadian residency education in a CBME era

B. McGurn<sup>1</sup>, J. R. Frank<sup>1</sup>, S. Taber<sup>1</sup>, T. Phillips<sup>1</sup>, R. Almond<sup>2</sup>, A. MacLellan<sup>3</sup>

<sup>1</sup>Royal College of Physicians and Surgeons of Canada, Ottawa, ON; <sup>2</sup>College of Family Physicians of Canada, Mississauga, ON; <sup>3</sup>Collège des médecins du Québec, Montréal, QC

**Introduction:** The Canadian residency education accreditation system, though well-regarded nationally and internationally, has evolved to rely on accreditation standards that were felt to be process-heavy, unclear, and not reflective of best practice, along with manual accreditation procedures. The 3 Canadian accrediting colleges came together to form the Canadian Residency Accreditation Consortium (CanRAC) and developed a new conjoint accreditation system aligned with the principles of competency-based medical education (CBME).

**Methods:** CanRAC created a governance structure to develop new accreditation standards, with key stakeholders, by consensus, using a multi-year, iterative development process. Experts and leaders in residency education and accreditation formed 6 standards working groups, aligned with the standards domains defined by the Future of Medical Education Canada-Postgraduate initiative: Institution Governance, Program Organization; Education Program; Learners, Teachers, and Administrative Personnel; Resources; and Continuous Quality Improvement. A Standards Integration Committee leveraged the outputs of these working groups, building a comprehensive set of new standards.

**Results:** Following years of development, consultation, and testing, CanRAC implemented new standards for residency programs and institutions, and a new framework by which these standards are evaluated. The standards are aligned with CBME and place greater emphasis on the learning environment, continuous quality improvement, and program outcomes.

**Conclusions:** The Canadian residency accreditation system had not undergone a comprehensive review in more than 20 years. The CanRAC standards set new expectations and drive ongoing quality improvement of residency education, and ultimately, enhance patient care, providing a foundation for a 21st century Canadian residency accreditation system.

## CanERA: Enhancing rigor in the national residency accreditation system via novel standards and evaluation tools

A. Ronson<sup>1</sup>, S. Taber<sup>1</sup>, B. McGurn<sup>1</sup>, R. Almond<sup>2</sup>, A. MacLellan<sup>3</sup>, J. R. Frank<sup>1</sup>

<sup>1</sup>Royal College of Physicians and Surgeons of Canada, Ottawa, ON; <sup>2</sup>College of Family Physicians of Canada, Mississauga, ON; <sup>3</sup>Collège des médecins du Québec, Montréal, QC

**Introduction:** In 2013, the Canadian accrediting colleges formed CanRAC to develop a new conjoint residency accreditation system comprising 10 components. Stakeholder feedback highlighted several challenges with the rigor of the accreditation system: vague, sometimes implicit standards with unclear expectations; lack of standardized tools to support the evaluation of standards and transmit this evaluation to the accreditation report, as well as challenges with the transparency, validity, and reproducibility of accreditation decision-making.

**Methods:** CanRAC created a new consensus-based governance structure to develop the conjoint residency accreditation system, including standards working groups and an integration committee to develop new accreditation standards. Standards evaluation and report tools, as well as tools to help standardize decision-making, were developed iteratively with ongoing input from the colleges' accreditation committees and the Accreditation Process Advisory Committee, with robust testing during the prototype implementation of the new accreditation system.

**Results:** The new accreditation system introduces several components to enhance rigor. A hierarchical taxonomy of standards was implemented, with four levels (standard, element, requirement and indicator), to ensure expectations are clear and explicitly defined, and to facilitate unambiguous, objective evaluation of the standards. CanERA also includes new accreditation categories, with more detailed definitions, and three tools that integrate thresholds, weightings and expert human judgment, to guide their application.

**Conclusions:** CanERA strengthens rigor through clearer standards, an objective evaluation framework, and the application of decision support tools. Ultimately, these approaches provide insights and examples for other medical education accreditation bodies worldwide seeking to enhance the rigor and objectivity of their accreditation system.

## From episodic quality assurance to continuous quality improvement

T. Phillips<sup>1</sup>, S. Taber<sup>1</sup>, D. Laliberté<sup>1</sup>, R. Almond<sup>2</sup>, A. MacLellan<sup>3</sup>, J. R. Frank<sup>1</sup>

<sup>1</sup>Royal College of Physicians and Surgeons of Canada, Ottawa, ON; <sup>2</sup>College of Family Physicians of Canada, Mississauga, ON; <sup>3</sup>Collège des médecins du Québec, Montréal, QC

**Introduction:** By 2012, the Canadian residency accreditation system had not undergone a comprehensive review in more than 20 years. Interviews with Canadian postgraduate deans highlighted the need for transformative change to address concerns about the episodic, high-stakes nature of the process, characterized by workload peaks and valleys; to align with the principles and design of competency-based medical education; and to increase emphasis on quality improvement.

**Methods:** The Canadian accrediting colleges came together as the Canadian Residency Accreditation Consortium (CanRAC), creating a new consensus-based governance structure to develop the new accreditation system. New features were developed iteratively and collaboratively through annual summits of experts and leaders in residency education and accreditation with ongoing input from the colleges' accreditation committees.

**Results:** CanRAC introduced a balanced accreditation cycle with 8 years between regular reviews supplemented by recurring data. The distribution of effort across 8 years will lessen workload peaks and valleys and recognizing institutions' and programs' ability to conduct internal reviews focuses on autonomy rather than "snapshot in time" compliance. The integration of new data sources (eg, annual surveys) will provide a signal of quality that programs and institutions can use to drive quality improvement.

**Conclusions:** The new accreditation system represents a shift from a 6-year review of program and institution performance to a continuous 8-year accreditation cycle that aligns with contemporary ideas about accreditation and continuous improvement. External sources of data in the accreditation process will complement and strengthen the information generated by accredited institutions and programs.

**Prototyping: Rapid PDSA cycles for residency accreditation system reform**

D. Laliberté<sup>1</sup>, S. Taber<sup>1</sup>, T. Phillips<sup>1</sup>, R. Almond<sup>2</sup>, A. MacLellan<sup>3</sup>, J. R. Frank<sup>1</sup>

<sup>1</sup>Royal College of Physicians and Surgeons of Canada, Ottawa, ON; <sup>4</sup>College of Family Physicians of Canada, Mississauga, ON; <sup>5</sup>Collège des médecins du Québec, Montréal, QC

**Introduction:** The Canadian residency accreditation system had not undergone a comprehensive review in more than 20 years. In 2012, interviews with Canadian postgraduate deans highlighted the system needed major, transformative change to address challenges such as manual procedures and process-oriented standards. Given the potential scope and impact, and the inherently high-stakes nature of accreditation, there was impetus to test any new innovations before they were fully deployed.

**Methods:** The 3 Canadian accrediting colleges came together as the Canadian Residency Accreditation Consortium (CanRAC), creating a new consensus-based governance structure, to develop a new conjoint residency accreditation system. Annual summits were held with experts and leaders in residency education and accreditation to consult on the ongoing developments of the proposed accreditation system.

**Results:** Stakeholders identified the need to introduce the changes in a way that would recognize the importance and size of the change, give institutions and programs time to prepare and adjust, and allow for feedback and improvement as the changes were implemented. Recognizing these needs, CanRAC developed a collaborative 3-stage prototype model of implementation with increasing impact and effort required by accreditation stakeholders and the iterative collection and implementation of feedback from previous phases.

**Conclusions:** The CanRAC prototype model of rapid improvement cycles and increasing impact on stakeholders balanced the need to introduce essential transformative change in the system, while respecting the length of time needed to prepare for accreditation and the need to continuously and collaboratively improve the new system prior to its full implementation.

**Identifying narcissistic traits in residency applicants: Go with your gut**

N. Gawad<sup>1</sup>, I. Raiche<sup>1</sup>, A. Ibrahim<sup>2</sup>, M. Duffy<sup>1</sup>, C. Nessim<sup>2</sup>

<sup>1</sup>University of Ottawa, Ottawa, ON; <sup>2</sup>The Ottawa Hospital, Ottawa, ON

**Introduction:** Personal characteristics assessed during interviews have been shown to negatively predict performance in residency. A needs assessment at our institution suggested the importance of identifying traits associated with narcissism (ie, a sense of entitlement, difficulty accepting criticism, arrogance) in residency applicants. The objective of this study was to evaluate an interview station designed to identify narcissistic personality traits among applicants to our general surgery residency program.

**Methods:** An interview station was developed in which applicants were provided negative feedback as a simulated evaluation. Participants (n = 48) were interviewed by 1 interviewers (1 staff surgeon and 1 resident) and completed the Narcissism Personality Index (NPI-40), which assesses adaptive and maladaptive facets of narcissism. NPI-40 scores were compared to the interview station scoresheet, which included numerical rating scales and a subjective "red flag" system used to identify concerns related to professionalism or personality through written comments.

**Results:** Linear regression demonstrated a significant correlation between red flags on the negative feedback station and a high maladaptive narcissism score on the NPI-40 ( $P = .015$ ). There was no significant correlation between the numerical interview score and the maladaptive narcissism score ( $P = .33$ ). There was a high interrater reliability between interviewers' numerical scores ( $r = 0.89$ ) and in determining red flags ( $\sigma = 0.83$ ).

**Conclusions:** We designed an interview station that successfully identified general surgery residency interviewees displaying high maladaptive narcissistic traits. Our findings suggest the subjective intuition of surgeons in interview stations designed to identify applicants with difficulty accepting negative feedback may provide valuable information that is not captured in the numerical scoring process.

**CaRMS portfolio evaluation: Are there any pearls in the oysters?**

K. Dore<sup>1</sup>, D. Fedorkow<sup>2</sup>, J. Lamont<sup>2</sup>, J. Azzam<sup>2</sup>, N. Dzaja<sup>2</sup>

<sup>1</sup>McMaster University, Burlington, ON; <sup>2</sup>McMaster University, Hamilton, ON

**Introduction:** Increasing numbers of residency candidates and complicated candidate dossiers make the portfolio review, which often is completed by the program director, difficult for a single individual. This study assessed candidates more objectively, identifying the utility of various components of the dossier and assessing the interrater reliability within and between faculty and resident evaluators. This project was taken on to determine the feasibility and reliability of a more objective process for evaluation of CaRMS portfolios.

**Methods:** Four raters (2 faculty and 2 residents) independently reviewed all 103 applications received for a single residency program. Raters scored a single portfolio at a time, reflecting the traditional review process. This study evaluated 19-items across a 10-point Likert scale to assess candidates. Pilot surveys predetermined the content to be assessed across all aspects of the CaRMS portfolio. Data were analyzed using SPSS and Generalizability Theory.

**Results:** A total of 103 applications were reviewed. Average review time was high at 30-minutes per applicant per evaluator. The interrater reliability coefficient found for within levels and between levels of training was 0.93 and 0.58, respectively, suggesting discordance in perspectives. Faculty tended to provide high scores ( $x = 7.6/10$ ) compared to residents ( $x = 6.6/10$ ).

**Conclusions:** Including faculty and residents into the residency candidate evaluation process results in a more robust assessment and lessens the burden on a small number of faculty. Some areas, previously deemed important, were determined to add little value. Overall, this process provided a framework to develop a more objective assessment to ensure fairer evaluations of applicants across postgraduate programs.

## **The black box of resident selection: The program director perspective on what matters**

K. Dijkhuizen, J. Bustraan, A. De Beaufort, M. van den Bogaard

Leiden University Medical Center, Leiden, Netherlands

**Introduction:** Selection of residents is a high-stakes process for candidates and selection committees. Many studies investigate predictive validity of selection instruments, yet little is known on the actual selection process. This study aims to fill that gap by exploring: (1) What attributes do program directors (PDs) value in candidates and why? and (2) How do selection committees draw final conclusions on who to hire?

**Methods:** We performed an exploratory qualitative study using semistructured interviews with 11 PDs from different specialties at 1 university teaching hospital. Transcripts were analyzed with a combined approach of generic and in vivo coding.

**Results:** PDs select candidates who distinguish themselves somehow and who add something “extra” to the existing workforce. The decision on who to hire is mainly an intuition-based group process, but selection committees try to find certainty in various ways; by using “proxies” for qualities deemed important or by hiring candidates they observed during clinical work. PDs seem to adhere to high professional, personal, and ethical standards during this process.

**Conclusions:** PDs apply the principle that the best predictor of future performance is past performance. This may result in candidates who have no ties with a PD have no equal chance of admission. Criteria used by selection committees often remain implicit, and mainly focus on whether a candidate “fits in” with the current resident group. This may compromise the diversity of the future workforce.

## The preclerkship residency exploration program increases student interest in nonsurgical residency placement

M. Smyth, T. Dow, S. Haupt

Dalhousie University, Halifax, NS

**Introduction:** Annual data published by the Canadian Resident Matching Service shows that nonsurgical residency spots have not met their quota since 2006. The Medical Exploration and Discovery (MEAD) program is a preclerkship elective offered at Dalhousie University. This 2-week elective provides second-year medical students exposure to medical disciplines through half-day electives, simulations, and career discussions with the goal of enhancing student interest. This study evaluated the effectiveness of the MEAD program in increasing student interest in nonsurgical disciplines.

**Methods:** Surveys were distributed to applicants of the MEAD program. Demographics, prior nonsurgical exposure, and current interest in various nonsurgical specialties were analyzed. The Likert scale was used to measure responses along with checkbox and multiple-choice questions. Pre- and postprogram surveys were designed to assess the impact of the MEAD program on residency decisions and any change in discipline interests. Univariate descriptive statistics will be completed on all variables of the study.

**Results:** A total of 71 of 110 second-year medical students at Dalhousie applied for the MEAD program. Applicants were predominantly female (63%), aged 25–26 (43%), and had obtained a Bachelor's degree (55%). The majority (56%) of applicants had not previously been exposed to nonsurgical disciplines at the time of the application. Student interest varied amongst several nonsurgical disciplines.

**Conclusions:** Preclerkship exposure to specialties has been shown to significantly impact medical student career decisions. The MEAD program offers 1 approach to address the inability to meet residency quota in several nonsurgical disciplines by providing exposure to a variety of medical disciplines.

## Understanding national selection practices

K. Dore<sup>1</sup>, I. Schabert<sup>2</sup>, G. Bandiera<sup>3</sup>, C. Cervin<sup>4</sup>, D. Russell<sup>2</sup>, S. Kreuger<sup>2</sup>

<sup>1</sup>McMaster University, Burlington, ON; <sup>2</sup>McMaster University, Hamilton, ON; <sup>3</sup>University of Toronto, Toronto, ON; <sup>4</sup>Northern Ontario School Of Medicine, Sudbury, ON

**Introduction:** The Future of Medical Education in Canada project and the Thomson Reuters report have drawn increased focus in postgraduate medical education (PGME) regarding the need for increased transparency and rigor in the selection processes of trainees. Selection literature informs both psychometrics and other factors influencing selection decisions. To date, there was no detailed understanding of the decision-making processes for Canadian and international applicants into residency selection.

**Methods:** An online survey was developed through the use of literature and expert review determining key questions to illuminate the PGME selection process. Selection included the first and second iteration, and processes at the time of file review, interview, and ranking for domestic and international applicants. The survey was administered through McMaster University, sent to all PGME deans for distribution to program directors at their sites. Research Ethics Board approval was attained at all sites. If the PDs could not answer the questions they were asked to forward to a designate. Responses were anonymized.

**Results:** A total of 116 surveys were fully (n = 56) or partially (n = 60) completed. Respondents identified key academic and nonacademic factors and processes in file review, key academic and nonacademic factors and processes during interview and ranking, as well as match rates, across domestic and international applications for both the first and second iteration. Both quantitative data and qualitative comments were collected.

**Conclusions:** The results of this survey can provide insights into both the overt and hidden programs of selection used in postgraduate training across Canada.

**Factors and considerations that influence health professionals in choosing the institution to perform their residency**

A. Eymann, F. Reboiras, C. Facioni, M. Sanchez, D. Faingold, M. Figari, G. Perez Raffo

Instituto Universitario del Hospital Italiano de Buenos Aires, Buenos Aires, Argentina

**Introduction:** The new generation of applicants to health residences prefers flexible and unstructured institutions for their professional development. This could influence the decision of the institution to design their residency policies and programs.

**Objective:** We analyzed the conditions influencing applicants' decision about the institution where they will complete their residency.

**Methods:** An anonymous survey was conducted after the applicants completed the multiple-choice admission examination. Demographic variables, specialty, and the 3 main conditions influencing the institution choice in order of importance were analyzed.

**Results:** A total of 1002 surveys were analyzed, 59% of the applicants were women. The applicants came from the University of Buenos Aires, National, Private or Foreign Universities in 46.9%, 26.5%, 16.3%, and 10.2%, respectively. They were registered for surgical, clinical, or other specialties in 44.7%, 49.2%, and 6.1%, respectively. The leading attributes that influence applicants' choice are (1) academic quality (65.4%); (2) institutional prestige (16%); and (3) patient flow and complexity (5.9%). In second place were (1) working environment (21.6%); (2) academic quality (20%); and (3) prestige (18.8%). In third place were (1) working climate (16.1%); (2) working conditions (16.1%); and (3) academic quality (14.5%).

**Conclusions:** Leading institutional attributes valued by applicants include academic quality, institutional prestige, and patient flow and complexity. Applicants also assigned importance to climate and working conditions.

## Improving resident selection practices in radiation oncology using a multiple mini-interview format

D. Bowes<sup>1</sup>, K. Watts<sup>1</sup>, H. Campbell<sup>2</sup>, T. Daigle-Maloney<sup>1</sup>

<sup>1</sup>Dalhousie University, Halifax, NS; <sup>2</sup>Dalhousie University, Saint John, NB

**Introduction:** It is highly important that resident selection procedures provide an accurate assessment and are fair and transparent. We sought to improve the selection procedures in our Radiation Oncology residency training program by applying the published Best Practices in Admission and Selection (BPAS) recommendations.

**Methods:** The BPAS recommendations were reviewed with our existing selection procedures for candidates applying through the Canadian Resident Matching Service (CaRMS). Goals and objectives for resident selection were designed, including a definition of criteria for candidacy and ranking. A novel selection procedure was developed, including the multiple mini-interview (MMI) format to incorporate evaluation of noncognitive skills.

**Results:** The goals of the selection process were to identify candidates likely to succeed in residency training and practice in radiation oncology, prioritizing interpersonal skills, professionalism, ability to work as part of a team, and interest and motivation in radiation oncology. A scoring system was designed to evaluate the candidate's submitted application. The MMI format was designed to take the place of the traditional interview; stations were developed to assess candidates' skills through situational assessments and role-play, evaluating the factors identified in the goals and objectives. This format has been fully implemented and used for 4 cohorts of candidates, and has improved accordance with the BPAS recommendations.

**Conclusions:** We have developed a resident selection procedure, which improves our agreement with the BPAS recommendations, objectively assesses noncognitive skills using the MMI format, and in our opinion, is more equitable and fair to applicants. More detailed information about these procedures will be presented.

## Trends in Canadian ophthalmology residency applications

I. Kherani<sup>1</sup>, B. Hurley<sup>2</sup>

<sup>1</sup>Resident Doctors of Canada, Ottawa, ON; <sup>2</sup>University of Ottawa, Ottawa, ON

**Introduction:** Increased population and decreasing funds have resulted in strain on vision care. Graduates interested in ophthalmology can apply through the Canadian Residency Matching Service (CaRMS). The purpose of this study is to analyze ophthalmology residency match data to inform medical students, ophthalmology programs, and larger human resource planning conversations, a first known assessment of Canadian ophthalmology residency data.

**Methods:** Unidentified ophthalmology applicant and program data were requested from CaRMS for the matches between 2006 and 2017, and summarized per year.

**Results:** A total of 52 (39–63) English and 26 (22–33) French Canadian graduates applied, and 49 (25–68) international graduates applied. The University of Ottawa received the largest number of applicants in 7 of the last 11 cycles. Twenty-six (22–30) English-speaking and 10 (9–10) French-speaking Canadian graduate positions are available; 1.33 (0–2) international are available. Of the Canadian graduates interested, 9 go unmatched and 18 match to alternate disciplines. Of the international graduates interested, 28 go unmatched and 4 match to alternate disciplines. There are 2.00 (1.7–2.4) English and 2.60 (2.2–3.67) French Canadian applicants per position; there are 36 international graduates per position.

**Conclusions:** Fifty English and 25 French Canadian graduates apply each year. The University of Ottawa receives the largest number of applications, likely due to its bilingual environment. Of the Canadians who did not match into ophthalmology, most matched to an alternate discipline. Most of the international candidates who did not match into ophthalmology remained unmatched. The competition for French Canadian positions is higher than the English positions. Future research should evaluate the role of residency training in supply and demand models for vision care.

**Validity, reliability, feasibility, and acceptability of using the consultation letter rating scale to assess written communication competencies among geriatric medicine postgraduate trainees**

V. Xu<sup>1</sup>, J. Hamid<sup>2</sup>, M. von Maltzahn<sup>1</sup>, T. Izukawa<sup>3</sup>, M. Norris<sup>4</sup>, V. Chau<sup>5</sup>, B. Liu<sup>4</sup>, C. Wong<sup>2</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>St. Michael's Hospital, Toronto, ON; <sup>3</sup>Baycrest Hospital, Toronto, ON; <sup>4</sup>Sunnybrook Health Sciences Centre, Toronto, ON; <sup>5</sup>Mount Sinai Hospital, Toronto, ON

**Introduction:** The implementation of Competence by Design (CBD) involves using in-training assessment tools. The modified "Consultation Letter Rating Scale," published by the Royal College of Physicians and Surgeons of Canada, evaluates written communication competencies. This multisite project evaluates the tool's validity, reliability, feasibility, and acceptability for use in postgraduate education in geriatric medicine.

**Methods:** Ten geriatric medicine trainees each provided 5 consultation letters from the 2017–2018 academic year. Letters were deidentified. Six geriatricians reviewed a standardized module, and independently completed the tool for 50 letters in a block-randomized order. They recorded the time used to complete the tool for each letter and completed a face validity survey. Inter-letter and inter-rater reliability was estimated using weighted and unweighted kappa. Responses on face validity were reviewed independently by 2 authors for thematic content. Participants completed a survey on the tool's usefulness.

**Results:** Data from 300 assessments were collected; a very small portion (4%, N = 12) were incomplete. There was a high agreement among raters, with an overall multiple-rater weighted kappa of 83% (95% CI 76%–89%). High level of pair-wise agreement between raters was also observed, with minimum kappa of 73% and maximum of 98%. Strong agreement across the 5 letters was observed, with a weighted kappa of 81% (95% CI 72%–88%). An average of 4.82 minutes (SD = 3.17) was used to complete the tool.

**Conclusions:** The "Consultation Letter Rating Scale" has adequate reliability and feasibility for assessing written communication competencies in postgraduate training in geriatric medicine. Analyses of acceptability and face validity are underway.

**Plastic surgery residents' perception of feedback in the operating room—A comparison of structured and non-structured approaches**

Y. Sardiwalla, N. Joukhadar, D. Tang

Dalhousie University, Halifax, NS

**Introduction:** As the Royal College of Physicians and Surgeons of Canada phases in Competence by Design (CBD) throughout residency programs, the importance of standardized evaluation tools has become evident. We proposed that using standardized, competency-based assessment tools such as the Ottawa Surgical Competency Operating Room Evaluation (O-SCORE) for clinical scenarios would represent an improvement over the typical In-Training Evaluation Report (ITER). We sought to evaluate plastic surgery residents' perception of feedback in the operating room (OR) given this change, particularly contrasting ITER to O-SCORE evaluations.

**Methods:** A multiple methods design was used. All Dalhousie plastic surgery residents (PGY 2–6, N = 11) who were exposed to the transition of both ITER and O-SCORE evaluations were recruited. A grounded theory approach was used to conduct a focus group. Additionally, a 5-minute paper survey contrasting ITER and O-SCORE methods was distributed to participants.

**Results:** The results of this study indicate that residents were more accepting of low scores with the O-SCORE and also perceived a benefit to using the O-SCORE for feedback. The structured feedback tool was beneficial in defining important aspects of the case and improved the amount and quality of feedback received compared to the traditional nonstructured technical feedback provided on ITERs.

**Conclusions:** The results of this study illustrate the importance of improving feedback tools for residents to best equip them for the demands of CBD. Implementation and quality assurance of new structured feedback tools must be corroborated by residents' satisfaction to ensure effectiveness.

## Examining the accuracy of emergency medicine residents' self-assessments during their objective standardized clinical examinations

R. Egan, H. Braund, A. K. Hall, D. Dagnone, A. Szulewski

Queen's University, Kingston, ON

**Introduction:** Self-assessment needs to be developed throughout postgraduate medical education to facilitate self-regulated learning. This study examined the extent to which residents were able to accurately self-assess their performance during 2 objective standardized clinical examinations (OSCEs) as compared to faculty ratings.

**Methods:** Twenty-five emergency medicine (EM) residents verbally dictated their self-assessment ratings prior and subsequent to 2 EM OSCEs across 5 levels areas of practice.

**Results:** No significant differences were found between residents' average post scenario (S) self-assessment scores and average faculty scores ((S1)  $M = 0.11$ ,  $P = .37$ , (S2)  $M = 0.02$ ,  $P = .90$ ). Correlation between scores were (S1)  $r = 0.69$ ,  $P < .01$ , (S2)  $r = 0.59$ ,  $P < .01$ . Intraclass correlation coefficients (ICC) in S1 were  $ICC = 0.65$ ,  $P < .001$  (S1) and in S2 were  $ICC = 0.54$ ,  $P < .001$ . A total of 32% of residents were overconfident in both scenarios, 40% were under confident in both scenarios, and 28% were inconsistent. No statistically detectable correlation was found between resident performance and self-assessment accuracy. Overconfident residents scored 0.49 (10%,  $SD = 0.58$ , S1) and 0.34 (6.8%,  $SD = 10.3$ , S2) higher than faculty assessors, and under confident residents scored 0.52 (10.4%,  $SD = 0.10$ , S1) and 0.27 (5.4%,  $SD = 0.19$ , S2) lower than faculty assessors.

**Conclusions:** Residents were relatively consistently over and under confident; however, in contrast to the literature confidence was not predicted by performance. Our results suggest the need to calibrate residents' self-assessment scores with faculty ratings through ongoing practice and debriefing opportunities.

**Key factors for successful remediation in postgraduate medical education**

C. Shearer, M. Bosma, F. A. Bergin, J. Sargeant, A. Warren

Dalhousie University, Halifax, NS

**Introduction:** Stakes are high when a resident must undergo remediation. With possible consequences of failure including probation or dismissal, the experience can be stressful for all involved. As such, there is great interest in factors that promote successful remediation. There are suggested best practices for remediation (eg, tailored remediation plans) but even the best designed program can be unsuccessful. In order to highlight essential ingredients for successful remediation, we asked postgraduate education experts to describe key factors for remediation success.

**Methods:** We interviewed individuals identified as experts in remediation at all English-speaking Canadian medical schools (N = 13). The interview explored policy and procedures and involved explanation of the remediation process at their institution. Interviewees were asked, in cases of remediation success, to what do they attribute that success. Responses to that question were collated and analyzed thematically by the research team.

**Results:** Resident factors were most commonly cited as drivers of remediation success. In particular, insight, manifested as an acknowledgement that performance was falling short and that remediation was necessary, was linked to program commitment. Attitudes and motivation were other resident factors included by key informants. Program director factors, including attitudes and engagement, also featured quite heavily. Finally, early and specific identification of the particular learner difficulty was deemed important, along with intensive supervision of the resident in remediation.

**Conclusions:** Experts in the area of remediation reported that resident factors were highly influential to remediation success. Efforts to improve resident self-assessment and perceptions of remediation (from punitive to supportive) may benefit the remediation process.

**Assessing residents' self-assessment accuracy in resuscitation medicine: Findings from a multi-institutional simulation based study**

R. Egan<sup>1</sup>, N. Cofie<sup>1</sup>, T. Chaplin<sup>1</sup>, J. J. Gu<sup>2</sup>, T. McColl<sup>3</sup>, B. Thoma<sup>2</sup>

<sup>1</sup>Queen's University, Kingston, ON; <sup>2</sup>University of Saskatchewan, Saskatoon, SK; <sup>3</sup>University of Manitoba, Winnipeg, MB

**Introduction:** The accuracy of self-assessed performance and clinical judgment of first-year on-call residents with limited support is essential to the health and safety of patients. Unfortunately, preparation for independent call may vary between specialties. Here, we investigate the accuracy of first-year residents' self-assessed performance in a simulated call curriculum designed to prepare first-year residents for independent call.

**Methods:** We compared the self-assessment of 67 residents to faculty assessors in 2 medical schools, across 13 specialty programs and 17 scenarios.

**Results:** Using faculty physicians' scores as the standard, we found no significant difference between residents' average self-assessment scores and average faculty scores ( $M = 0.15$ ,  $P = .07$ ). Correlation between self-assessment scores and average faculty scores was  $\rho = 0.23$ ,  $p = .065$ . On average, 50% and 39% of residents were respectively over and under confident across scenarios. Overconfident residents scored .73 ( $M = 3.70$ ,  $SD = .46$ ) higher than faculty assessors ( $M = 2.97$ ,  $SD = .51$ ), and under confident residents scored .49 ( $M = 3.26$ ,  $SD = .33$ ) lower than faculty assessors ( $M = 3.75$ ,  $SD = .40$ ). Residents in the overconfident group were overconfident on 63% of scenarios, and residents in the under confident group were under confident on 72% of scenarios.

**Conclusions:** Although no statistical difference between residents scores were found, only a small percentage of residents were fully accurate. Over and under confident students were roughly equally distributed, and tended to be consistent in their bias.

## Establishing validity of a novel competency-based orthopedic objective structured clinical examination (OSCE) using convergent and divergent comparators

A. Bishop, M. Gillis, G. Richardson, B. Oxner, J. Morash, M. Biddulph, L. Gautier, A. Hayward, S. A. Scott, A. Glennie

Dalhousie University, Halifax, NS

**Introduction:** Objective evaluations of resident performance can be difficult to simulate. A novel Competency-based surgical objective structured clinical examination (OSCE) was developed to evaluate surgical skills. The goal of this study was to test the construct validity comparing previously validated Ottawa scores (O-scores) and orthopedic in-training evaluation scores (OITE).

**Methods:** An OSCE designed to simulate general orthopedic surgical cases was developed to evaluate resident surgical performance. Postgraduate year (PGY) 3–5 trainees have an encounter (interview and physical examination) with a standardized patient and perform a correlating surgery on a cadaver. Examiners evaluate all components of the treatment plan and provide an overall score on the OSCE and also provide an O-score on overall surgical performance. Convergent and divergent validity was assessed comparing OSCE to O-scores and OITE scores. SPSS was used for statistical analysis. Analysis of variance was used to compare PGY averages, and Pearson correlation coefficients were calculated to compare OSCE versus O-score and OITE scores.

**Results:** A total of 96 simulated surgical cases were evaluated over a 3-year period for 24 trainees. There was a significant difference in OSCE scores based on year of training. (PGY-3: 6.06/15; PGY-4: 8.16/15; and PGY-5: 11.14/15;  $P < .001$ ). OSCE and O-scores demonstrated a strong positive correlation of 0.89, while OSCE and OITE scores demonstrated a moderate positive correlation of 0.68.

**Conclusions:** OSCE scores demonstrated strong convergent and moderate divergent correlation. A positive trajectory based on level of training and stronger correlations with established, validated scores supports the construct validity of the novel surgical OSCE.

## Practice performance of physicians licensed through alternative registration pathways in Ontario, Canada

W. Yen, D. Faulkner, N. Thakkar, K. Hodwitz

College of Physicians and Surgeons of Ontario, Toronto, ON

**Introduction:** In the early 2000s, the College of Physicians and Surgeons of Ontario implemented alternative registration pathways to facilitate the licensure of physicians who do not meet traditional registration requirements (eg, completion of certification examinations). This was in response to perceived physician shortages in the early 2000s. A comprehensive evaluation of these alternative pathways was conducted.

**Methods:** Physician performance was compared using 3 measures: chart audit, multi-source feedback (MSF), and indicators of primary care performance. Logistic regression analysis was conducted to compare the likelihood of receiving a decision of reassessment following a chart audit. Fixed-effects regression analyses were conducted to compare physicians' MSF scores. Multivariate analyses were conducted to compare primary care quality indicators. Analyses compared performance of traditionally registered physicians (TRPs) to alternatively registered physicians (ARPs), with ARPs subdivided into 7 groups. Covariates of performance were accounted for in all analyses.

**Results:** There were no differences in chart audit performance between TRPs and ARPs for 4 of the 7 alternative routes. Three ARP subgroups were more likely than TRPs to receive decisions of reassessment. There were no meaningful differences between ARPs and TRPs on MSF scores. ARPs were similar to TRPs on the majority of primary care quality indicators. Some differences were found for certain ARP subgroups for preventive pediatrics care, spirometry testing, and all-cause emergency department visits.

**Conclusions:** The results highlight that ARPs perform similarly to TRPs on the 3 performance measures, but that some educational opportunities may exist for certain ARP subgroups.

## **A grounded theory study of assessment anchors in postgraduate medical education: Forthcoming opportunities and ongoing tensions**

N. Dudek<sup>1</sup>, W. Gofton<sup>1</sup>, J. Rekman<sup>1</sup>, A. McDougall<sup>2</sup>

<sup>1</sup>University of Ottawa, Ottawa, ON; <sup>2</sup>CMPA, Ottawa, ON

**Introduction:** Traditional workplace-based assessment (WBA) tools have well-documented problems. A notable reconsideration of the role and design of assessment anchors is taking place in medical education. Although research has demonstrated that entrustment-based assessment tools are more reliable than traditional ones, a dearth of evidence exists for how and why these anchors actually work. This qualitative study explored the form, function, and experience of assessment anchors, aiming to develop a theoretical framework for affordances and barriers related to the adoption of entrustment-based tools.

**Methods:** A 2-phase, constructivist grounded theory study analyzed semistructured interviews with residents and staff from multiple specialties. Phase 1 participants (n = 12) had only been exposed to traditional WBA tool rating scales. Phase 2 participants (n = 10) had been exposed to WBA tools using entrustability anchors. Data were analyzed iteratively over the course of a 1-year study.

**Results:** Five themes were expressed by participants. Entrustment anchors were described as (1) concrete and defensible; (2) promoting better feedback conversations; (3) working in multiple contexts; and (4) making it possible to use the entire scale. However, entrustment anchors (5) “leave a gap” in that they do not provide information about how a trainee is doing relative to their peers and/or an expected trajectory.

**Conclusions:** This richer understanding of physician and resident perspectives on entrustability scales will assist WBA developers in creating more practical and acceptable tools. Understanding these perspectives is key to developing faculty development initiatives designed to introduce and improve use of these assessment tools.

## Development of competency assessment tools for neonatal intubation and mask ventilation: An international Delphi study

Z. Bismilla<sup>1</sup>, E. Finan<sup>2</sup>, J. DiLabio<sup>1</sup>, M. Ayoub<sup>1</sup>, H. Almandhari<sup>1</sup>, A. Moussa<sup>3</sup>, G. Schmölzer<sup>4</sup>, V. Connan<sup>1</sup>, C. M. Walsh<sup>1</sup>

<sup>1</sup>Hospital for Sick Children, Toronto, ON; <sup>2</sup>Mount Sinai Hospital, Toronto, ON; <sup>3</sup>CHU Sainte-Justine, Montreal, QC; <sup>4</sup>Royal Alexandra Hospital, Edmonton, AB

**Introduction:** There is growing need for procedural assessment tools with strong validity evidence to support competency-based education. Using the Delphi methodology, we aimed to develop and establish content validity evidence of a Neonatal Intubation Competency Assessment Tool (NICAT) and Neonatal Mask Ventilation Competency Assessment Tool (NMVCAT) for application in both the clinical and simulation-based training environments.

**Methods:** An international panel of neonatal experts rated potential checklist and global rating items for their importance as indicators of competence in performing neonatal intubation and mask ventilation. After each round, responses were analyzed and resent to the experts for further ratings until consensus was achieved.

**Results:** Thirty-four experts from 26 centers in Canada (n = 23) and the United States (n = 11) participated: 18 neonatologists, 9 nurses or nurse practitioners, 4 respiratory therapists, 2 pediatricians, and 1 pediatric anesthesiologist. Systematic literature reviews generated 67 checklist and 24 global rating items for the NICAT and 48 checklist and 23 global rating items for the NMVCAT. Three rounds of Delphi surveys were completed before consensus was achieved, with response rates ranging from 74% to 100%. In the final round, 28 checklist and 9 global rating items reached consensus for the NICAT and 15 checklist and 7 global rating items for the NMVCAT.

**Conclusions:** Delphi methodology allowed for rigorous development and content validation of new measures of competence in performing neonatal intubation and mask ventilation, reflective of practice across institutions. Further prospective studies are planned to assess validity evidence of the NICAT and NMVCAT in the clinical and simulated settings.

## Are OSCE scores a good predictor of clinical performance? A pilot study

N. Wagner, N. Amin, S. Kelly, R. Sonnadara

McMaster University, Hamilton, ON

**Introduction:** In 1975, Harden introduced the objective structured clinical examination (OSCE) in an effort to improve the measurement of competence in medical trainees. Since then, OSCEs have become a gold standard for evaluating clinical skills; however, the relationship between OSCE scores and performance in the clinical environment remains unclear (Dong et al, 2017). The purpose of this pilot study was to compare OSCE scores and clinical evaluations completed within a month of each other in new surgical trainees.

**Methods:** In July 2017, all incoming surgical residents at McMaster University (n = 34) completed a 9-station OSCE at the end of a 2-week surgical foundations boot camp. In the month following, residents were required to complete 6 formative evaluations on informed consent, breaking bad news, suturing, hand ties, or Foley catheter insertion in the clinical setting. Correlation coefficients were used to compare entrustment scores.

**Results:** Results suggest there were no significant correlations between OSCE scores and clinical evaluations for informed consent (r = 0.05), breaking bad news (r = 0.07), suturing (r = -0.15), hand ties (r = 0.18), and Foley catheter insertion (r = 0.23).

**Conclusions:** While OSCEs are often used for evaluating competence, this pilot study suggests OSCE scores do not correlate with performance in the clinical environment for new trainees. We suggest possible explanations, and explore whether competence committees should consider weighing OSCE evaluations differently from direct clinical observations in some circumstances. A continuation of this study will explore whether the lack of correlation persists with specialty-specific evaluations and learners at different stages.

## The interrater reliability of technical skills assessment and retention of rater training

N. Gawad, A. Fowler, R. Mimeault, I. Raiche

University of Ottawa, Ottawa, ON

**Introduction:** The interrater reliability of laparoscopic skills assessment is usually determined in the context of motivated raters from a single subspecialty practice group with significant experience using similar tools. The purpose of this study was to determine what extent of rater training is necessary to achieve good interrater reliability between attending surgeons with differing experience and practices, and if rater training is retained over periods of non-use.

**Methods:** Two surgeons assessed 33 laparoscopic cholecystectomy videos using the Global Operative Assessment of Laparoscopic Skills (GOALS) instrument over 5 scoring sessions distributed across 6 months. They participated in 2 different types of training sessions, and retention was tested in the other 3 sessions. Interrater reliability was calculated with an intraclass correlation (ICC) in a 2-way random-effects model.

**Results:** The ICC was highest after each training session (Scoring #1 ICC = 0.76, Scoring #3 ICC = 0.74). The ICC was not retained 1.5 months after the brief video-based training session (Scoring #2 ICC = -0.17). The ICC was retained 2.5 months after the in-depth discussion training session (Scoring #4 ICC = 0.70), but not 4.5 months later (Scoring #5 ICC = 0.04).

**Conclusions:** Good interrater reliability can be achieved with different types of rater training, but the impact of rater training is lost in periods of non-use. This suggests the need for further study of the interrater reliability of technical skills assessment when performed by the wide variety of surgeon raters as is commonly encountered in the environment of postgraduate resident assessment.

## Assessment of technical skills competence in the operating room: A systematic and scoping review

C. Fahim<sup>1</sup>, N. Wagner<sup>1</sup>, M. Nousiainen<sup>2</sup>, R. Sonnadara<sup>1</sup>

<sup>1</sup>McMaster University, Hamilton, ON; <sup>2</sup>University of Toronto, Toronto, ON

**Introduction:** While academic accreditation bodies continue to promote competency-based medical education (CBME), the feasibility of conducting regular CBME assessments remains challenging. The purpose of this study was to identify evidence pertaining to the practical application of assessments that aim to measure technical competence for surgical trainees in a nonsimulated, operative setting.

**Methods:** In August 2016, the authors systematically searched Medline, Embase, and the Cochrane Database of Systematic Reviews for English-language, peer-reviewed articles published in or after 1996. The title, abstract, and full text of identified articles were screened. Data regarding study characteristics, psychometric and measurement properties, implementation of assessment, competency definitions, and faculty training were extracted. The findings from the systematic review were supplemented by a scoping review to identify key strategies related to faculty uptake and implementation of CBME assessments.

**Results:** A total of 32 studies were included. The majority of studies reported reasonable scores of interrater reliability and internal consistency. Seven articles identified minimum scores required to establish competence. Twenty-five articles mentioned faculty training. Many of the faculty training interventions focused on timely completion of assessments or scale calibration.

**Conclusions:** There are a number of diverse tools used to assess competence for intraoperative technical skills and a lack of consensus regarding the definition of technical competence within and across surgical specialties. Further work is required to identify when and how often trainees should be assessed and to identify strategies to train faculty to ensure timely and accurate assessment.

## Using electronic health record data to assess emergency medicine trainees' clinical performance using report cards: A qualitative account of what matters for assessment

S. S. Sebok-Syer<sup>1</sup>, R. Pack<sup>1</sup>, L. Shepherd<sup>1</sup>, A. McConnell<sup>1</sup>, R. Sedran<sup>2</sup>, A. Dukelow<sup>1</sup>, L. Lingard<sup>1</sup>

<sup>1</sup>Western University, London, ON; <sup>2</sup>London Health Sciences Centre, London, ON

**Introduction:** Competency-based medical education (CBME) requires that trainees receive timely assessments and effective feedback about their clinical performance. To meet this goal, we investigated how data collected by the electronic health record (EHR) might be used to assess emergency medicine (EM) trainees' independent and interdependent clinical performance, and how such information could be represented in an EM trainee report card.

**Methods:** Following constructivist grounded theory, individual semistructured interviews were conducted with 10 EM faculty and 11 EM trainees across all postgraduate years. In addition to open questions, participants were presented with the current list of EM faculty performance indicators and asked to comment on how valuable each would be in assessing trainee performance, and the extent to which each indicator captured independent or interdependent performance. Data collection and analysis were iterative; analysis employed constant comparative inductive methods.

**Results:** Participants refined and eliminated faculty performance indicators and created new indicators specific to trainees. We present a catalog of clinical performance indicators from the EHR database at the study site organized on a spectrum of independent and interdependent EM trainee performance. For instance, independent indicators include number of patients seen and number of narcotics prescribed, and interdependent indicators include length of stay and ordering practices.

**Conclusions:** Our findings document a process for developing EM trainee report cards that incorporate the perspectives of clinical faculty and trainees. Our work has important implications for capturing trainees' contributions to EM clinical performances, and distinguishing between independent and interdependent indicators in this collaborative work setting.

**Identifying cases for an OSCE in endocrinology and metabolism using consensus methods**

S. Dizon, J. Malcolm, D. Pugh

University of Ottawa, Ottawa, ON

**Introduction:** As medical education community moves toward a Competency by Design (CBD) model, it is important to determine gaps in assessment within residency training programs. There will be a greater demand for workplace assessments; however, there are certain cases that are less often encountered yet clinically important, which may not be consistently amenable to assessment in the clinical environment. In the Endocrinology and Metabolism training (E&M) program, the development of an objective structured clinical examination (OSCE) could address this issue. To this end, we conducted a needs assessment to identify key cases that would be best assessed using an OSCE.

**Methods:** A consensus approach using a modified Delphi method was used. An initial survey was sent to 13 E&M program directors (PDs) and 29 recent E&M graduates. This survey included cases that reflected the E&M training objectives and were determined to be rare or emergent. Participants were asked to select 5 emergent and 3 rare cases that they considered valuable to assess using simulation and were invited to suggest other cases.

**Results:** Seven PDs and 14 E&M graduates responded to the initial survey, providing the top 10 ranked cases. Subsequent surveys were distributed until consensus was achieved for the top 5 cases to be included in the E&M OSCE. Further results will be forthcoming.

**Conclusions:** This study outlines that there is a perceived need to include rare or emergent cases that are not easily assessed in the workplace as a means to broaden the scope of competency-based assessment for E&M residents.

## The implementation of CanMEDS 2015 in simulation and assessment of internationally educated physicians

A. Frisina, T. Gamage

Touchstone Institute, Toronto, ON

**Introduction:** Medical training programs across Canada are now required to implement CanMEDS 2015 and Competence by Design. How can programs effectively plan, develop, and implement these frameworks into an assessment? In 2016, our Pre-Residency Program for CaRMS-Matched IMGs developed an evaluation form and accompanying guide to measure CanMEDS competencies exhibited during clinical simulations for postgraduate year 1s (PGY-1s) entering residency.

**Methods:** A modified Delphi method was used. First, an assessment form was designed to include relevant competencies and rating scale. Second, focus groups of 40 preceptors of varying specialties were asked a set of semistructured questions. Ultimately, a rating guide was designed based on responses generated from the Delphi.

**Results:** The Delphi produced observable behaviors aligned to CanMEDS competencies based on our program goals, and was mapped to PGY-1 stages of training of the Competence by Design continuum in creating a 5-point Likert scale. Delphi data were incorporated into a rating guide to further the standardization of assessment across all preceptors. The evaluation form and rating guide have been implemented over 8 iterations of programming. Feedback from preceptors indicate overall ease of use; however, some discrepancy exists between competencies, their observable behaviors, and the associated Likert rating.

**Conclusions:** The results demonstrate the need for continual preceptor training to ensure international medical graduates receive standardized feedback on observed competencies during simulated clinical encounters in our programming.

## Exploring the effectiveness of competency-based assessment tools in providing quality feedback to medical oncology residents

A. Tomiak<sup>1</sup>, N. Hammad<sup>1</sup>, R. Egan<sup>1</sup>, H. Braund<sup>1</sup>, N. Dalgarno<sup>1</sup>, J. Emack<sup>1</sup>, M. Reid<sup>2</sup>

<sup>1</sup>Queen's University, Kingston, ON; <sup>2</sup>Michigan State University, East Lansing, MI, United States

**Introduction:** Competency-based medical education (CBME) assessment tools are designed to support residents' development. Yet, little is known about the quality of feedback provided through competency-based assessments. This study explores the effectiveness of entrustable professional activity (EPA) assessment tools in providing quality feedback to medical oncology residents.

**Methods:** Using a mixed-method design, we collected data from 4 workplace-based assessment tools (WBA; n = 17), a resident focus group (FG; n = 4), and physician interviews (n = 5) in 1 department of medical oncology just prior to the July 1, 2017 implementation of CBME. Data were analyzed using a literature-informed quality feedback framework and emergent thematic design.

**Results:** The overall rating of EPA achievement on the WBAs was 71% "Achieved" and 29% "In progress." Quantifiable written feedback was included in 88% of assessments; of these 33% provided actionable feedback and 20% offered next steps. Four themes emerged from the qualitative data: quality feedback means timely, specific, and actionable; written feedback is important for learning and documentation; consistency is needed by assessors completing entrustment scales to support resident learning; and communication is key for all stakeholders to understand the new assessment process.

**Conclusions:** Greater emphasis is needed to ensure the documentation of actionable feedback encouraging professional growth. Faculty development is critical for stakeholders' explicit understanding of how to use the assessments, and how they will be applied to document competency development and achievement. Adopting WBAs is supported with the belief that adjustments will be required, but not known until fully implemented.

## Early adoption of CBME in internal medicine—Report on implementation of first 7 months in foundations and core of discipline stages

G. Sandhu, V. Daniels

University of Alberta, Edmonton, AB

**Introduction:** The internal medicine residency program at the University of Alberta transitioned to competency-based medical education in July 2017, before most Canadian programs. The purpose of this project is to describe the first 7 months of the Foundation (PGY-1) and Core of Discipline (PGY-2 and PGY-3) stages.

**Methods:** In 2016–2017, we piloted entrustable professional activities (EPAs) in a Google Forms–based portfolio. Using resident feedback, we developed various resources (eg, videos, websites, documents). For 2017–2018, we moved to our MD program’s portfolio system. Using our specialty committee guidelines, we created 10 and 16 assessment forms, respectively, for all EPAs in Foundations and Core of Discipline. We pulled anonymous data from our portfolio system after 7 months and conducted surveys to better understand this transition.

**Results:** Sixty-five residents completed 808 assessments, averaging 12.4 assessments per resident. The most commonly acquired were FD1 (Acute Medical Presentations), CD1 (Atypical Medical Presentations), and CD5A (Procedures of Internal Medicine) at 104, 121, and 118, respectively. These EPAs require the most observations. The least commonly acquired were CD8 (Adverse Event) and CD10 (Health Promotion) at 0 and 1, respectively, which require the least observations.

**Conclusions:** Results indicate that residents are completing the assessments that require the most observations at a sufficient rate. Our surveys suggest resident uncertainty on which assessments to obtain on specific rotations. More education is needed in this area especially when it comes to assessments that require fewer observations. Given that 80% to 90% of residents are utilizing our resources, we are confident we can continue to address the aforementioned concerns.

**Feeling overwhelmed? Examining perceptions of CBME graduates 3 years into practice**

I. Oandasan, L. Nardi, D. Kljucic

College of Family Physicians of Canada, Mississauga, ON

**Introduction:** The College of Family Physicians of Canada implemented competency-based medical education (CBME) across all family medicine (FM) residency programs in 2010. One key outcome was to produce self-reflective, life-long learners who identify and address areas of improvement. A resident survey was given at entry, exit, and 3 years into practice. In this study, we examined changes in FM resident perceptions of problem-solving and learning and feeling overwhelmed at exit from residency and 3 years into practice after a residency CBME intervention.

**Methods:** Inferential statistical analysis with chi-square test and confidence interval to test the null hypothesis were used on deidentified, aggregate FM Longitudinal Survey (FMLS) data of participating residents from 7 FM residency programs: T2 exit 2013 FMLS (n = 392) and respondents at 3 years postgraduation: T3-2016 FMLS (n = 104).

**Results:** Three years postresidency respondents reported a significant increase in their abilities to identify their learning needs (T2 90%; T3 98%;  $P < .01$ ), and to problem solve effectively when faced with complex patient presentations (T2 77%; T3 92%;  $P < .01$ ). At the same time, respondents reported increased feelings of being overwhelmed when dealing with complex patients 3 years into practice. (T2 50%; T3 71%;  $P < .01$ ).

**Conclusions:** The first cohort of graduates from the FM CBME Pan-Canadian residency intervention reported increased perceptions of abilities to problem solve and identify their learning needs, which is reassuring with the introduction of CBME. However, 3 years into practice respondents highlighted increased feelings of being overwhelmed when dealing with complex patients. In the context of CBME learning, these feelings of being overwhelmed despite increased problem-solving skills and abilities to identify learning needs merits further research.

## Web-based navigation of EPA assessments for general internal medicine

L. Melvin<sup>1</sup>, R. Shah<sup>1</sup>, T. O'Brien<sup>2</sup>, R. Cavalcanti<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>Women's College Hospital, Toronto, ON

**Introduction:** With the advent of Competence by Design (CBD) in Canada, residency programs are instituting workplace-based assessments of entrustable professional activities (EPAs). CBD emphasizes multiple and frequent formative assessments, which are collated over time and across supervisors to inform high-stakes promotion decisions by competence committees. The transition toward workplace-based EPA assessments requires increased assessment volume, resulting in unique challenges. One such challenge has been implementation of user-friendly web design to allow residents and faculty to fluidly access and complete increased numbers of assessments.

**Methods:** We designed a website to host EPA assessments for the General Internal Medicine subspecialty residency program at the University of Toronto. Key design elements included: (1) a user-friendly landing page with key information for trainees and supervisors; (2) hyperlinked pages with EPAs broken down by rotation and by stage of training; (3) links to all assessment forms; and (4) multiple user-friendly methods for providing feedback to developers. Website analytics were tracked using Google Analytics.

**Results:** The website facilitated program implementation of workplace-based assessment using EPAs. Through Google Analytics, page behaviors and flow were tracked. User behavior metrics indicated a preference by residents and supervisors to access forms through "EPAs by Rotation," contrasted with the "EPAs by Stage of Training" portals.

**Conclusions:** A website that allows access to EPA assessments according to how training is structured (eg, by rotation) facilitates ease of EPA assessment form completion.

**Do the foundations of discipline entrustable professional activities examine the CanMEDS roles as intended?**

V. David, M. Walsh, J. Lockyer, M. Mintz

University of Calgary, Calgary, AB

**Introduction:** The Competence by Design (CBD) approach is built on assessing competencies in residency education via entrustable professional activities (EPAs). The University of Calgary Internal Medicine Residency Program piloted CBD using 7 Foundations of Discipline EPAs. Each EPA focuses on a topic: EPA-1: initial management; EPA-2: ongoing management; EPA-3: consulting specialists; EPA-4: discharge planning; EPA-5: unstable patients; EPA-6: goals of care; and EPA-7: identifying learning needs. Each EPA has a primary CanMEDS role it is intended to assess. We analyzed EPA qualitative comments to determine if it aligned with the intended CanMEDS role.

**Methods:** Seven EPAs were piloted with 31 PGY-1 Calgary internal medicine residents. Qualitative feedback for each EPA was assigned applicable CanMEDS role(s). The most common CanMEDS role identified for each EPA category was compared to the primary CanMEDS role each EPA aims to assess.

**Results:** A total of 123 EPAs were submitted. The same primary CanMEDS role was identified for 6 of the 7 EPA categories (compared to the CanMEDS role the EPA aims to assess). Medical Expert was appropriately identified as the primary CanMEDS role for EPA-1 (60.0%, n = 21), EPA-2 (55.2%, n = 16), EPA-4 (61.1%, n = 11), and EPA-5 (70.0%, n = 7). Communicator was appropriately identified for EPA-4 (61.1%, n = 11) and EPA-6 (25.0%, n = 2), and Scholar was appropriately identified for EPA-7 (46.2%, n = 6). Our only discordance was EPA-3, where we identified Collaborator (40.0%, n = 4) and Communicator (40.0%, n = 4), while the primary CanMEDS role is Medical Expert.

**Conclusions:** The majority of the Foundations of Discipline EPAs assess the CanMEDS roles as intended.

## Implementation of a stage-specific resident boot camp: How to hit the ground running

A. Hadjinicolaou<sup>1</sup>, M. Dandavino<sup>1</sup>, K. Kaspy<sup>2</sup>, E. Ruano Cea<sup>2</sup>

<sup>1</sup>Montreal Children's Hospital, Montreal, QC; <sup>2</sup>McGill University, Montreal, QC

**Introduction:** Competency-based medical education (CBME) has made “boot camps” key curricular components of training programs. Boot camps are “focused courses designed to enhance learning, orientation, and preparation for learners entering a new clinical role” (Blackmore, 2014). To our knowledge, no postgraduate program has incorporated a comprehensive boot camp curriculum that aligns with the Royal College of Physicians and Surgeons of Canada Competency by Design (CBD) stages of training, and encompasses all CanMEDS roles. We developed, implemented, and evaluated a stage-specific boot camp for pediatrics residents.

**Methods:** A needs assessment of residents and faculty informed the content of a CBD and CanMEDS-aligned boot camp, which focused on preparation for stage-specific general pediatric inpatient’s clinical responsibilities. In total, 36 residents participated in either the 3-day Transition to Discipline (TTD), the 3 half-day Foundation of Discipline (FD), or the 3 half-day Core of Discipline (CD) segments of the boot camp. The curriculum, overseen by clinician educators, emphasized simulation, case-based, and interactive sessions. Topics included dealing with medical emergencies, challenging communication, patient safety–related topics, and technical skills. We assessed the level of satisfaction and self-efficacy of residents immediately after and 6 months post–boot camp via surveys and informal focus groups.

**Results:** Residents reported increased self-efficacy in particular for the sessions involving simulation (TTD) and challenging communication (FD and CD). Trainees identified content gaps, and proposed new strategies for future boot camp iterations, including having senior residents-as-teachers for TTD.

**Conclusions:** A stage-specific boot camp is a time-effective, relevant, and educationally congruent strategy that can facilitate transitions to new clinical responsibilities. Our experience could help postgraduate programs enhance their curricular alignment with CBD and CBME.

## Quality of entrustable professional activity feedback: A Calgary pilot project in competence by design

M. Walsh, V. David, J. Lockyer, M. Mintz

University of Calgary, Calgary, AB

**Introduction:** The Royal College of Physicians and Surgeons of Canada introduced Competence by Design as an educational model along with entrustable professional activities (EPAs) as markers of achievement that could be directly observed on a frequent basis. The internal medicine (IM) program at the University of Calgary implemented a CBD pilot from April to June 2017 to help transition residents and staff. The purpose of this study was to assess whether feedback from directly observed EPAs was (1) actionable; (2) valuable; and (3) disruptive to workflow.

**Methods:** Thirty-one IM residents were assessed on 7 Foundation of Discipline EPAs by senior residents, fellows, and attending physicians. Residents were asked to comment on the value of the encounter and the degree of disruption to workflow. Data were anonymized, and comments were coded for actionability (0, not actionable, 2, actionable); value (0, not valuable; 1, indeterminate; 2, valuable), and disruption (0, disruptive; 1, indeterminate; 2, not disruptive).

**Results:** A total of 123 EPAs were submitted. Only 7.4% (n = 9) of the EPAs contained comments with actionable feedback. Thirty-two EPAs were evaluated for value and 61 for disruption. EPAs containing indeterminate comments on value and disruption were excluded from analysis. Residents rated 96.9% (n = 31) of their encounters as valuable and 65.6% (n = 40) of their encounters as not disruptive. The average time to complete an EPA was 8.5 minutes.

**Conclusions:** The majority of feedback was not actionable, likely limiting its benefit in improving future performance. Despite this, the majority of trainees found the process valuable and not disruptive.

## Implementing CBD in Canadian residency programs: Interviews with CBME leads across Canada

L. Branfield Day<sup>1</sup>, L. Fares<sup>2</sup>, A. Krawchenko-Shawarsky<sup>3</sup>, R. Mungroo<sup>4</sup>, I. Kherani<sup>5</sup>, T. Colbourne<sup>3</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>Dalhousie University, Halifax, NS; <sup>3</sup>University of Manitoba, Winnipeg, MB; <sup>4</sup>Resident Doctors of Canada, Ottawa, ON; <sup>5</sup>University of Ottawa, Ottawa, ON

**Introduction:** Canadian specialty residency programs have begun the transition to Competence by Design (CBD), with all programs slated to transition to CBD by 2022. Successful adoption of CBD is dependent on understanding the strengths and challenges of early implementation efforts. However, there is a lack of shared knowledge across institutions of current implementation strategies, and associated facilitating factors and barriers. The purpose of this study was to address this gap and determine what strategies can be learned from early adopters of CBD to smooth transition for future programs.

**Methods:** Between May 2017 and December 2018, all CBME leads from Canadian institutions not located in Quebec were invited to participate in a 1-hour, semistructured telephone or e-mail interview. Questions addressed CBD implementation, facilitating factors, obstacles to implementation, resident involvement, faculty preparedness, and communication and assessment strategies. Interviews were transcribed and analyzed using qualitative methodologies to discover emergent themes.

**Results:** CBME leads (n = 11) from 11 institutions participated in 1-hour interviews. Key factors supporting implementation included national specialty committee support, small program sizes in initial rollout, program leadership, faculty and resident engagement, and academic funding models. Barriers to implementation included technological challenges, difficulty implementing in large programs and in off-service rotations, assessment burden, and uptake by residents and staff. Multiple strategies to reduce assessment burden and improve buy-in were identified.

**Conclusions:** Semistructured interviews of CBME leads identified barriers and facilitators and highlighted innovations and approaches to implementation that can be adapted to assist with CBD implementation across institutions and programs.

**CBME in anesthesia: The faculty experience in the first year of implementation**

C. Shearer, M. Casey, P. Livingston, J. Chisholm

Dalhousie University, Halifax, NS

**Introduction:** As residency programs implement competency-based medical education (CBME), there is opportunity to learn from early experience of this transition. The anesthesia residency program at Dalhousie University began implementing its hybrid CBME curriculum in 2015. Using Rogers' Diffusion of Innovations (DOI) as a theoretical framework, we sought to explore faculty experience of the transition to CBME throughout the first year of implementation.

**Methods:** We conducted in-depth interviews with faculty members (N = 12) at varying stages of innovation adoption (ie, innovators/early adopters, early/late majority, and laggards) at both the onset of CBME and 1 year after implementation began. Transcripts were analyzed thematically in relation to factors that, according to DOI, promote innovation diffusion, and compared across time points to evaluate changes in perceptions of CBME.

**Results:** *Relative advantage* over the traditional program, *compatibility with individual values*, and *trialability* of CBME featured heavily in interviews at both time points, with laggards and innovators offering disparate opinions. All faculty interviewees acknowledged a need for *observable results*, but varied in their confidence that the impact of the transition could be measured in a timely way. Opinions of CBME changed modestly between the 2 time points (from mild skepticism to cautious optimism), with this change occurring primarily in the early and late adopter groups. In contrast, changes were minimal in the laggard category.

**Conclusions:** Opinions of CBME change slowly and expectations for faculty adoption should take this into consideration. Specific interventions for improvement of faculty uptake are likely best directed at early and late adopters, as they are the largest group and demonstrated the most change in opinion over time.

## Expectancy-value theory perspectives on competency-based medical education: So what and now what?

D. Stockley, [E. Soleas](#), R. Egan, L. Flynn

Queen's University, Kingston, ON

**Introduction:** Changing the paradigm of medical education from time-based to competency-based medical education (CBME) is an arduous process that raises concerns from stakeholders about the prospect of the risks and costs being worth the benefit. Using Expectancy Value Theory allows researchers to assess the relative motivations that stakeholders hold as they balance the expectancies and values against the perceived costs.

**Methods:** Our questionnaire used a 15-item survey including qualitative and quantitative items to assess relative stakeholder engagement in the CBME process. Multivariate analyses of variance of closed-ended items were complemented with thematic analysis of the open-ended items.

**Results:** A total of 222 of 316 potential stakeholders in the School of Medicine at Queen's University responded. Thematic and statistical analyses revealed differences in CBME expectancies and values by perceived cost, value, expectancy beliefs about resident learning, and knowledge. Stakeholders more proximal to teaching residents, such as preceptors, reported higher perceived cost of CBME than stakeholders more distal such as program directors. Stakeholders more engaged in implementation leadership such as CBME leads, educational technologists, and academic advisors reported higher belief that the costs of CBME, including time and resources, would be outweighed by the benefits to resident assessments.

**Conclusions:** These results point to a sustained need to make the case for CBME long after implementation has been completed. The varied acceptance among stakeholders illustrates that the culture change expected to happen with the implementation of CBME has not occurred uniformly, and that special attention needs to focus on the preceptors conducting resident assessment to facilitate CBME uptake and successful implementation.

**Resident perceptions of competency-based medical education at Queen's University, Kingston**

S. Mann, T. Beesley, R. Egan

Queen's University, Kingston, ON

**Introduction:** As the Royal College of Physicians and Surgeons of Canada prepares to implement competency-based medical education (CBME) across all residency programs, surprisingly little is known about how residents perceive this method of training. Despite an abundance of expert opinion describing the merits of CBME, there are few published reports detailing residents' experiences in CBME, nor regarding how Canadian residents view the impending transition. The purpose of this study was to determine how residents at our institution understand CBME, what they anticipate to be its advantages and disadvantages, and what barriers they see to its successful implementation.

**Methods:** This qualitative study involved 16 residents from a variety of residency programs at Queen's University participating in semistructured interviews, which were analyzed using the constant comparative method.

**Results:** Responses were distributed into 4 categories: Advantages, Barriers, Concerns, and Recommendations. Five main thematic groupings emerged.

1. Perceptions of CMBE are shaped by rumors
2. Perceptions of assessment in CBME
3. Perceptions of teaching and learning in CBME
4. Perceptions regarding implementation of CBME
5. Perceived impact of CBME on residents

**Conclusions:** Residents anticipate improved assessment and feedback processes to be the greatest advantage of CBME over current training, with flexibility of training time and schedule being less important. Major concerns include disorganization of the transition, additional workload associated with evaluation, and the process by which competencies are established. Detailed communication and ample opportunities for feedback are felt to be key to successful implementation. Further research is necessary to determine whether these findings are generalizable to other institutions.

## Competence by design: Determining learner needs

S. E. Card, T. Robertson-Frey, L. Desanghere, B. Rohr, R. Jalbert, M. Elliott, A. Saxena

University of Saskatchewan, Saskatoon, SK

**Introduction:** The purpose of this project was to delineate learner needs to inform Competence by Design (CBD) implementation at the University of Saskatchewan. The CBD initiative launched by the Royal College of Physicians and Surgeons of Canada (RCPSC) aims to better align residency education with evolving societal needs by focusing on expected outcomes. Successful institutional implementation of CBD requires a shift to greater learner centeredness.

**Methods:** Ten working groups were established within the college to initiate CBD implementation. The CBD Learner Working Group examined learners' understandings about CBD. Through 14 focus groups, perceptions of approximately 150 residents from all specialty programs across all training sites were explored. Content analysis was used to determine themes within topic areas.

**Results:** Key findings from the focus groups included detailed feedback from residents on their perceptions of resident CBD knowledge; changes, benefits, and challenges of CBD; and resident needs for transition and communication. Although average perceived CBD knowledge was low (2.3 of 5) overall residents emphasized the need to optimize learner-centered learning. Based on the focus groups findings, the CBD Learner working group developed 5 key recommendations: (1) Transition CBD Learner Working Group to a CBD Resident lead group; (2) support a shift to learner-focused learning via a coaching model; (3) address resident concerns regarding supervision and assessment; (4) address myths and misunderstandings of CBD; and (5) increase resident CBD knowledge.

**Conclusions:** Adopting a distributed leadership approach to CBD has informed development of future educational initiatives that best meet residents' needs during CBD implementation.

## The language of entrustment: A qualitative study of internal medicine attending physicians

L. Melvin<sup>1</sup>, J. C. Rassos<sup>1</sup>, L. Stroud<sup>1</sup>, W. Tavares<sup>2</sup>, R. Brydges<sup>1</sup>, D. Piquette<sup>3</sup>, S. Durant<sup>2</sup>, S. Ginsburg<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>Wilson Centre, Toronto, ON; <sup>3</sup>Sunnybrook Health Sciences Centre, Toronto, ON

**Introduction:** A key unit of assessment in competency-based medical education (CBME) is the entrustable professional activity (EPA). Little is known, however, about how clinical faculty perceive and enact entrustment across specialties. We aimed to develop a thorough understanding of the process, concept, and language of entrustment in the internal medicine (IM) setting.

**Methods:** Using a constructivist grounded theory approach, we purposively sampled diverse faculty who attend on the IM clinical teaching unit. To date we have completed 8 semistructured interviews. We will continue interviewing until we reach theoretical sufficiency. We are iteratively analyzing the data using the constant comparison method.

**Results:** In preliminary analysis, 3 themes emerged. First, the concept of entrustment must be adapted to recognize that the work in IM is often already completed at the time of assessment; thus, language reflecting the need for intervention or guidance is not suitable. Second, participants made a distinction between entrustment and competence, which are currently conflated on EPA forms. Finally, the interplay between trust of the individual and entrustment of the task is nuanced and informs entrustment decisions. Participants imply that the language of current EPA scales does not seem to reflect in vivo practices.

**Conclusions:** A tension exists between the need for a common language of CBME and the need for authentic representation of supervision within each specialty. With new assessment instruments required to operationalize the tenets of CBME, we need to understand the nuanced and specialty-specific language of entrustment to ensure validity of our assessments.

## **Scaffolding for assessment success: How 1 Canadian residency training program is paving the way for resident success in Competency by Design**

R. P. Pero, L. Marcotte

Queen's University, Kingston, ON

**Introduction:** In July 2017, the Faculty of Health Sciences at Queen's University introduced competency-based medical education (CBME) across all 29 residency training programs. A "robust and multifaceted" assessment system, driven by the learner (rather than the program), is a key component of CBME (Holmboe et al, 2010, p. 676). Residents are encouraged to initiate assessments as per their curriculum and as clinical opportunities arise; however, a new resident's cognitive load limits their ability to independently drive the capture of important assessment information (Sweller, 1988). A lack of assessment data limits a resident's possible advancement within the program and affects program-level decisions (Humphrey et al, 2017). The general internal medicine training program has developed an innovative approach (ie, scaffolding) to reduce cognitive load and to teach assessment expectations and behaviors.

**Methods:** This paper discusses the general internal medicine program's use of scaffolding to reduce cognitive load for new learners under CBME.

**Results:** The results highlight a knowledge of the inner-workings of CBME, including the challenges of operationalizing an assessment system, and outline an innovative approach to support resident success.

**Conclusions:** The application of a sound educational technique to reduce cognitive load for residents and to ensure the successful implementation of CBME. This innovative approach to assessment could be replicated in residency training programs in Canada. This research is emerging and future research examining outcomes for residents and programs is required.

## Does the operative experience of UK general surgery trainees reflect the entrustment model of competency assessment?

E. Elsey<sup>1</sup>, J. West<sup>2</sup>, G. Griffiths<sup>3</sup>, D. Humes<sup>2</sup>

<sup>1</sup>University of Nottingham, Newark; <sup>2</sup>University of Nottingham, Nottingham; <sup>3</sup>Ninewells Hospital, Dundee, United Kingdom

**Introduction:** General surgery trainees in the United Kingdom (UK) are expected to meet requirements for procedural competency prior to completing training. Competency assessment is changing with the introduction of the entrustment concept, in the United Kingdom and North America. This study aimed to assess the operative experience of trainees and changing supervision through training as a proxy to entrustment.

**Methods:** Data from the Intercollegiate Surgical Curriculum Programme (ISCP) and the eLogbook databases for all UK general surgery trainees registered from August 1, 2007, who had completed training were used. Total and index procedures (IP) were counted and variation assessed. Operative experience (IP and supervision code) by training level was assessed.

**Results:** We identified 311 trainees with complete data. The mean total procedures at completion of training (including assisting codes) was 2060 (SD 535). The type of IP recorded varied through training with appendectomy the most frequently undertaken IP during first year of training (mean total procedures [MTP] = 26) and emergency laparotomy during final year of training (MTP = 52). Of IPs recorded during final year, 91.2% of appendectomies (MTP = 20), 45.7% of cholecystectomies (MTP = 24), 26.1% of emergency laparotomies (MTP = 52), and 17.3% of segmental colectomies (MTP = 15) were unsupervised. The proportion of index procedures recorded as unsupervised increased through training for all IPs ( $P < .05$ ).

**Conclusions:** Type and supervision of procedures performed during general surgical training in the United Kingdom changes along the lines of an entrustment model. Mapping these changes for individual trainees using existing data may provide evidence of competency.

## Does it work—Pilot implementation of 3 EPAs in busy medical oncology outpatient clinics

A. Smrke, H. Lim

BC Cancer Agency, Vancouver, BC

**Introduction:** Transition to Competency by Design (CBD) requires faculty assess learners using a framework of entrustable professional activities (EPAs). Adding another task to busy outpatient clinics is a concern for faculty and learners, especially in nonprocedure-based disciplines where learners are not continuously observed.

**Methods:** Four PGY-4 medical oncology residents completed real-time EPA assessments over a 1-month period in academic medical oncology outpatient clinics. After EPA completion, feedback forms were collected from the resident and the assessing faculty.

**Results:** Twenty-one resident (91%) and 23 faculty (100%) feedback forms were collected based on 23 completed EPA encounters (8–Consult, 9–Follow up, 4–Systemic Therapy). The majority of the EPAs took less than 5 minutes to complete (Faculty 87%, Residents 95%). Faculty often used 6 to 10 milestones to provide feedback to learners, the average EPA had 11 milestones. Both faculty and learners found milestones relevant and achievable. More faculty than residents agreed or strongly agreed that the EPA was a useful tool for feedback. Residents reported that if used as a checklist, the EPA did not allow the faculty to provide better feedback. Residents were less likely to find the tool useful, and found feedback was not more specific and the EPA was useful for staff who typically provide good feedback.

**Conclusions:** Completion of EPAs in outpatient clinics was time efficient. Faculty found EPAs useful to give specific feedback; however, residents discordantly reported use of EPAs did not improve feedback from faculty. This suggests faculty development must include feedback and coaching beyond simply completing the EPA.

**Feedback frequency in Competency by Design: A quality improvement initiative**

N. Arnstead, E. Monteiro, P. Campisi

University of Toronto, Toronto, ON

**Introduction:** Otolaryngology–head and neck surgery (OHNS) is in the initial wave of residency programs adopting Competency by Design (CBD), a new model of competency-based medical education. The University of Toronto OHNS PGY-1 residents piloted CBD during the 2016–2017 academic year, trialing several entrustable professional activities (EPAs), the task-specific assessments in CBD. The rate of completion of EPAs was monitored and targeted for a quality improvement initiative.

**Methods:** Residents and faculty participated in a focus group to characterize obstacles to EPA completion and to engage the stakeholders in the issue. The initial bundled intervention—rules dictating when to seek an EPA assessment and a weekly reminder a resident to the rest of the cohort—was not successful. The second intervention consisted of a leaderboard, designed on an audit-and-feedback system, sending a weekly e-mail from the program director to all PGY-1s comparing their completion rates. The number of EPAs completed weekly per resident was measured, and change was analyzed for statistical significance using control charts.

**Results:** The focus groups found barriers to EPA completion related to trainee attitudes, supervisor attitudes, and the measurement tool. Motivations for completion were complex, and interventions were based on intrinsic and extrinsic motivators. The leaderboard intervention demonstrated significant improvement, increasing from a baseline of 0.25 EPAs/resident-week to 2.87 EPAs/resident-week.

**Conclusions:** An audit-and-feedback leaderboard improved the frequency of CBD assessment completion. Resident design of the intervention fostered the necessary engagement for the initiative to succeed. Further study will have to demonstrate ongoing stability and sustainability of this process.

**Exploring how coaches approach their roles: Implications for medical education**

C. Watling<sup>1</sup>, K. LaDonna<sup>2</sup>

<sup>1</sup>Western University, London, ON; <sup>2</sup>University of Ottawa, Ottawa, ON

**Introduction:** While conceptually attractive, coaching in medicine remains ill-defined, with little examination of the transferability of coaching principles from other fields. We explore how coaching is enacted inside and outside of medicine to understand the elements required for it to be useful.

**Methods:** In this constructivist grounded theory study, we interviewed 24 individuals across 3 groups: physicians who consider themselves coaches in clinical learning settings (n = 8); physicians with experience as sports, arts, or business coaches (n = 10); and sports coaches without medical backgrounds (n = 6). Data collection and analysis were conducted iteratively using constant comparison to identify themes and explore their relationships.

**Results:** Despite blurring of boundaries between teaching, coaching, and mentoring, we identified several features perceived to characterize effective coaching: (1) reciprocal engagement; (2) focus and specificity; and (3) ongoing reflection from both learner and coach. Longitudinal relationships facilitated effective coaching, although they were not always viewed as essential. Unlike medical coaches, those outside of medicine were more likely to undertake rigorous training for their roles; paradoxically, they were also more likely to recognize the limits of their expertise and delegate aspects of their work to others. Cultural barriers to coaching in medicine were identified, including learning environments that limit learner engagement, and medical teachers' dual roles as coaches and players in health care delivery.

**Conclusions:** Medical education's embrace of coaching should be informed by an understanding of the coach and learner behaviors that need to be encouraged and trained, and of the cultural and organizational supports required to foster success.

## Residents' and recent graduates' perspectives on the importance of coaching in neonatal resuscitation

M. Woodward<sup>1</sup>, A. J. Hunter<sup>1</sup>, M. McConnell<sup>2</sup>, C. Williams<sup>1</sup>

<sup>1</sup>McMaster University, Hamilton, ON; <sup>2</sup>University of Ottawa, Ottawa, ON

**Introduction:** In health care, coaching has been described anecdotally as a means of knowledge transfer predominantly in surgical specialties. Residents' perspectives on the role of coaching in ensuring competency acquisition in neonatal resuscitation has not been previously reported.

**Objective:** We explored the perspectives of residents and recent graduates on coaching as a training modality in competency acquisition in neonatal resuscitation

**Methods:** This project employed an interpretive design qualitative methodology, using an a priori educational theory incorporating the principles of social cognitive theory, deliberate practice, distributive practice, and "choke phenomenon." Semistructured focus groups were used for data collection. Interpretive analysis in the style of Crabtree and Miller was employed.

**Results:** Participants endorsed the role of coaching in competency acquisition for neonatal resuscitation. Strengths of coaching included (1) the opportunity for direct observation; (2) the opportunity to be "critically supported" through a complex situation; and (3) in a competency-based system allows for accurate assessment of the learner's competency level. Participants described a good coach as one who had insight into the level of the learner. The coach was a content expert who could "guide hands and thoughts" through procedures and clinical decision-making. Finally, participants identified barriers to coaching opportunities, including a lack coach availability, limited or variable skill in coaching, and variation in personality or "fit."

**Conclusions:** Participants highlighted the important but often inconsistent role of coaching in competency acquisition in neonatal resuscitation. While designing competency-based programs, educators might consider incorporating a coaching model for neonatal resuscitation.

**An e-Learning module that provides residents with strategies to be effective coaches in competency-based medical education**

C. Green, M. McLeod, A. MacLeod, I. Epstein

Dalhousie University, Halifax, NS

**Introduction:** Competency-based curricula are built on the assessment of entrustable professional activities (EPAs). EPA assessments have various proposed improvements over current assessment methods, including a greater emphasis on coaching learners. Significant effort has been focused on teaching faculty how to provide good EPA evaluations; however, on certain clinical rotations senior residents may be responsible for the bulk of teaching and evaluation. In spite of their key role, little effort has been invested to develop residents as competent coaches and evaluators. Most reported interventions to improve resident teaching skills describe programs that are comprehensive, with long duration, and presence of instructors. Given our well-defined goal to train residents to be effective EPA assessors, we hypothesize that an e-Module limited to 30 minutes in length would be adequate to improve the quality of EPA assessments performed by residents.

**Methods:** We designed a 30-minute e-Learning module, aimed at senior residents, that is meant to provide strategies for giving effective feedback during EPA evaluations. The strategies we describe are based primarily on the R2C2 method, described previously by Sargeant et al, which we modified slightly for application to a single clinical observation.

**Results:** We describe our approach for teaching residents how to provide good feedback during EPA evaluations.

**Conclusions:** We have implemented the e-Learning module we developed in a randomized trial to determine its effect on the quality on EPA evaluations by residents.

**Surgical coaching in obstetrics and gynecology: A multicenter pilot project**

S. Mathur<sup>1</sup>, R. Cherniak<sup>2</sup>, J. Bodley<sup>3</sup>, M. Farrugia<sup>4</sup>

<sup>1</sup>University of Toronto, Mississauga, ON; <sup>2</sup>University of Toronto, Toronto, ON; <sup>3</sup>Sunnybrook Hospital, Toronto, ON; <sup>4</sup>Mount Sinai Hospital, Toronto, ON

**Introduction:** Surgical coaching has emerged as a new frontier of medical education. New evidence suggests that focused coaching in the operating room (OR) improves technical skill when compared to current residency training.

**Methods:** We wanted to develop the surgical coaching competency of faculty and resident members of our department through exposure to the Wisconsin Surgical Coaching Framework. We delivered a workshop jointly to faculty and residents at 2 academic hospitals. A preworkshop survey was conducted to assess awareness of the benefits of surgical coaching. Following the workshop, participants were asked to intentionally apply the Wisconsin Coaching Framework in upcoming surgical education encounters, and then immediately evaluate the utility of the tool.

**Results:** The 24 staff obstetricians and gynecologists surveyed reported that time pressure, attitudes toward learners, and case difficulty were the most commonly noted barriers to effective surgical coaching. Only 2 (8%) staff physicians report having received formal training in coaching techniques, and 67% of residents report preoperative goals were rarely or never set and coaching of nontechnical and cognitive skills rarely or never occurs. The results of the 3-month evaluation of the framework by surgical coaching dyads will be presented at the International Conference on Residency Education 2018.

**Conclusions:** In our study, obstetrics and gynecology residents noted significant variation in the teaching skills of surgical teachers. A survey of our faculty and residents showed limited exposure to formal surgical coaching concepts. There is a need for a formalized framework and language surrounding operating room teaching.

## **Institutional CBME assessment completion rates: Monitoring implementation**

L. A. McEwen, D. Dagnone, R. Walker, J. M. Hall, L. Flynn, R. van Wylick, R. Egan, D. Stockley

Queen's University, Kingston, ON

**Introduction:** On July 1, 2017, with permission from the Royal College of Physicians and Surgeons of Canada, Queen's University launched competency-based education (CBME) models for incoming residents. Given the emphasis on assessment in CBME, assessment completion rates were identified as 1 mechanism for monitoring implementation.

**Methods:** A comparative analysis was conducted between institution-wide, electronically captured, CBME assessment completion rates for September 2017 and February 2018. Data for 21 programs were included in the analysis. Cumulative CBME assessment completion rates for the 21 programs were 1971 in September 2017 and 5444 in February 2018. The average number of CBME assessments completed for CBME cohorts within and across programs were calculated for both time points. The average number of completed CBME assessments per month and per resident was also determined. Across programs, the mean number of completed CBME assessments per month and per resident rose from 5 in September 2017 to 6 in February 2018, with the range remaining constant (2 min, 9 max).

**Results:** Program level results reflect 3 major trends with 8 programs showing increases in the number of completed assessments, 7 programs maintaining completion rates over time, and 6 programs dropping. Upon further investigation, drops in completion rates ranged from 1 per month in 3 of the 6 programs to 2, 3, and 4 in the remaining 3 programs, respectively.

**Conclusions:** While CBME assessment completion rates are crude implementation indicators, they offer leadership the opportunity to trigger more in-depth investigations that could include, for example, examining stage specific assessment plans.

**Evaluation fatigue in surgical education: Implications for competency-based medical education**

C. Fahim, R. Sonnadara

McMaster University, Hamilton, ON

**Introduction:** Training progression in a competency-based medical education model relies on meaningful feedback to advance trainee learning and skills acquisition. However, the administrative burden of completing multiple evaluations coupled with perceived lack of assessment impact often leads surgical staff to complete assessments that are generally of low quality. We refer to this phenomenon as “evaluation fatigue” and sought to explore its prevalence among surgical staff.

**Methods:** A pan-Canadian prospective questionnaire was administered to surgical staff at Canadian academic teaching hospitals. Closed and open-ended questions pertained to evaluation fatigue prevalence, score inflation, and perceptions of competency-based curricula.

**Results:** A total of 78 staff participated in the survey. Eighty-one percent of participants indicated that they experience evaluation fatigue, 44% believed they spend too much time on weekly evaluations, and 52% were dissatisfied with current processes of evaluation. Time and scheduling barriers were the most significant obstacles to completing evaluations. Other barriers included a lack of administrative and technological support, perceived lack of interest in feedback by trainees, and lack of support by colleagues. Revised assessment forms, development of a positive assessment culture, and staff training may mitigate the evaluation fatigue phenomenon.

**Conclusions:** Evaluation fatigue is a significant problem affecting Canadian surgical educators at academic institutions. Additional work to determine the prevalence of the phenomenon and identify effective solutions is warranted.

## How competent is our competency training? Evaluation of the RANZCP training program

M. Aimer

Royal Australian and New Zealand College of Psychiatrists, Melbourne, VIC, Australia

**Introduction:** The Royal Australian and New Zealand College of Psychiatrists (RANZCP) introduced a competency-based fellowship program in December 2012. The RANZCP undertook an evaluation of stages 1 and 2 in November 2015, an initial evaluation of Stage 3 in 2017, and a more in-depth analysis of the 2017 data in 2018.

**Methods:** An online survey was carried out in November 2017. The aim was to gather feedback on all aspects of stages 1, 2 and 3 of the new training program, including entrustable professional activities (EPAs), workplace-based assessments (WBAs), assessments, examinations, regulations, and supervision arrangements. The surveys were sent out via e-mail to all active trainees and accredited supervisors, followed by reminder e-mails, as well as promoted through newsletters, social media, and via Directors of Training. A total of 24% of trainees and 14% of supervisors responded to the 2017 survey.

**Results:** Although trainees noted their satisfaction with the training program and feedback received from supervisors, there were concerns about the burden of assessment and managing work-life balance. Supervisors valued the structure that EPAs and WBAs provide to giving feedback. At the same time, there was some concern among supervisors about the junior consultant standard and how this is communicated.

**Conclusions:** The Stage 3 evaluation has been analyzed in depth and feedback received from a number of RANZCP committees, and a series of recommendations have been developed for review by the Education Committee.

## Exploring the lived experience of implementing CBME in emergency medicine: Lessons learned

A. K. Hall<sup>1</sup>, J. V. Rich<sup>1</sup>, D. Dagnone<sup>1</sup>, K. Weersink<sup>1</sup>, J. Caudle<sup>1</sup>, J. Sherbino<sup>2</sup>, J. R. Frank<sup>3</sup>, G. Bandiera<sup>4</sup>, E. Van Melle<sup>1</sup>

<sup>1</sup>Queen's University, Kingston, ON; <sup>2</sup>McMaster University, Hamilton, ON ; <sup>3</sup>Royal College of Physicians and Surgeons of Canada, Ottawa, ON; <sup>4</sup>University of Toronto, Toronto, ON;

**Introduction:** The specialist emergency medicine (EM) postgraduate training program at Queen's University implemented the Royal College of Physicians and Surgeons of Canada Competence by Design model of competency-based medical education (CBME) on July 1, 2017. This presents an opportunity to identify key successes and challenges to inform broader implementation efforts.

**Methods:** We used case study methodology with rapid-cycle evaluation to explore the lived experience of implementing CBME. Data were collected at 3- and 9-month postimplementation via field observations, document analysis, and interviews with key stakeholders. Qualitative findings have been triangulated with quantitative assessment data.

**Results:** EM stakeholders interviewed included residents (15), front-line faculty (10), program director (1), CBME lead (1), and academic advisors (4). Key themes emergent from stakeholder interviews included: comfort with more frequent, distributed, and data-driven monitoring of resident progress; concerns that the new systems have not necessarily facilitated the delivery of more constructive feedback; strong desire for additional frequent global assessment; a perception that frontline assessment of individual milestones is cumbersome and distracts from the tacit capacity for feedback provision; and effective and interactive data visualization is essential for competency committee decision-making. We also identified needs for faculty and resident development related to the delivery of constructive feedback, shared mental models of entrustable professional activities (EPAs) and entrustment scoring, and role delineation with respect to program administration.

**Conclusion:** Exploring the lived experience of implementing CBME with rapid-cycle evaluation from the perspectives of all stakeholders has provided critical early insights regarding the successes and challenges of operationalizing CBME.

**CBME implementation at Queen's University: Lessons learned from a 3-year longitudinal study**

D. Dagnone, D. Stockley, A. Hastings Truelove, L. Flynn, A. Hussain

Queen's University, Kingston, ON

**Introduction:** Queen's University is the first Canadian medical school to transition all of its residency programs to CBME in June 2017. As programs continue to transition with their national CBD cohorts, we offer our lessons learned over the past 3 years of implementation—from concept to launch.

**Methods:** We conducted annual interviews with key stakeholders (executive leadership, program directors, CBME leads, residents, and education consultants) over a 3-year period using the Levels of Use interview protocols from Hall and Hord's Concerns-Based Adoption Model. Three interview data sets were collected in years 1 (n = 39), 2 (n = 68), and 3 (n = 68).

**Results:** Year 1 data point to participants' lowest level of use of CBME (ie, Level III or less on LoU Chart), as the majority were in the very early stages of orienting themselves with CBME. Additionally, they highlighted the scarcity of protected time, money, and manpower allotted to implement CBME, and a concern that constantly arose was lack of buy-in. Year 2 and 3 data celebrated faculty buy-in, collaboration, and supports, but there were still concerns about insufficient time and resident buy-in.

**Conclusions:** Over the course of the initial 3 years of Queen's implementation of a CBME curriculum for all residency programs there has been an increase in faculty engagement. However, concerns persist about time needed for increased assessments, resident ability to obtain these assessments, and the technology required to support this process.

## **Wading through the data: Developing a structured framework to help guide academic advisors**

J. Trier, T. Hanmore, M. V. Bouchard, A. Acker

Queen's University, Kingston, ON

**Introduction:** In July 2017, 29 postgraduate specialty training programs at Queen's University (QU) transitioned to a competency-based curriculum model. This transition necessitated more frequent workplace-based assessment (WBA), which creates more data to review when making high-stakes promotion decisions. At QU, academic advisors (AAs) are faculty members assigned as primary reviewers of performance data for individual residents who meet with residents every 3 to 4 months. The volume of data to review can be overwhelming.

**Methods:** The departments of pediatrics and physical medicine and rehabilitation collaboratively developed a template to provide structure to AA meetings. Template content was based on objectives of training, clinical and nonclinical experiences, and assessment methods. Therefore, the content of the template varied between programs. The template includes a co-created learning and change plan, with learning goals developed based on facilitated feedback during AA meetings. The AA template has been iteratively modified with consistent use and feedback.

**Results:** The AA template provides structure to complex situations with overwhelming amounts of data. Assessment data contribute to determining authentic patterns of performance. The role of the AA is to coach the resident using facilitated self-assessment to identify gaps and opportunities for performance improvement.

**Conclusions:** The AA template facilitates a way to interpret large amounts of data and provide recommendations to residents and competency committees. The template can be adapted to multiple programs and training environments, as demonstrated by its successful implementation in 2 vastly different programs. Future research on this innovation is required to determine its effectiveness.

**Beyond hands-on and hands-off: A model of supervisory approaches on the inpatient ward**

R. Hatala<sup>1</sup>, V. Daniels<sup>2</sup>, L. Farrell<sup>3</sup>, S. Olsen<sup>4</sup>, T. Kennedy<sup>5</sup>, A. Gingerich<sup>4</sup>

<sup>1</sup>University of British Columbia, Vancouver, BC; <sup>2</sup>University of Alberta, Edmonton, AB; <sup>3</sup>University of British Columbia, Victoria, BC; <sup>4</sup>University of Northern British Columbia, Prince George, BC; <sup>5</sup>Stan Cassidy Centre for Rehabilitation, Fredericton, NB

**Introduction:** The concept of entrustment has garnered significant attention in medical specialties, revealing variability in supervision styles and entrustment decisions. There is a need to further study the enactment of supervision on inpatient wards to inform competency-based assessment design. The objective of the current study was to examine “in-the-moment” enactments of supervision on the inpatient medical ward.

**Methods:** Attending physicians on clinical teaching inpatient wards were invited to describe a recent moment of enacting supervision with an internal medicine resident. Constructivist grounded theory methodology guided data collection and analysis. Interview transcripts were analyzed in iterative cycles to inform data collection. Constant comparison was used to build a theory of supervision from the emerging themes.

**Results:** In 2016–2017, 23 supervisors from 2 Canadian universities participated in 28 semistructured interviews. Supervisors contend with the competing roles of clinical teacher and care provider. Simultaneously, supervisors may feel personal responsibility for the ward (resulting in hands-on approaches) or shared responsibility for the ward (resulting in hands-off approaches). We have developed an Approaches to Clinical Supervision model that begins to explain variability in supervision by making those tensions explicit and depicting how they contribute to 4 representative approaches to supervision.

**Conclusions:** An individual supervisor’s approach to supervision changes in response to competing tensions around patient care versus teaching and personal versus shared responsibility for activities on the ward. For inpatient medical specialties, competency-based assessment approaches will need to contend with entrustment decisions being based on more than a unidimensional judgment of a trainee’s competence.

## Are faculty evaluated differently by junior and senior residents?

L. Cook-Chaimowitz, K. Van Diepen, K. Caners, A. Pardhan, M. Welsford, T. M. Chan

McMaster University, Hamilton, ON

**Introduction:** Senior emergency medicine residents (postgraduate year [PGY] 4–5) in our program select faculty preceptors and self-schedule shifts, while other residents' (PGY-1–3) are assigned to teachers. We sought to explore differences in faculty evaluations provided by those who self-schedule versus those who do not.

**Methods:** We studied 4 teaching sites across 2 hospital systems in Canada, with 82 faculty in total. Daily faculty evaluations capture overall teaching effectiveness, as well as 4 subdomains (content, process, organization, and evaluation). We performed simple descriptive statistics to discern if there was a difference in faculty evaluations by the self-scheduling senior residents and those residents who do not. Senior residents' average rating of faculty members were compared to the ratings of all other trainees who did not self-schedule.

**Results:** We collected 3390 daily faculty evaluations by PGY-1s to PGY-5s from September 2013 to February 2018. A total of 54% (1844 of 3390) were from PGY-1 residents; 22% (749 of 3390) were from PGY-2 and PGY-3 residents; 12.7% (431 of 3390) from the self-scheduling seniors. Senior residents' rating of faculty's overall teaching effectiveness was significantly higher than that of more junior residents (senior = 6.44 SD 0.64 versus all others 6.14 SD 0.91,  $P < .001$ ).

**Conclusions:** When evaluations are analyzed by trainee level, they show an incremental increase in mean ratings, with the highest ratings provided by senior trainees. Further research might elucidate if this is related to senior residents selecting the best teachers, identifying faculty they enjoy working with, or if all faculty are better suited to teaching senior learners.

**Reading between the lines: What do psychiatry learners tell us about educator effectiveness?**

S. Harms<sup>1</sup>, B. JM. Bogie<sup>1</sup>, A. Lizius<sup>1</sup>, K. Saperson<sup>2</sup>, M. McConnell<sup>3</sup>

<sup>1</sup>McMaster University, Hamilton, ON; <sup>2</sup>McMaster University, Ancaster, ON; <sup>3</sup>University of Ottawa, Ottawa, ON

**Introduction:** The shift in postgraduate medical training toward a competency-based framework has focused on the competencies of medical educators, in addition to learners. Research has identified traits of good educators, but these findings do not consider the clinical context. This study examined narrative comments in psychiatry faculty evaluations to understand educator effectiveness and compared findings with existing literature.

**Methods:** Data consisted of McMaster University psychiatry faculty evaluations completed in 2015–2016 by postgraduate and undergraduate learners (N = 268) in clinical and didactic settings. Descriptive qualitative methods were applied to faculty evaluation comments by 3 independent reviewers to answer the question: What do learners in psychiatry tell us about educator effectiveness? Saturation of themes was achieved prior to completion of coding.

**Results:** Qualitative analysis revealed 4 major themes and 2 subthemes. Effective psychiatry educators demonstrated specific personal characteristics, which aligned with previous frameworks. Data revealed novel themes, including the importance of relationships and affective factors, including learner security and inspiration through role modeling, which transcended the importance of medical expertise. Effective educators embodied pedagogy in a way that moderated learning barriers.

**Conclusions:** Medical expertise and educator-learner relationships continue to be important. Discussions of educator effectiveness in psychiatry have thus far excluded the dynamic, relational, and affective components of the educational exchange highlighted in the current study. This may be an important focus for future educational research.

## Gender differences in evaluations of faculty performance in a Canadian academic emergency medicine program

T. M. Chan, A. Pardhan, K. Caners, L. Cook-Chaimowitz, K. Van Diepen, M. Welsford

McMaster University, Hamilton, ON

**Introduction:** Prior studies have shown a gender difference in the resident evaluations, with female trainees on average receiving lower scores and appearing to progress more slowly than their male counterparts. At our site, faculty and trainees evaluate each other at the completion of clinical shifts. The purpose of this study was to discern whether there was a gender difference in resident evaluations of faculty.

**Methods:** Our daily faculty evaluations capture scores for specific CanMEDS domains, number of patients seen, as well as overall teaching effectiveness. The faculty group includes 28 women and 54 men. We performed a Student's *t* test to compare the mean faculty evaluation scores of the female and male attendings.

**Results:** Between September 2013 and February 2018 we collected 3630 faculty evaluations by postgraduate year 1 to 5 residents. There was a statistically significant difference in overall teaching effectiveness between male and female faculty with females scoring lower (6.21 versus 6.12,  $P = .002$ ). In addition, female staff scored significantly lower in 2 subdomains: Medical Expert (6.28 versus 6.16,  $P < .001$ ) and Organization and Professionalism (6.32 versus 6.24,  $P = .003$ ). Process and Evaluation showed no significant differences.

**Conclusions:** Female faculty had a small but statistically significant lower mean evaluation than their male colleagues. This gender-based difference in evaluations may impact future academic promotions. Future research should explore if these findings are consistent across other disciplines and universities, and whether the scores reflect true teaching effectiveness.

**“Don't let anyone twist your arm into the job, it's too important”: Program directors' tools and techniques for professionalism socialization**

L. Rigby

Royal Australasian College of Physicians, Sydney, NSW, Australia

**Introduction:** “Socialization appears to be used as a throwaway term . . . as a vague reference to an unspecified social process” (Hafferty, p. 58). The theoretical framework of workplace affordances contributes to understanding how educators use their knowledge and skills in the clinical workplace. This study seeks to provide an understanding of the specific tools and techniques used by program directors (PDs) as part of this socialization process with a focus on the learning of professionalism.

**Methods:** Semistructured interviews were held with 10 program directors responsible for a cohort of junior physicians in their first 2 years of postgraduate training in 10 hospitals in New South Wales, Australia. The interviews were recorded and transcribed verbatim. The transcripts were thematically analyzed to understand the tools and techniques explained by the PDs.

**Results:** Under the personal, contextual, and interactional factors providing workplace affordances, a number of themes were identified as tools the PDs were using. The identified tools under personal factors were PD as parent, PD coach; under contextual, PD as shepherd; and under interactional, PD as auditor and PD as hub. The PDs had different techniques in using these tools.

**Conclusions:** This research provides unique insight into how PDs utilize certain tools and techniques to support the learning of professionalism for cohorts of junior physicians. It provides practical ideas of how PDs support the socialization of a cohort of junior physicians.

## A multi-methods systems approach to improving the culture and practice of feedback

S. Glover Takahashi, R. Dube

University of Toronto, Toronto, ON

**Introduction:** While feedback is central to workplace-based health professions education, it is repeatedly viewed by both learners and faculty as unsatisfactory. Recent work suggests feedback may need to be reconceptualized to be less frequent but more effective, and welcomed by the receiver within the context of a constructive relationship and a culture of continuous learning and improvement. To improve the culture of feedback, faculty developers and education leaders need enhanced approaches to feedback and coaching to support the successful implementation of competency-based medical education.

**Methods:** This case study describes a multilevel, systems approach that applies an integrated relationship-centered approach to building individual, program, and systems capacity for effective feedback. The approach builds on lessons gleaned from the education and leadership research, differentiating data from feedback and coaching, and clarifying myths and misconceptions held by givers and receivers of feedback for a sustained improvement to the practice and culture of feedback. We report on the guiding theoretical frameworks used, resources developed and outcomes of workshops delivered, as well as the observed capacity of residents and faculty to co-learn and co-teach improved feedback in the context of a supportive framework.

**Results:** Key lessons include: benefits of concurrent developmental activities that include faculty and learners; benefits of flexibility in educational delivery; need for longitudinal mentorship of learners and faculty; and the positive potential impact of multilevel, systems approach that applies an integrated relationship-centered approach to building individual, program, and systems capacity for effective feedback. Early program evaluation data on the impact of interventions are provided.

**Online mastermind groups: A nonhierarchical mentorship model for professional development**

G. Paetow<sup>1</sup>, F. Zaver<sup>2</sup>, M. Gottlieb<sup>3</sup>, T. M. Chan<sup>4</sup>, M. Lin<sup>5</sup>, M. Gisondi<sup>6</sup>

<sup>1</sup>Hennepin County Medical Center, Minneapolis, United States; <sup>2</sup>University of Calgary, Calgary, AB; <sup>3</sup>Rush University Medical Center, Chicago, IL, United States; <sup>4</sup>McMaster University, Hamilton, ON; <sup>5</sup>University of California, San Francisco, San Francisco, CA, United States; <sup>6</sup>Stanford University, Palo Alto, CA, United States

**Introduction:** Mentorship in professional development is essential and increases career satisfaction, scholarship, and academic promotion. The Mastermind group is a collaborative, network-based model for mentorship through regularly scheduled meetings. The group benefits from the combined intelligence and accumulated experience of the participants, who may be at different career stages.

**Methods:** Academic Life in Emergency Medicine ([www.aliem.com](http://www.aliem.com)), a digital health professions education organization, conducted 2 Mastermind groups. The groups included all levels of academic rank from full professor to instructors, and represented 14 different medical schools in North America. Each Mastermind group completed a self-assessment summarizing their professional strengths and weaknesses. Two 90-minute videoconference meetings were conducted on Google Hangouts on Air using a structured, moderator-facilitator. Each participant discussed their self-assessments, current projects, and career challenges. Suggested professional development resources, actionable next steps, and an accountability timeline for each participant were then established.

**Results:** Participants received specific resource recommendations, including books, training courses, or conferences. Contacts outside the group for additional mentorship were made possible given the breadth of networks among the participants. All participants had accountable and identifiable next steps. Overall, the participants described a synergy of energy, commitment to one another's longitudinal success, and benefit from the diverse range of talent and expertise in the group. Many of the members discussed plans to replicate this mentorship model at their own institutions.

**Conclusions:** Our experiences suggest that the Mastermind conceptual framework is an easily replicated, feasible, zero-cost, and effective model for professional development, especially in a diverse, globally distributed team.

**Preparing faculty to remediate residents**

C. LeBlanc, M. Boudreau, M. Rajda, L. Hazelton, A. Warren, C. Shearer, C. A. Silver-Smith

Dalhousie University, Halifax, NS

**Introduction:** Formal remediation of residents is an uncommon event with significant implications. Educators may struggle with designing and implementing plans that address the range of learner needs remediation comprises. Faculty developers support those providing remediation, yet relevant professional development needs are incompletely understood. Our study explores faculty views on resident remediation, seeking to understand perspectives and identify learning needs impacting design and delivery of faculty development.

**Methods:** Data were collected through focus groups and individual interviews at Dalhousie University. Participants included program directors and clinical supervisors with prior involvement in remediation. Data were analyzed using thematic techniques.

**Results:** Respondents differentiated between formal and informal remediation. The importance of supervisor skills in observation, assessment, and feedback was emphasized. Remediation of deficits other than medical expertise was thought to pose more challenges, suggesting a potential focus for targeted faculty development. Suggestions regarding the timing and delivery of faculty development were offered.

**Conclusions:** Faculty development and support should be tailored to address the needs of those involved in formal remediation, while assessment and feedback skill development should be provided to a broad range of postgraduate medical educators. Faculty development offerings on topics such as remediation of professionalism and enhancing insight would address specific challenges experienced by supervisors. "Remediation consultants" and just-in-time resources for those actively involved in remediating may be more appropriate than prescheduled sessions. Support from the postgraduate medical education (PGME) office, colleagues, and faculty developers may be helpful for dealing with role conflict and stress experienced by faculty.

## Differences in EM trainee caseload and faculty ratings associated with supervising faculty gender

L. Cook-Chaimowitz, K. Van Diepen, K. Caners, A. Pardhan, M. Welsford, T. M. Chan

McMaster University, Hamilton, ON

**Introduction:** Research has shown gender-based differences in feedback provided to residents and faculty alike. Locally, we have detected similar differences in faculty evaluations. We sought to explore if this difference persisted after correction for clinical workload.

**Methods:** Faculty teaching evaluations were collected from 4 teaching sites at a single Canadian academic center. Resident workload was reported as the number of patients seen with a faculty member. Evaluations of 82 faculty (28 F, 54M) were included, and analyses of variance (ANOVA) were performed to compare reported workload and faculty ratings.

**Results:** From September 2013 to February 2018, 3592 faculty evaluations by trainees were recorded. Comparing the trainee workload, there was a significant main effect of gender (ANOVA  $F(1,3592) = 41.0$ ,  $P < .0001$ ), with lower workload under female supervising faculty. With female faculty, 14% of learners see fewer than 5 patients (versus 11% with male faculty). The largest difference is in the proportion of learners who see > 10 patients ( $F = 23\%$ ,  $M = 32\%$ ). Once we adjusted for caseload, there was no statistically significant difference between male and female faculty ratings by trainees (ANOVA  $F(1,3) = 0.332$ ,  $P = .80$ ).

**Conclusions:** Trainees self-reported seeing fewer patients with female supervisors. This difference raises questions about the balance between teaching and direct patient care, as the number of patients seen may impact trainee case exposure. Quantifying trainee workload may be helpful in discerning possible confounders affecting perceived teaching efficacy in the clinical environment.

**Coaching in residency: What is it and how might we best use it?**

J. Sargeant<sup>1</sup>, H. Armson<sup>2</sup>, J. Lockyer<sup>2</sup>, M. Zetkulik<sup>3</sup>, K. Könings<sup>4</sup>

<sup>1</sup>Dalhousie University, Halifax, NS; <sup>2</sup>University of Calgary, Calgary, AB; <sup>3</sup>Hackensack University, Hackensack, NJ, United States; <sup>4</sup>University of Maastricht, Maastricht, Netherlands

**Introduction:** Coaching is gaining much attention as competency-based medical education emphasizes frequent observation of residents with feedback. Coaching engages residents in a discussion about their feedback and strategies for using it to improve. The purposes of this study were to identify through a literature review the components of coaching and explore supervisor use of each component in providing feedback to residents.

**Methods:** We reviewed literature in the coaching, education, and medical education fields, and identified key components of coaching through iterative analysis and synthesis of the various models described. We then studied coaching approaches used by supervisors in an international study of the R2C2 feedback model in residency education in 5 programs. Feedback interviews with residents and debriefing interviews with supervisors and residents were audiotaped, transcribed, and analyzed using framework analysis, with the coaching components as the framework.

**Results:** Coaching is comprised of 2 main components—process and content. Examples of process subcomponents include supervisor preparation, relationship development, facilitation of learner critical reflection; and of content, using specific feedback to engage learners in identifying gaps, setting goals, and developing written improvement plans. Supervisors demonstrated varied use of all coaching subcomponents. That used the least frequently was development of written plans. Both supervisors and residents reported valuing the coaching. Supervisors identified the need for training in coaching skills.

**Conclusions:** Coaching is a unique educational approach and skill comprised of various components which can be useful in workplace-based education. Clinician educators require faculty development in coaching to be effective.

## Implementing the I-PASS handover bundle: Lessons learned

R. J. Connelly, L. Ruland, L. A. McEwen

Queen's University, Kingston, ON

**Introduction:** Handover, or the transfer of patient care from 1 health care provider to another, is a recognized weakness in our health care system putting patients at risk of medical error. As such, the teaching of handover has merit. The I-PASS bundle has been identified by Accreditation Canada as a "leading practice," and there is support for structured approaches to handover even though the educational effectiveness of these interventions has been questioned. We examined process and outcome variables with the implementation of the I-PASS handover intervention bundle for residents on neonatal intensive care unit rotations in a midsized Canadian hospital.

**Methods:** We assessed resident handovers pre- and postimplementation of the I-PASS intervention bundle for quality, and adverse events and handover-related care errors were documented. Focus groups were conducted with residents and faculty to explore their perceptions about the value of the intervention.

**Results:** No significant differences were recorded in handover quality, number of adverse events, or handover-related care errors pre- and postimplementation. Faculty identified residents' ability to synthesize and intermittent use of patient categorization as potential factors to explain the absence of impact. Residents identified the "receiver synthesis" and "illness severity" components of I-PASS as worthwhile. They also voiced a need for authentic training scenarios as opposed to the generic examples in the bundle and underlined the need for faculty to model and explain I-PASS in the practice context in an ongoing fashion.

**Conclusions:** Although implementation of the I-PASS bundle did not have a positive effect on handover quality, insights from residents point to the importance of customizing training interventions to local contexts.

## Resident practice-sharing in an academic family medicine teaching unit: Exploring effects on patient care and the resident educational experience

S. Strobel, R. Peters, D. Toubassi

University of Toronto, Toronto, ON

**Introduction:** Family medicine residents often manage their own “mini” practices in Family Medicine Teaching Units (FMTUs). Residents provide a limited number of half-days of care each week due to other educational commitments. This necessarily compromises their patients’ access and continuity of care, contributing to a range of negative health and educational outcomes. Practice-sharing, in which paired residents jointly manage a merged practice, presents a possible solution to this issue.

**Methods:** This study was conducted at an FMTU at the University of Toronto from September 2016 through April 2017. Four residents were recruited to form 2 practice-sharing pairs, with the remaining 24 residents at the site serving as controls. Data were collected retrospectively from the clinic’s electronic health record. The effects of practice-sharing were analyzed using a multivariate difference-in-differences logit regression. The main outcome measures were a continuity of care metric (the probability that a patient accessed 1 of their primary residents) and the “no-show” rate. In addition, the effects of practice-sharing on the subjective educational experiences of residents were interrogated using a focus group.

**Results:** The continuity of care metric increased by 11% ( $P = .01$ ), and the no-show rate decreased by 24% ( $P = .01$ ). Practice-sharing residents perceived increased continuity of care, as well as the potential for improved cross-coverage, collaboration, and mentorship. A small, acceptable increase in workload was noted.

**Conclusions:** Practice-sharing may improve the experiences of both patients and residents in a primary care training environment. More extensive investigations with prospective designs are indicated, as well as assessments of patient satisfaction.

## Development and implementation of a standardized emergency department handover tool

E. Kwok<sup>1</sup>, G. Clapham<sup>2</sup>, S. White<sup>2</sup>, M. Austin<sup>1</sup>, L. Calder<sup>3</sup>

<sup>1</sup>University of Ottawa, Ottawa, ON; <sup>2</sup>The Ottawa Hospital, Ottawa, ON; <sup>3</sup>Canadian Medical Protective Association, Ottawa, ON

**Introduction:** Published evidence suggests that structured handover processes can prevent communication breakdown, discontinuity of clinical care, and medical errors; although few studies are emergency department (ED) specific. Locally, no standardized tools ensured adequate handover of critical information at overnight shift change. We aimed to improve adequate handover by 50% in 4 months using an ED-specific tool.

**Methods:** Using published best practices, local observations, and stakeholder input, we developed a structured ED-specific handover tool consolidating critical communication components for 2 unique ED patient populations: active-care and admitted/referred. We implemented this tool via staff engagement, formal resident education, and cognitive aids. We assessed handover rates and adequacy (e-note completion or verbal communication of  $\geq 50\%$  of critical components) through convenience sampling direct observation. Tool utilization characteristics, time metrics, and user satisfaction were measured. Metrics were shared, and feedback solicited on 3 PDSA cycles to improve the tool. We present run charts and descriptive statistics.

**Results:** We assessed 415 patient handovers in 29 sessions. For active care patients, the median proportion of verbal handover improved from 75% to 100%. The median proportion of adequate handovers improved from 50% to 75%. Handover delivery time increased by 15 seconds per patient. End user feedback was positive, specifically for communication quality and resident educational value.

**Conclusions:** A standardized handover tool improved quality of critical information communication at overnight shift change. Emphasizing resident engagement and education enhanced project success, reinforcing the value of formal handover teaching in residency curriculum. This approach to implementing a locally tailored handover tool can be applied in any ED.

**Improving advance care planning through a focus on team process: Novel use of simulation-based education with a heart failure home care team**

A. Kaba

Alberta Health Services, Calgary, AB

**Introduction:** A 2015 survey of 500 Alberta clinicians found that 4 out of the 5 most frequently perceived barriers for engaging in Advance Care Planning (ACP) and Goals of Care Designation (GCD) activities are in team process domains. To address these issues, a process improvement project using simulation was undertaken with the Calgary Heart Failure Home Care Team. The objective was to determine whether a participatory team-based simulation intervention could improve team effectiveness in ACP and GCD processes.

**Methods:** Partnering with the Process Improvement AHS Improvement Way Team, Simulation Team, ACP GCD educators, and ACP CRIO researchers, physicians, nurse clinicians, and a manager from the HF Home Care team defined the goals statement, and identified current ACP and GCD processes, root cause analysis for gaps, and targets to create improvement. Clinical scenarios were developed to simulate key process improvements in having conversations and the use of ACP/GCD documentation.

**Results:** Pre- and post-self-assessment of health care team effectiveness behaviors were collected using the Mayo High Performance Teamwork Scale and compared to prospectively collected baseline measures during simulation. Qualitative data from the simulations debriefings identified 4 key themes: (1) initiation of process; (2) having the conversation (content, length); (3) ACP/GCD education; and (4) and roles.

**Conclusions:** This project provided novel integration of process improvement methods, clinician education, and simulated practice to improve utilization of an ACP and GCD policy and process. The approach of embedding simulation for ACP within a larger health care system education has the potential to have lasting, sustainable impacts on patient safety and quality outcomes.

## Reducing the time to analgesia for musculoskeletal injuries in the emergency department

V. Woolner<sup>1</sup>, R. Ahluwalia<sup>2</sup>, H. Lum<sup>2</sup>, J. De Leon<sup>2</sup>, L. Chartier<sup>2</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>University Health Network, Toronto, ON

**Introduction:** Greater than 80% of patient visits to the emergency department (ED) are pain related, with almost 40 000 such visits per year in our teaching hospital ED. Delays to adequate analgesia result in worse patient care, decreased satisfaction, and increased patient complaints. Our aim is to reduce the time-to-analgesia (TTA; time from triage to receipt of analgesia) for patients with musculoskeletal (MSK) pain in our ED by 40% (to under 60 minutes) in 9 months (by May 2018).

**Methods:** After stakeholder engagement, surveys to assess root causes (with resulting Pareto Chart), our completed and ongoing plan-do-study-act cycles include (1) education at huddles; (2) signage and quick reference badges cards for nurses; (3) introduction of analgesia interventions at triage; and (4) new documentation aids for medication administration. Outcome measures are TTA (in minutes), the proportion of patients receiving analgesia and ED length of stay (LOS; in minutes). Process (pain scores, triage medications) and balancing (adverse events, triage time) measures are also being tracked.

**Results:** Baseline median TTA is 95 minutes, with only 48% of patients having received any analgesia at all, and median ED LOS is 199 minutes. A run chart is being updated weekly with ongoing data abstraction; no special cause variation has been identified to date.

**Conclusions:** Through improved nurse-initiated analgesia administration of both pharmaceutical and non-pharmaceutical interventions in our academic ED, we hope to improve the care of patients with MSK concerns. If successful and sustainable, we hope to spread our methods to all pain-related concerns.

**“Everyone thinks that everyone knows, but nobody really does”: A qualitative exploration of adolescent medicine subspecialty residents’ experience with trauma and trauma-informed care**

S. Lorber<sup>1</sup>, S. Pasricha<sup>2</sup>, K. Hick<sup>1</sup>

<sup>1</sup>SickKids Hospital, Toronto, ON; <sup>2</sup>Centre for Addiction and Mental Health, Toronto, ON

**Introduction:** Untreated childhood trauma has been associated with long-term negative mental and physical health outcomes. Trauma-informed care (TIC) is an evidence-informed approach that provides a map for creating positive clinical encounters with patients who have trauma histories. Adolescent medicine subspecialty residents at an urban tertiary hospital care for youth with a high prevalence of childhood trauma, yet TIC is absent in the training curriculum. This quality improvement project explored how subspecialty residents’ learning experience is impacted by the absence of TIC training in their curriculum despite the need to care for youth with significant trauma histories during their subspecialty training.

**Methods:** A focus group attended by the subspecialty residents was conducted to (1) understand their knowledge and experience with childhood trauma and TIC, and (2) explore their vision for a TIC curriculum. The session was recorded and transcribed verbatim, with participants deidentified to maintain anonymity. Transcripts were reviewed, coded, and analyzed for themes by 2 members of the project team.

**Results:** Several themes emerged, including low self-efficacy, a knowledge and skills gap when encountering trauma disclosures and symptom management, as well as the unanticipated impact of vicarious trauma. Trainees were able to articulate their vision for a spiral TIC curriculum, which included foundational didactic content supported with interactive learning and ongoing opportunities for supervision.

**Conclusions:** The absence of TIC in the adolescent medicine subspecialty residents’ curriculum is a training gap. A thoughtfully designed curriculum delivered during the resident academic half-day could address this need.

## Improving patient communication in an academic emergency department's rapid assessment zone

A. K. Taher<sup>1</sup>, F. Magcalas<sup>2</sup>, S. Casey<sup>3</sup>, D. Davies<sup>3</sup>, L. Chartier<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>York University, Toronto, ON; <sup>3</sup>University Health Network, Toronto, ON

**Introduction:** Communication between patients and providers in the emergency department (ED) faces a multitude of challenges, which lead to suboptimal patient experiences, increased anxiety, and provider interruptions. Our aim is to increase patient-reported satisfaction and decrease patient anxiety each by 20% within 6 months in the ambulatory area of an ED staffed by attending and resident physicians.

**Methods:** We undertook stakeholder engagement through leader and front-line provider meetings, surveys, and a patient focus group to determine root causes and potential interventions. Outcome measures were Likert scales of patient-reported satisfaction and anxiety. Process measures were Likert scale provider-reported interruptions by patients. Ongoing PDSA cycles include refinement of stakeholder-identified gaps: (1) information brochure with high-yield patient-relevant information; (2) waiting room information slide show of frequently asked questions; and (3) provider education on communication.

**Results:** Thirty-seven providers (root cause analysis) and 64 patients (baseline data) have completed questionnaires to date, which identified wait times, ED process, timing of next steps, and directions as communication gaps. Patients rated satisfaction with communication, and their anxiety as a median of 3 out of 5. Providers noted interruptions and their preventability as a median of 4 out of 5 (5 being worst). Iterative plan-do-study-act (PDSA) cycles were completed through May 2018, with ongoing measurements for run chart formulation. No special cause variation has been identified to date.

**Conclusions:** We identified common communication gaps leading to decreased patient satisfaction, anxiety, and increased provider interruptions. Stakeholder-identified interventions are underway using iterative PDSA cycles. If successful, similar interventions could be explored in other ED zones.

## Family experiences of the advance care directives discussion for patients with advanced dementia: A quality improvement initiative

Z. Furqan<sup>1</sup>, Z. Alidina<sup>1</sup>, P. Babani<sup>1</sup>, A. Iaboni<sup>2</sup>, A. Lo<sup>3</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>University Health Network, Toronto, ON; <sup>3</sup>Toronto Rehabilitation Institute, Toronto, ON

**Introduction:** Advanced dementia is a significant cause of morbidity and mortality in North America. Due to the loss of capacity to make decisions about health care, families take on the responsibility of making health care decisions on behalf of patients with advanced dementia, particularly decisions around advance care directives (ACD). Families have reported multiple challenges in making these decisions in various settings. Our initiative aims to improve family satisfaction with the discussion about ACD, as demonstrated by a 20% increase in total survey scores and qualitative feedback obtained through interviews submitted by April 30, 2018. This initiative will take place on the Geriatric Psychiatry Unit at Toronto Rehabilitation Institute.

**Methods:** Family members of 5 patients with advanced dementia admitted to the unit will be recruited for this initiative. A survey will be administered asking families to rate their experience of the ACD discussion. Family members will then take part in a 20- to 30-minute interview to discuss their experience of the ACD discussion and to elicit their recommendations for improvement. Using the Model for Improvement, plan-do-study-act (PDSA) cycles will be completed to implement an intervention aimed at improving the ACD discussion and evaluating its effectiveness in improving family satisfaction.

**Conclusions:** We expect this quality improvement project to have the potential to improve the family experience of the challenging process of making decisions for patients with advanced dementia and to improve this experience. Patient and family centeredness is essential to providing high-quality care to patients with advanced dementia admitted to the Geriatric Psychiatry Unit at The Toronto Rehabilitation Institute.

**MyPathologyReport.ca: An online pathology education resource for patients**

A. J. Lafreniere<sup>1</sup>, J. Wasserman<sup>2</sup>, B. Purgina<sup>3</sup>, D. Banerjee<sup>3</sup>

<sup>1</sup>The Ottawa Hospital, Ottawa, ON; <sup>2</sup>University of Toronto, Toronto, ON; <sup>3</sup>University of Ottawa, Ottawa, ON

**Introduction:** Patients are receiving increasing access to their electronic health record and laboratory results, including pathology reports, are among the most frequently accessed pieces of information. MyPathologyReport.ca is a novel website exclusively providing pathology education to patients, designed to help patients understand the language of pathology and to effectively navigate their pathology report. Feedback on this free online tool was solicited from health care providers to determine whether MyPathologyReport.ca would serve the needs of their patient population.

**Methods:** An online questionnaire was distributed to targeted health care providers at the Ottawa Hospital, the Children's Hospital of Eastern Ontario, and select community practices. Respondents were required to navigate MyPathologyReport.ca and complete a 15-question survey regarding their use of pathology reports and whether MyPathologyReport.ca provided useful information for their patients.

**Results:** There were 22 respondents across 6 specialties, including multiple surgical subspecialties, pediatrics, medical genetics, and family medicine. Over 80% reported that all features of MyPathologyReport.ca were either very useful or extremely useful, including (1) how to read a pathology report; (2) an illustrated pathology dictionary; and (3) articles outlining the most common pathological diagnoses. A total of 72% of respondents stated they were somewhat likely or very likely to recommend MyPathologyReport.ca to a patient.

**Conclusions:** An informed patient is an active member of the health care team. Our feedback questionnaire demonstrates that clinicians find MyPathologyReport.ca to be a useful patient resource. Next steps involve longitudinal assessment of MyPathologyReport.ca from nonmedical community members and evaluation of patient satisfaction and knowledge with access to this resource.

## **Defining learning objectives and assessment of leadership skills to inform curriculum in family medicine postgraduate program**

C. Grady, N. Knarr, B. Wolfrom, K. Schultz

Queen's University, Kingston, ON

**Introduction:** The change to CanMEDS Family Medicine framework from the role of Manager to that of Leader prompted the department to determine how to incorporate leadership skills development into the postgraduate program. The purpose of this study was to identify learning objectives for leadership training.

**Methods:** A mixed methods concurrent design was used. Quantitative methods were used to identify the frequency of most valued leadership constructs; qualitative methods were used to explore these constructs. Two groups of participants provided data. Self-identified physician leaders (60) participated in a workshop to identify which point in training was ideal for skills development. Focus groups were held with a different group of participants—all family physicians (9) to understand how leadership skills can be demonstrated.

**Results:** There was consensus on the value of learning leadership skills during residency. Communicating effectively, managing change, building teams, and leading self were viewed as most valuable skills for physician leader. Self-awareness/leading self and communicating effectively identified as the 2 highest-ranked skills (92% and 84%) a physician should demonstrate at start of medical career. Three goals to guide curriculum development were identified: (1) understand why physician leadership is important (2) know and understand the breadth of leadership and roles for family physicians; and (3) increase self-awareness and gain capacity to see themselves as leader.

**Conclusions:** Defining leadership is difficult and assessing skills a challenge. Attributes labeled "soft skills," which increase a physician's capacity to influence others, are the most highly valued. Further study on methods to incorporate development of these skills and assessment techniques is needed.

## Assessing the impact of a chief resident orientation program

G. Williams, C. Shearer, J. Acuna

Dalhousie University, Halifax, NS

**Introduction:** Chief residents provide important leadership in most residency training programs, yet there is scarce literature on how to prepare residents for this role. At Dalhousie University, a chief resident orientation day was developed based on needs assessment. The 1-day program consists of multiformat sessions covering the role of the regional resident doctors association, leadership skills, resident wellness, feedback, creating call schedule, cultural sensitivity, and dealing with a difficult resident. We evaluated immediate reaction to the program and perceived benefit after 6 months in the role of chief resident.

**Methods:** We administered surveys immediately postsession to assess reaction to the program, and 6 months later to examine perceived impact on the resident's function as chief resident.

**Results:** Thirty-six residents attended the program, of which 33 (92%) and 17 (47%) completed the postsession and 6-month follow-up surveys, respectively. Immediately following the session, most residents strongly agreed that the program provided them with the necessary skills to be chief resident (mean Likert score of 4.47/5, SD = 0.60). Follow-up surveys showed continued endorsement, with most of the sessions rated as "quite" or "very" helpful in preparation for the role of chief resident. In particular, the program's focus on resident wellness and advocacy for residents in difficulty were highlighted as especially valuable 6 months into the role.

**Conclusions:** The Dalhousie Chief Resident orientation program was well received and on 6-month follow-up residents felt the program had been helpful in preparing them. Findings will be used to further improve the program and distribute the program broadly.

**Emerging leaders in academic medicine program: The resident experience**

G. Williams, C. Shearer, L. Hazelton, J. Acuna

Dalhousie University, Halifax, NS

**Introduction:** Nearly all physicians take on leadership roles in clinical and/or academic contexts. Yet, few residency programs provide leadership training, resulting in feelings of inadequacy to meet leadership expectations after the transition to practice. We adapted a faculty-focused curriculum, "Emerging Leaders in Academic Medicine (ELAM)," for delivery to residents to fill this training gap. The ELAM-R (resident) is an 8-week, faculty-facilitated, online, asynchronous program focusing on improving understanding of leadership and practical skills.

**Methods:** Program evaluation activities included examining discussion board activity and questionnaires completed both before and after the course. Residents rated their leadership knowledge, described their leadership experience, elaborated on their expectations for the course (pre), and reflected on key learnings and suggestions for improvement (post).

**Results:** Twenty-four residents participated in the ELAM-R program and submitted 164 posts on discussion boards over the course duration. Surveys, completed by 9 and 17 residents at pre and post, respectively, demonstrated that residents recognized the importance of leadership training but felt that too little was provided within their residency training programs. Participant feedback reflected an appreciation for the format of the course, value of the discussion boards, and highlighted goal setting, time management, conflict resolution, and resiliency as highly relevant topics. Although sample size precluded statistical testing, mean ratings suggested knowledge gains in all topic areas.

**Conclusions:** Residents valued the ELAM-R program and learned useful leadership skills. The program has therefore been adopted for repeated offering to residents. Future analysis will compare faculty and residents' evaluation of the course.

**Challenges of chief residents: Difficulties and achievements of the role in a university hospital**

A. Eymann, F. Reboiras, M. Sanchez, S. Carrió, L. Vazquez, D. Faingold, M. Figari

Instituto Universitario del Hospital Italiano de Buenos Aires, Buenos Aires, Argentina

**Introduction:** Chief residents are young professionals who have recently completed their specialty training. They are the main direct referral point for residents to guide their learning, and they have a central role as leader of the residents group. We identified the type of activities developed by chief residents during their teaching role, and their perceptions about those activities.

**Methods:** An electronic questionnaire was sent to 38 chief residents at a single institution. The survey was self-administered and confidential, and was taken at the end of their teaching period. They were asked about demographic variables; percentage of time for activities such as academic management, teaching, clinical care, research, and administrative; more and less rewarding situations lived; training needs; and if they would recommend the chief resident's role to a colleague.

**Results:** Thirty-seven of 38 chief residents answered the questionnaire; 46% of respondents were women. The ratio of chief resident per resident was 1/12.7 (37/471) and 1/4 (118/471) for other teaching roles. Time spent in academic management activities represented 24.8%, teaching activities 23.6%, clinical health care 26.1%, research activities 9.6%, and administrative activities 15.9%.

The most rewarding situations perceived were teaching role performance, recognition for the work carried out, and teamwork experience. The least rewarding were dealing with interpersonal issues, administrative tasks, and management difficulties. Training needs reported were learning group management, leadership, and teaching training. Among respondents, 56.8% acknowledge lack of training to perform the role. Nevertheless, 94.3% would recommend the role of chief resident to a colleague.

**Conclusions:** Chief residents acknowledge lack of training in learning group management and leadership. Despite the pressure of the role, most find the role rewarding and would recommend it to others.

## **Integrating a leadership curriculum into the family medicine residency program**

B. Wolfrom, C. Grady, N. Dalgarno, K. Schultz, K. Bishop, P. Edwards, W. Chan, C. Lavery, L. Roberts

Queen's University, Kingston, ON

**Introduction:** Recently, CanMEDS Family Medicine (FM) updated the role of Manager to that of Leader, prompting medical programs to focus on learning that enable residents to meet leader competencies. One department of family medicine sought to better understand current capacity and learner readiness in their residency program to inform development of a structured leadership skills curriculum.

**Methods:** Adopting a mixed-methods design and convenience sampling, data were collected from a resident survey (n = 78), and physician focus groups (n = 8) and interviews (n = 7). Data were analyzed using thematic design and descriptive statistics. The analysis identified leader opportunities within the curriculum, gaps in training, and recommendations for a fulsome leadership skills curriculum. The identified leadership activities currently offered in the program were mapped onto the key CanMEDS-FM competencies.

**Results:** Residents valued current leadership training but did not feel confident in preparedness to meet Leader competencies. They identified a need for further training, favoring mentoring and simulation exercises. Residents preferred to develop leader skills through family medicine clinicians rather than those with military or business leadership expertise. Faculty believed that leadership skills development was important to meet accreditation standards, enhance existing skills of residents, and better prepare them for future practice.

**Conclusions:** Leader skills development is viewed as an essential component in family medicine training. Gaps exist in current activities that aim to address the 4 key Leader competencies. This research provides the starting point for addressing gaps in curriculum. The next step is to develop comprehensive competency-based Leader-specific assessments to ensure competency achievement for physicians transitioning to practice.

## Learning curves: Identifying learning trajectories of individual residents in a surgical residency program

S. A. Scott<sup>1</sup>, N. VanEyck<sup>1</sup>, E. Driessen<sup>2</sup>, K. Eva<sup>3</sup>

<sup>1</sup>Dalhousie University, Halifax, NS; <sup>2</sup>Maastricht University, Maastricht, Netherlands; <sup>3</sup>University of British Columbia, Vancouver, BC

**Introduction:** Competency-based medical education (CBME) aims to ensure residents achieve competence in the tasks thought important to medical practice. Little is known though about the trajectories through which residents achieve competence or the stability of success once it has been achieved. These are important issues to understand to determine how assessment is conducted within the context of CBME. One way in which we may begin to address this problem is by examining numerous assessments over time in the form of learning curves. The purpose of this study was to determine if distinct and interpretable patterns of resident performance emerge.

**Methods:** Within our Canadian obstetrics and gynecology residency training program, daily operative assessments include the role of the resident, the type/complexity of the procedure, the performance of the resident, and entrustment. These data were analyzed retrospectively. Learning curves of resident performance over time were generated after controlling for procedural complexity, role of the resident, and the individual assessor.

**Results:** Thirty-three obstetrics and gynecology residents spanning 10 years were included in the study. The median number of operative procedures assessed per resident was 127 (range 52–231). Distinct patterns of learning trajectories were identified in which residents could be classified. Plateaus and peak performances were identified at various stages of training for different residents.

**Conclusions:** Distinct learning trajectories and patterns of development exist for individual residents, which may be useful to guide further development of assessment strategies and to target educational interventions.

## Association between cardiology fellows' evaluations and performance during fellowship training

M. W. Cullen, T. Beckman, C. Scott, K. Klarich

Mayo Clinic, Rochester, MN, United States

**Introduction:** Minimal studies have explored the validity of clinical evaluations in internal medicine subspecialty programs, particularly for cardiology fellows. We sought to determine associations between faculty-of-fellow clinical evaluation scores with educational outcomes during cardiology fellowship.

**Methods:** This was a retrospective study of 7 classes of cardiology fellows. Independent variables included in-training examination (ITE) scores, educational conference attendance, completion of rotation and faculty evaluations, performance on the cardiology board examination, receipt of institutional or departmental awards, and faculty appointment upon completion of training. The outcome was mean faculty-of-fellow evaluation scores (scale 1–5). Calculations were performed using linear regression analysis.

**Results:** The study included 65 fellows. Independent variables included mean ITE percentile score (69), mean number of educational conferences attended during 2 years of clinical training (97),  $\geq 90\%$  evaluation compliance (34, 52%), failure on the cardiology board examination (2, 3%), receiving an award (20, 31%), and faculty appointment (23, 35%). The overall mean  $\pm$  standard deviation faculty-of-fellow evaluation score was  $4.07 \pm 0.18$ . In multivariable analysis (model  $R^2 = 0.25$ ), mean evaluation scores during fellowship training were independently associated with ITE scores (beta = 0.035 per 10 point increase,  $P = .04$ ) and receiving a departmental or institutional award (beta = 0.145,  $P = .001$ ). Evaluation scores were not associated with conference attendance, evaluation compliance, faculty appointment, or performance on the board certification examination.

**Conclusions:** Faculty-of-fellow clinical evaluation scores during cardiology fellowship training are associated with performance on the ITE and receiving competitive awards. These data support the validity of faculty-of-fellow evaluation scores as a measure of clinical performance during cardiology training.

## An empirical method for determining sentinel milestone ratings to predict residents' attainment of recommended graduation targets

K. Yamazaki<sup>1</sup>, E. Holmboe<sup>1</sup>, S. J. Hamstra<sup>2</sup>

<sup>1</sup>Accreditation Council for Graduate Medical Education, Chicago, IL, United States; <sup>2</sup>University of Ottawa, Ottawa, ON

**Introduction:** Achievement of the recommended graduation target on milestones at the end of residency is an indicator of a resident's readiness for unsupervised practice. Biannual milestone ratings allow us to estimate the likelihood that residents may (not) reach their graduation target. This study empirically derives the likelihood by retrospectively investigating milestones data over time.

**Methods:** Milestones data were examined from 1336 emergency medicine (EM) residents (2013–2016) in 123 programs. For each of 22 subcompetencies, a multilevel spline regression model was applied to data for residents who did not reach the target. This regression line was used to establish a cut-off milestones rating per time of evaluation. We explored various milestones rating thresholds as part of a sensitivity analysis. Odds ratios (OR) were calculated using a multilevel logistic regression model to determine the likelihood residents below the thresholds would not reach the target. Negative predictive values (NPV) were also calculated to estimate the accuracy of classification.

**Results:** OR and NPV increased with each assessment over time. Using the spline regression cut-off at end of postgraduate year 2, ORs ranged from 2.5 to 8.9 and NPVs from 15% to 51% among 22 subcompetencies. Lowering threshold to the nearest 0.5 milestone unit, ORs ranged from 1.4 to 10.4 and NPVs from 27% to 76%.

**Conclusions:** ORs and NPVs calculated from national milestones ratings provide various options to help program directors identify struggling residents earlier and determine the best time to intervene. The findings of this study need to be cross-validated using different cohorts of residents.

## Factors affecting the development of confidence during surgical residency training

M. C. Lees, B. Zheng, L. Daniels, J. S. White

University of Alberta, Edmonton, AB

**Introduction:** Recent literature suggests the development of surgical confidence is multifactorial and affected by both trainee- and program-specific factors. This literature is based largely on surveys and questionnaires, and approaches the topic from the perspective of a "confidence crisis." The objective of this study was to explore and better characterize the factors affecting confidence during surgical training.

**Methods:** This was a qualitative research study in which we conducted semistructured interviews with 7 general surgery residents to explore their experiences of confidence. Interview transcripts were coded and analyzed using inductive strategies to determine common categories, topics, and recurring themes. Each resident received a postinterview summary of their responses.

**Results:** Two main categories were found to affect the confidence of surgery residents: internal and external. Internal factors incorporated personal experiences (including operative experience), personal expectations, self-perception, and individual skill development. External factors involved feedback, patient outcomes, relationships with staff, and working within a supportive environment. Interestingly, residents discussed external social factors more than case volume, technical skills, or underlying knowledge. Residents did not feel that their personal lives (eg, marital status or having children) directly affected their surgical confidence. Regardless of the factor itself, positive experiences helped build and maintain confidence by providing feelings of reassurance, encouragement, comfort, and acceptance.

**Conclusions:** Surgical confidence is influenced by a range of both internal and external factors. Improving our understanding of these factors can help educators improve learning experiences for residents and accelerate their progress toward being confident, independent surgeons.

**Autonomy provision and professional identity formation during residency: A qualitative study**

A. Sawatsky, H. Nordhues, W. L. Santivasi, B. Vaa, J. Ratelle, T. Beckman, F. Hafferty

Mayo Clinic, Rochester, MN, United States

**Introduction:** Professional identity formation (PIF) should be a focus of medical education. Tensions between supervision and autonomy affect residents' sense of ownership over patient care. Social cognitive theory (SCT) provides a lens to view the interactions between identity, role, and context. We explored resident perceptions of autonomy to characterize its relationship to PIF.

**Methods:** We conducted semistructured interviews with 23 internal medicine residents (5 postgraduate year [PGY] 1, 9 PGY-2, and 9 PGY-3). Guided by constructivist grounded theory, we used open codes, analytic memos, and discussion to identify and explore relationships between themes. Using SCT to frame our data analysis, we constantly compared our initial conceptualization of findings, SCT, and new data as it was collected to explore the role of autonomy in PIF.

**Results:** Residents identified autonomy as a critical factor for PIF during residency. We identified themes describing "roles," "identity," and "context" affecting residents' experience of autonomy. There is a relationship between the confidence portrayed by a resident and the trust that faculty place in that resident, affecting autonomy. Residents regularly engage in "faking" confidence to build trust from patients and faculty to engage in the roles of a physician. Providing autonomy space allows residents to make "real decisions" and builds their professional identity as the provider with ultimate responsibility for patient care.

**Conclusions:** Resident PIF is shaped by providing autonomy. Understanding the reciprocal relationships between identity, role, and context using SCT may help clinical supervisors balance supervision and autonomy in the clinical setting and provide the optimal context for PIF.

## The hidden curriculum: A good thing?

R. Mackin<sup>1</sup>, S. Baptiste<sup>2</sup>, A. Niec<sup>2</sup>, A. Kam<sup>2</sup>

<sup>1</sup>McMaster University, Burlington, ON; <sup>2</sup>McMaster University, Hamilton, ON

**Introduction:** The hidden curriculum is defined as a set of influences that function at the level of the organizational structure and culture to impact learning. It contributes to a multidimensional learning environment that includes the formal, informal, and hidden curriculum. Literature supports the significant impact of the hidden curriculum on all levels of learners in medical education. Our project aims to capture the messages being delivered to medical trainees at our local facility.

**Methods:** Multiple 1-time educational sessions on the hidden curriculum were provided at an academic tertiary care center over a 5-year period to health care professionals. Participants were asked to share personal examples of the messages they have learned through the hidden curriculum anonymously. A thematic analysis of the responses was completed and coded by 2 independent reviewers.

**Results:** Participants consisted of medical students, residents, faculty physicians, nurses, and other allied health professionals. The health care professionals' experience of the hidden curriculum emerged in 5 main themes: Vulnerability, Hierarchy, Privilege, Navigation and Negotiation, and Positivity.

**Conclusions:** The identified themes focus on a learners' ability to survive the clinical medicine learning environment. A minority of responses demonstrated the positive impact that the hidden curriculum can have on professional development. This project highlights the importance of formally addressing the hidden curriculum to capitalize on its impact on medical trainees. The results have led to a subsequent project which focuses on residents as the population of interest in their unique role as learners and preceptors.

## Learning in and from the matrix: The contextual curriculum

B. Schrewe<sup>1</sup>, R. Ellaway<sup>2</sup>, C. Watling<sup>3</sup>, J. Bates<sup>1</sup>

<sup>1</sup>University of British Columbia, Vancouver, BC; <sup>2</sup>University of Calgary, Calgary, AB; <sup>3</sup>Western University, London, ON

**Introduction:** Contemporary medical learners train in a broader range of clinical settings than ever before. While existing distributed medical education models have focused on workforce outcomes and equivalency of academic opportunity and performance, there are indications that the unprecedented breadth of contextual variation that learners experience is transformative on a deeper level. There is a need, therefore, to reappraise context's role in medical education.

**Methods:** We considered context as a matrix produced from 6 dynamic and intersecting patterns: patients, practices, education, locations, culture, and society. We drew on both situated learning theory to frame how trainees learn to participate competently in a specific context and approaches from philosophy to understand how context's effects on their learning might go unappreciated.

**Results:** Trainees' active engagement with unique affordances offered by each context results in highly individualized learning outcomes. Their participation in this contextual matrix shapes what they learn and who they might become as physicians, yet trainees may not grasp that competent practice is linked to context. Drawing upon the concept of the contextual curriculum may help make context's myriad effects on learning explicit.

**Conclusions:** Context shapes what it means to be competent. We may productively harness the contextual curriculum on both individual and institutional levels to ensure trainees are afforded opportunities to recognize the key role that context plays in training, to identify how their abilities and identities are critically dependent on contextual interaction, and to seamlessly provide safe and high-quality care when transitioning between rotations, sites, and career stages.

## **Nature and nurture: How learning style and environment can optimize plastic surgery training in Canada**

K. Boehm, D. Jenkins, S. Al Youha, O. Samargandi, D. Tang

Dalhousie University, Halifax, NS

**Introduction:** With the transition to competency-based education and restraints on trainee work hours, there is an increasing need to re-evaluate resident education. This can be accomplished by considering both learning styles and teaching environment. Understanding predominant learning styles coupled with knowledge of the impacts of shame-based learning (SBL) can provide valuable guidance during curriculum design. This study endeavored to identify the learning styles of plastic surgeons and trainees as well as quantify the prevalence and effects of SBL in Canadian plastic surgery programs.

**Methods:** An electronic survey was sent to all members of the Canadian Society of Plastic Surgeons. The Kolb Learning Style Inventory was used to identify each individual's learning style (converging, accommodative, assimilative, divergent). SBL was assessed using a validated questionnaire.

**Results:** A total of 98 responses (14.7%) comprising of 63% staff and 37% residents/fellows were received. Convergent (46.9%) and accommodative (28.6%) learning styles predominated. With respect to SBL, 76% of staff and 67% of residents/fellows have experienced shaming as a learner, 85% have witnessed a colleague being shamed, and 11% of respondents felt that same is necessary, all of whom have previously been shamed. The most common effect of SBL was a loss of self-confidence.

**Conclusions:** Three-quarters of plastic surgery residents and staff have learning styles that rely heavily on practical application and experiential learning. SBL negatively impacts self-confidence and job performance. This information can be used during curriculum design to tailor education delivery to the predominant learning styles with an emphasis on teaching strategies that are not rooted in SBL.

## Exploring how the clinical learning environment impacts residents' nontechnical skill development

K. LaDonna<sup>1</sup>, J. Smyth<sup>2</sup>, S. Cristancho<sup>3</sup>, L. Cowley<sup>1</sup>, L. Ananny<sup>1</sup>, S. Arntfield<sup>2</sup>

<sup>1</sup>University of Ottawa, Ottawa, ON; <sup>2</sup>London Health Sciences Centre, London, ON; <sup>3</sup>University of Western Ontario, London, ON

**Introduction:** Women admitted to the Antenatal Unit identify residents as their advocates, relying on them to translate information and liaise with care providers. This suggests that, despite nontechnical roles receiving less curricular emphasis, residents are learning the skills necessary for effective advocacy, communication, and collaboration. If we can understand whether features of the Antenatal Unit foster this learning, we may identify opportunities to optimize nontechnical skills training across clinical settings.

**Methods:** We interviewed staff (n = 7) and residents (n = 11) about training and care on the Antenatal Unit. Constructivist grounded theory informed data collection and analysis.

**Results:** In comparison to other rotations, participants perceived that residents had greater autonomy, more time to develop patient relationships, and more opportunities to see the implications of their actions. This afforded residents a sense of independence and accountability, which provided a glimpse of their future as independent practitioners. Specifically, having the ability to work directly with multiple care providers enabled residents to both develop a holistic understanding about women's complex medical and psychosocial needs and to identify opportunities to address them.

**Conclusions:** Developing nontechnical skills may require residents to spend more time with patients, observe care approaches, and experience the results of their decisions. Because of its unique features, the Antenatal Unit may be a useful environment for teaching and assessing nontechnical skills in obstetrics and gynecology. To fulfill the need for education and assessment of skills vital to independent practice, we encourage other postgraduate programs to identify learning environments that provide similar opportunities.

## **An exploration of learning environment, culture, and associated strengths and challenges across residency training programs**

L. Desanghere, T. Robertson-Frey, A. Saxena

University of Saskatchewan, Saskatoon, SK

**Introduction:** Distinct learning cultures (LC) and learning environments (LEs) exist across medical disciplines. The purpose of this project was to examine differences between programs on resident assessments of their LE and LC, as well as to explore strengths and weakness of program LEs.

**Methods:** A total of 207 residents across 4 program groupings (medical [n = 29], surgical [n = 66], family medicine [n = 43], and other [n = 69]) assessed LE, LC, and reported program strengths and challenges. One-way ANOVAs were carried out on LE and LC measures; content analysis was used to code open-ended responses.

**Results:** Significant effects of program were observed for LE and LC. Family medicine had higher ratings for LE content domains (eg, teaching style) than medical and surgical programs; as well as higher ratings for Atmosphere and Organization domains than surgical programs. Surgical and medicine disciplines also showed differences in ratings for LC domains of recognition, affiliation, and influence when compared to family medicine. The greatest challenges associated with LE concerned program structure and organization, with surgical programs identifying service demands as the greatest challenge; all other programs identified challenges with the environment (eg, discrimination, disrespect, intimidation). The greatest strengths in surgical and medical programs concerned the program resources (ie, learning opportunities) while family medicine and "other" programs identified strengths within the structure and organization of the program, specifically in supervision and support.

**Conclusions:** Resident assessments of both LE and LC can vary by program. Identifying strengths and challenges within programs can help bolster physician training by enhancing different aspects of the environment and culture.

## Medical education in the long-term care setting: Exploring residents' experience of learning in this environment

V. Ewa<sup>1</sup>, M. O'Beirne<sup>1</sup>, A. Dennis<sup>2</sup>, R. DeFina<sup>1</sup>

<sup>1</sup>University of Calgary, Calgary, AB; <sup>2</sup>Billings Clinic, Billings, MT, United States

**Introduction:** Long-term care (LTC) education has been shown to increase geriatric knowledge and skills of trainees. Literature on factors influencing learning in the LTC learning environment is sparse. With an aging population and increasing multimorbidity, training physicians to deal with this challenge is a priority. The aim of this study is to explore learners' experience of learning within a competency-based curriculum with direct clinical supervision in the LTC environment. It also explores the impact of training on self-perception of competence to manage older adults across other care settings.

**Methods:** First-year family medicine residents participating in an optional 1-year longitudinal rotation in the LTC learning environment were interviewed. An iterative process of data collection and analysis consistent with grounded theory was employed to understand the reported experiences of residents.

**Results:** The study identified 26 themes in 5 categories: (1) resident supervision; (2) health system organization; (3) patient context; (4) communication; and (5) team. Residents reported feeling overwhelmed with the level of complexity and chronic multimorbidity in the LTC environment. The LTC environment was characterized as "slow-motion medicine" that facilitated competence in managing these patients. Despite acquiring competencies, residents identified the practice environment in other settings as a barrier to transfer of learning.

**Conclusions:** The key theoretical construct developed through this study is the notion of slow-motion medicine. This construct underpinned the themes that influenced learning in the LTC environment and enabled the development of competencies in the care of older adults with complex multimorbidity. Further research is needed on the impact on clinical practice following the LTC rotation.

**Burnout, depression, and belittlement: The results of a cluster analysis of survey data for US residents**

N. Yaghmour<sup>1</sup>, K. DeCarlo<sup>2</sup>, P. H. Rockey<sup>1</sup>, J. Schwartzberg<sup>1</sup>, D. C. Baldwin Jr<sup>1</sup>, T. Brigham<sup>1</sup>

<sup>1</sup>Accreditation Council for Graduate Medical Education, Chicago, IL; <sup>2</sup>Northwestern University, Chicago, IL, United States

**Introduction:** Seven of 10 US resident physicians experience burnout. Burned out residents are less able to offer optimal patient care and may not be learning efficiently. When resident survey respondents are clustered based on burnout, namely emotional exhaustion and engagement, do the clusters have different rates of depression and reported belittlement?

**Methods:** Between January and April 2017, US residents were offered an optional, anonymous survey querying general health, burnout (3 exhaustion and 3 engagement items from the Oldenburg Burnout Inventory), and satisfaction, along with a depression screen (Patient Health Questionnaire–2). We performed K-cluster analyses on the burnout items. The resultant clusters were compared by satisfaction levels and both rates of depression and reported belittlement.

**Results:** The 14 088 respondents (10.9% of US residents) were placed into 5 clusters, named according to exhaustion and engagement scores: “Thriving” (18.1%, engaged and not exhausted); “Coping” (19.6%, engaged and moderately exhausted); “Surviving” (23.7%, somewhat engaged and moderately exhausted); “Struggling” (26.7%, somewhat engaged and exhausted); and “Drowning” (11.9%, disengaged and very exhausted). Positive screens for depression were 1% for Thriving, 4% for Coping, 4% for Surviving, 20% for Struggling, and 49% for Drowning. Likewise, reported belittlement rates were 8%, 20%, 22%, 40%, and 57%, respectively.

**Conclusions:** Higher rates of emotional exhaustion and disengagement are associated with increased risks of depression and reported episodes of belittlement. Programs and institutions must eliminate trainee belittlement and seek to detect and respond to signs of burnout and depression. “Drowning” residents may need targeted interventions with a mentor or a mental health professional.

## Examining intimidation and harassment in medical education: Impact on learning environment and program culture

A. Saxena, L. Desanghere, T. Robertson-Frey

University of Saskatchewan, Saskatoon, SK

**Introduction:** The prevalence of intimidation and harassment in residency training programs continues to be problematic, with 45% to 93% of residents reporting having experienced this behavior on at least 1 occasion (Karim and Duchcherer, 2014). The purpose of this project was to explore the impact of experiencing and/or witnessing intimidation and harassment on resident perceptions of their learning environment and learning culture.

**Methods:** A total of 207 residents assessed their learning environment and learning culture, as well reported whether they had experienced and/or witnessed intimidation and harassment over the last 6 months. One-way analyses of variance were used to explore intimidation and harassment experience on residents' assessments of their learning environment and culture.

**Results:** Residents who reported experiencing intimidation and harassment (17% yes, 7% preferred not to answer or witnessing (21% yes, 4% preferred not to answer) had significantly lower ratings ( $P < .05$ ) on all aspects of their learning environment than residents who did not experience (76%) or witness (75%) these behaviors. These included lower ratings on content (eg, teaching style, feedback); atmosphere (eg, respect, support); and organization (eg, learning aims, task clarity). These residents also provided significantly different ratings on learning culture measures, including recognition, dissatisfaction, affiliation, accomplishment, and influence within their program.

**Conclusions:** These results demonstrate the negative effects of intimidation and harassment on residents' perception of learning environment and learning culture, factors which have shown to have a profound influence on resident learning, achievement, and satisfaction. Explicit attention and deliberate improvement efforts to reduce intimidation and harassment would have immediate benefits to resident learning and culture for individuals who are experiencing or witnessing these events.

## Mentorship needs of radiation oncology residents: Implications for program design

J. Croke<sup>1</sup>, E. Milne<sup>1</sup>, A. Bezjak<sup>1</sup>, B. Millar<sup>1</sup>, S. Heeneman<sup>2</sup>, M. Guiliani<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>Maastricht University, Maastricht, Netherlands

**Introduction:** Mentorship during residency guides professional and personal development, enhances productivity, and decreases burnout. Despite this, formal mentorship programs are uncommon. The objective of this qualitative exploratory study was to assess the mentorship needs of radiation oncology residents to inform formal mentorship program design.

**Methods:** Radiation oncology residents and faculty from a single university were invited to participate in 1-on-1 interviews to explore their mentorship experiences, needs, and program design suggestions. Interviews were audiotaped and transcribed verbatim. Two researchers independently coded data to derive emergent themes using NVivo Pro version 11. A constant comparative method was executed. Data collection occurred until thematic saturation.

**Results:** Twenty interviews took place (10 residents, 10 faculty). Participants were balanced according to gender (10 women, 10 men) and seniority (4 junior, 6 senior residents; 5 junior, 5 senior faculty). Four emergent themes were identified. First, residents and faculty have limited formal mentorship experiences. Second, characteristics for successful relationships identified were commitment, approachability, and availability by residents, and commitment and initiative by faculty. Third, mentorship needs change throughout residency. Junior residents seek general mentorship in program logistics and research, whereas senior residents seek specific mentorship in networking, fellowship, and jobs. Lastly, exposure to multiple mentors was recommended to address specific areas and evolving needs.

**Conclusions:** Mentorship needs evolve during training. Commitment is necessary for successful mentorship relations. Residents should have access to multiple mentors to address their needs. Future work will involve designing and implementing a formal mentorship program for our program that can be modified for use in other institutions.

## Improving orientation for new trainees

M. Aimer

Royal Australian and New Zealand College of Psychiatrists, Melbourne, VIC, Australia

**Introduction:** The welfare and support of psychiatry trainees and psychiatrists has been a major area of focus for the Royal Australian and New Zealand College of Psychiatrists (RANZCP) over the past 3 years. This focus has included improving the orientation of new trainees.

**Methods:** In September 2014, the RANZCP Membership Engagement Committee commissioned a comprehensive study into the welfare of psychiatrists and trainees to identify issues affecting the health and welfare of members, and to inform future work. The study incorporated an anonymous member survey, a literature review, an online discussion forum thread, and targeted focus groups. Further to this, in April 2015, the RANZCP Board established a Trainee Welfare Working Group to review current issues facing RANZCP trainees, document the full range of support measures in place, and prioritize support initiatives that the College could develop further.

**Results:** The RANZCP has undertaken a number of initiatives to improve trainee and member well-being, including the development of a series of orientation and support resources to help trainees to plan and stay on track during training and maintain a healthy career–life balance. Other initiatives include the introduction of mentoring programs and the inclusion of well-being activities during conferences.

**Conclusions:** The RANZCP Member Welfare and Support Program describes a broad range of activities that the RANZCP is doing to improve the health and well-being of members and advocate for the improved health and well-being of medical students and physicians more generally.

**Canadian critical care medicine physician perceptions regarding transition to Competence by Design: Mind the gap!**

J. A. Lord<sup>1</sup>, J. Gaudet<sup>1</sup>, M. Palacios<sup>1</sup>, W. Sligl<sup>2</sup>, G. Finlayson<sup>3</sup>, S. Bridge<sup>4</sup>, J. Guimond<sup>5</sup>, R. Ellaway<sup>1</sup>

<sup>1</sup>University of Calgary, Calgary, AB; <sup>2</sup>University of Alberta, Edmonton, AB; <sup>3</sup>University of British Columbia, Vancouver, BC; <sup>4</sup>Queen's University, Kingston, ON; <sup>5</sup>Centre Hospitalier de l'université de Montréal, Montreal, QC

**Introduction:** Canadian residency specialty training programs are transitioning to Competence by Design (CBD). Identifying and addressing barriers and enabling factors will facilitate transition.

**Objective:** We investigated perceptions of critical care medicine faculty and residents regarding transition to CBD and explored whether understanding of CBD principles influences opinions regarding CBD implementation.

**Methods:** We surveyed critical care medicine faculty and residents from 5 Canadian universities regarding their perceptions of CBD. Data are reported using descriptive statistics. Comparisons between groups were performed using independent sample *t* tests.

**Results:** A total of 112 (48%) physicians completed the survey. Participants were ambivalent about the need for CBD and lacked confidence they could implement CBD. Those who understood CBD felt more strongly there was a need for transition and believed compelling evidence exists. The most significant implementation barriers identified were lack of faculty engagement, lack of time, and insufficient training in evaluation and feedback. Those who felt they did not understand CBD expressed greater personal uncertainty about CBD principles and lack of faculty training. Anticipated benefits of CBD included greater ability to identify residents in difficulty, and to provide enhanced resident feedback. Better quality health care for society and greater physician accountability were considered less important.

**Conclusions:** Uncertainty regarding CBD principles exists and may jeopardize implementation. CBD implementation strategies should focus on improving faculty engagement, providing faculty development on CBD principles including coaching and feedback, and addressing time constraints impacting workplace-based assessment.

## **An evaluation of formalized mentorship for residents in psychiatry: A competency-based medical education program with career counseling tools**

M. M. Thomas, A. Kassam

University of Calgary, Calgary, AB

**Introduction:** Mentorship is an asset to postgraduate medical education residents for improved well-being and career development. The CanMEDS roles are an essential component of medical education, and their inclusion in a formalized mentorship program has yet to be evaluated. In this study, we evaluate the use of CanMEDS roles in a formal mentorship program for medical residents in psychiatry and faculty member mentors at the University of Calgary.

**Methods:** A mixed methods design was used. Quantitative survey results from 46 residents and 41 faculty members were analyzed. The phi coefficient test was used to determine significance of cross tabulations between demographics and perceptions. Semistructured interviews with 8 medical residents in psychiatry and 6 faculty members were conducted. Through the quantitative survey we gauge perceptions of mentorship prior to the program, and qualitative interviews assess the current perceptions of the mentorship program.

**Results:** Participants felt the mentorship program was a positive experience, and spoke to the benefits of indirectly using the CanMEDS roles in mentoring sessions. The interview and survey data found perceived personal compatibility between mentor and mentee was essential to mentorship.

**Conclusions:** Mentees and mentors value mentorship for career development and well-being. The use of CanMEDS roles are beneficial to mentees when used indirectly to relate to their experiences in residency. Transferability is limited because only 1 mentorship program is in place for medical residents at the University of Calgary. Therefore, future work is needed to assess the implementation of formal mentorship programs in other medical residency training programs.

## Motivation to access laparoscopic skills training by obstetrics and gynecology residents: A novel tool to characterize motivation

J. A. Stairs<sup>1</sup>, S. A. Scott<sup>1</sup>, B. Bergey<sup>2</sup>

<sup>1</sup>Dalhousie University, Halifax, NS; <sup>2</sup>Queens College, City University of New York, New York, NY, United States

**Introduction:** Despite increasing emphasis on laparoscopic simulation, little is known about the motivational factors that influence residents' utilization of simulation facilities. Our primary objective is to understand factors that motivate residents to seek laparoscopic simulation experience outside of the formal postgraduate curriculum. The purpose of this pilot study was to evaluate a questionnaire designed to assess motivational factors influencing residents in this context.

**Methods:** A prospective cohort study was conducted to pilot a questionnaire grounded in Expectancy Value Theory, an established psychological theory of educational motivation. The questionnaire was developed by modifying existing validated measures of motivation to the context of surgical skills acquisition in postgraduate education. Obstetrics and gynecology residents at Dalhousie University completed the questionnaire and participated in a focus group. Fifteen residents completed the questionnaire (65% response rate). Four respondents participated in a focus group. Cronbach's alpha were calculated to assess the internal reliability of scales. Reliability analyses were combined with focus group feedback to highlight necessary questionnaire modifications.

**Results:** Most scales demonstrated strong internal reliability (Cronbach's alpha = 0.87–0.93). Information from reliability analyses and focus groups converged to indicate ways to improve scales. Further, focus groups revealed a possible moderating variable: whether residents believed that use of laparoscopic simulation resources led to skill development.

**Conclusions:** We plan to administer this novel questionnaire to obstetrics and gynecology residents across Canada to determine motivational factors that drive simulation use. We hope that characterizing motivation to use simulation resources could inform development of simulation curricula and optimize simulation resource utilization.

## Simulation-based training for burr hole surgery procedure in VR versus iPad applications

D. B. Clarke<sup>1</sup>, N. Kureshi<sup>2</sup>, A. Galilee<sup>3</sup>, L. Fenerty<sup>2</sup>, M. Hong<sup>2</sup>

<sup>1</sup>QEII Health Sciences Centre, Halifax, NS; <sup>2</sup>Nova Scotia Health Authority, Halifax, NS; <sup>3</sup>Dalhousie University, Halifax, NS

**Introduction:** Surgical simulation offers postgraduate trainees the opportunity to acquire surgical skills outside of the operating room. This study investigated the effectiveness of low-fidelity (iPad) versus high-fidelity (VR) simulation training for a burr hole surgery procedure (PeriopSim) and transferability of learned material to the real world.

**Methods:** This was a randomized trial of 17 postgraduate year 1 neurological surgery residents from across Canada. Participants were randomly assigned to 2 groups: VR (Group 1) or iPad (Group 2) and simulation sessions were repeated over 3 sessions. Primary outcome measures in simulation were score, accuracy, and time saved. Knowledge transfer was assessed by participants identifying real surgical instruments within 45 seconds.

**Results:** In Group 1, 87% of participants had  $\geq 10$  weeks of elective neurological surgery rotations, compared with 12 % in Group 2 ( $P = .01$ ). Only Group 1 showed a decrease in number of errors ( $2.7 \pm 0.8$ ,  $P = .02$ ) from session 1 to session 3. Neither group demonstrated significantly higher scores or better overall times. In real instrument testing, participants correctly identified 89% and 83% of instruments in Group 1 and Group 2, respectively ( $P = .3$ ).

**Conclusions:** Our results show that both our high- and low-fidelity simulation platforms effectively transfer simulated learning into the real world. Future studies will be necessary to validate our findings that fewer errors of instrument recognition occur in high-fidelity VR simulation.

## How does resuscitation performance in the simulation setting relate to performance in the real world? A direct comparison of entrustment scoring of emergency medicine residents

K. Weersink, A. K. Hall, J. V. Rich, A. Szulewski, D. Dagnone

Queen's University, Kingston, ON

**Introduction:** Simulation is increasingly used in postgraduate medical training as an educational tool and, increasingly, as an assessment opportunity. However, there is limited evidence comparing performance in the simulation lab to real life clinical performance for nonprocedural tasks such as resuscitation in the emergency department (ED). We sought to directly compare resident performance in the simulation environment to clinical performance in the ED using a novel, workplace-based resuscitation assessment tool (RAT).

**Methods:** The RAT was derived from the previously evaluated Queen's Simulation Assessment Tool via a modified Delphi process. Emergency medicine (EM) residents from Queen's University were assessed using the RAT during simulation-based objective structured clinical examinations, and in the ED during resuscitation cases from July 2016 to June 2017. Resident mean entrustment scores were compared using Pearson product-moment correlation to determine the relationship between mean entrustment in simulation cases and in ED clinical performance.

**Results:** Eighteen residents from the CCFP-EM and FRCPC-EM training programs were assessed in both the ED and in simulated resuscitations. There was a moderate positive overall correlation between resident entrustment scores in the simulated and workplace-based settings ( $r = 0.541$ ;  $n = 18$ ;  $P = .02$ ). Further, mean trainee entrustment improved over the study period (3.33 of 5 to 3.98 of 5), and positive correlations were found during assessments within the same time interval ( $r = 0.221$ ,  $P = .64$  July–November;  $r = 0.597$ ,  $P = .024$  November–May).

**Conclusions:** This study contributes to the growing body of validity evidence supporting simulation-based assessment as a predictor of EM resident resuscitation performance in the workplace.

## Simulation for teaching and assessment of collaboration skills in a hematology residency program

Z. Liederman<sup>1</sup>, J. Petrucci<sup>2</sup>, D. Campbell<sup>2</sup>, M. A. Trinkaus<sup>2</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>St. Michael's Hospital, Toronto, ON

**Introduction:** There is little consensus on how to teach and evaluate collaboration for hematology residents. A robust collaboration framework is required as hematology residency programs transition into Competency by Design. Simulation has been successfully used in interprofessional education, often with a focus on junior learners. This pilot study evaluates simulation in the development and assessment of collaboration skills among senior hematology residents.

**Methods:** Two standardized simulation scenarios were developed that required residents to collaborate with multiple confederates. Three postgraduate year 4 (PGY-4) and 4 PGY-5 residents completed a simulation scenario and individual debrief. Pre-, post- and 3-month questionnaires were completed by residents to evaluate the exercise and self-assessed collaboration competency. The simulation and debrief were video recorded and qualitative analysis was performed using phenomenological inquiry.

**Results:** All participants completed the questionnaires. One resident declined to be videotaped and was excluded from qualitative analysis. Residents came into the scenarios with high confidence in a range of collaboration elements and a trend towards improved confidence was observed on post questionnaires (8.23 /- 0.70 versus 7.61 /- 0.64, 10-point Likert scale). This was maintained at 3 months. Within the simulation, trainees appeared more comfortable collaborating interprofessionally than with medical peers or supervisors. Overall, PGY-5 trainees demonstrated more advanced collaboration skills than PGY-4 trainees. All residents found the exercise to be a positive and unique learning experience.

**Conclusions:** Simulation is a promising tool for teaching and assessing collaboration within a hematology residency program. Future study is needed to compare simulation to traditional collaboration curricula.

**National pediatric critical care assessment of the individual trainee within a team:  
Organization, role in competency-based medical education, lessons, and future directions**

B. Mema<sup>1</sup>, E. Gilfoyle<sup>2</sup>, F. Muttalib<sup>1</sup>, O. Zaulan<sup>1</sup>

<sup>1</sup>Hospital for Sick Children, Toronto, ON; <sup>2</sup>Alberta Children's Hospital, Calgary, AB

**Introduction:** Simulation augments the clinical experiences and assessment opportunities. While simulation for training is context-dependent, there is a need for national assessment standards. Our objective was to design a sample national assessment blueprint and develop an assessment strategy where the individual learner assessment in simulation was within a team context to better portray real life.

**Methods:** An interprofessional team of 30 was in charge of blueprint. Eight scenarios were chosen to represent competencies difficult to assess with other assessment tools, not frequently entrusted or supervised during training, and could be demonstrated in a 30-minute simulation context. Eight teams, each composed of 2 physician trainees (junior and senior), 2 nurses, and 1 respiratory therapist was formed in the morning of the assessment day and rotated together through all simulation scenarios.

**Results:** Raters assessed the team and the individual (team lead); participants self-assessed the team and the lead performance. A traveling rater was assigned to 1 team to be able to assess how the function, team dynamics, and performance evolved over the day of simulation assessment. A retrospective pre-post evaluation of the participants showed an increase from 65 to 85 with no difference between physician-in-training, nurses, and respiratory therapist. Competency of the individual and the team was highly influenced by each other.

**Conclusions:** National assessment of trainees in simulation and within team context is feasible and is able to expose and assess competencies other than Medical Expert.

## Surgery tutor for assessment of technical proficiency in open soft-tissue tumor resection: A validation study

J. Ring, C. T. Yeo, M. Holden, T. Ungi, G. Fichtinger, B. Zevin

Queen's University, Kingston, ON

**Introduction:** There is increased utilization of simulation training in surgery, which can improve trainee skills and patient safety. However, cost and preceptor availability continue to limit widespread utilization within competency-based curricula. We developed an open-source platform, Surgery Tutor, for computerized assessment of technical proficiency during open soft-tissue tumor resections. Our objective was to provide evidence of reliability and construct validity for Surgery Tutor.

**Methods:** Thirty participants from Queen's University were recruited into "novice," "intermediate," or "experienced" groups, with 10 participants per group, based on the number of previous soft-tissue resections performed. Each participant resected 4 lesions from a phantom with Surgery Tutor tracking instrument motions, time per resection, mass of specimen excised, and margin status. Test-retest reliability was calculated using the interclass correlation coefficient (ICC). Construct validity was calculated by comparing tracking data between novice, intermediate, and experienced groups using 1-way analyses of variance or Kruskal-Wallis tests.

**Results:** There was "moderate" to "good" test-retest reliability for novice (ICC = 0.596,  $P < .01$ ), intermediate (ICC = 0.569,  $P < .01$ ), and experienced groups (ICC = 0.737,  $P < .01$ ). Construct validity was demonstrated for number of instrument motions ( $690.3 \pm 190.7$  versus  $597.7 \pm 169.4$  versus  $469.7 \pm 110.6$ ,  $P < .01$ ), number of tumor breaches ( $29.4 \pm 34.8$  versus  $15.8 \pm 11.4$  versus  $9.4 \pm 6.9$ ,  $P < .01$ ), rate of positive margins (68% versus 50% versus 28%,  $P < .01$ ), and mass of completely excised specimens ( $22.8 \pm 7.1\text{g}$  versus  $21.2 \pm 11.3\text{g}$  versus  $17.3 \pm 6.2\text{g}$ ,  $P = .04$ ).

**Conclusions:** Surgery Tutor shows evidence of reliability and construct validity for assessment of technical proficiency during open soft-tissue tumor resections. This platform can be used formative feedback and assessment in a simulated setting without the presence of a preceptor.

## Implementation and evaluation of a comprehensive proficiency-based upper gastrointestinal curriculum: A multi-institutional Canadian experience

B. Zevin<sup>1</sup>, G. Sheahan<sup>1</sup>, S. Ashamalla<sup>2</sup>, N. Dedy<sup>2</sup>, D. Jalink<sup>1</sup>, T. Grantcharov<sup>3</sup>

<sup>1</sup>Queen's University, Kingston, ON; <sup>2</sup>University of Toronto, Toronto, ON; <sup>3</sup>St. Michael's Hospital, Toronto, ON

**Introduction:** A comprehensive proficiency-based upper gastrointestinal (GI) curriculum was previously developed. The purpose of this study was to implement and evaluate this curriculum at 2 academic general surgery residency programs in Canada.

**Methods:** Upper GI curriculum included a didactic (lectures and group sessions) and a simulation-based component (proficiency-based laparoscopic enteroenterostomy training and simulated operating room crisis scenario). It was offered to postgraduate year 3–5 surgery residents at the University of Toronto and Queen's University. Pre- and postcurriculum knowledge and technical skills were assessed using a 25-item multiple-choice test and procedure-specific assessment scale, respectively. Postcurriculum nontechnical skills were assessed using a Non-Technical Skills for Surgeons (NOTSS) scale. Participants' perceptions about the curriculum were assessed using a questionnaire (5-point Likert scale).

**Results:** Twenty-seven residents participated in the curriculum across 2 institutions. There was a significant improvement in knowledge ( $46.9 \pm 13.8$  versus  $61.3 \pm 12.0$ ,  $P < .01$ ) and in technical skills ( $59.6 \pm 3.4$  versus  $88.6 \pm 1.0$ ,  $P < .001$ ) after completing the curriculum. Residents demonstrated "good" situation awareness (NOTSS: 4[3–4]), decision making (NOTSS: 4[3–4]), communication and teamwork (NOTSS: 4[3–4]), and "acceptable" leadership (NOTSS: 3[3–4]) after completing the curriculum. Participants perceived the didactic and simulation-based components to be of value ( $4.0 \pm 1.3$  and  $4.3 \pm 0.9$ ). Ninety-six percent of participants agreed and/or strongly agreed that upper GI curriculum was a useful learning experience and should continue to be part of academic curriculum. Lack of faculty supervision was the main barrier to implementation.

**Conclusions:** A comprehensive proficiency-based upper GI curriculum was successfully implemented at 2 academic general surgery residency programs in Canada. Ongoing faculty commitment and buy-in are essential for widespread implementation.

**From simulation to practice: A scoping review on skill transfer**

P. Kalun<sup>1</sup>, N. Wagner<sup>1</sup>, J. Yan<sup>1</sup>, M. Nousiainen<sup>2</sup>, R. Sonnadara<sup>1</sup>

<sup>1</sup>McMaster University, Hamilton, ON; <sup>2</sup>University of Toronto, Toronto, ON

**Introduction:** With the global shift toward competency-based education, surgical programs are making increasing use of simulation to supplement clinical learning. Simulation is an appealing teaching tool as trainees are able to make mistakes, receive valuable feedback, and improve performance prior to working with patients. The purpose of this review was to explore whether skills learned in simulation-based settings result in improved clinical performance in orthopaedic surgery trainees.

**Methods:** We searched Embase, Ovid-MEDLINE, Cochrane Library, and PubMed (August–September 2016) with the following search terms: simulation, transfer, orthopaedic\*, and orthopedic\*. Two independent reviewers completed a title and abstract review, and then screened articles that met the inclusion criteria. Experimental studies, systematic reviews, and narrative reviews were included.

**Results:** From a total of 127 articles, 15 studies were included, with 11 review papers and 4 experimental studies. The review articles reported little evidence regarding the transfer of skills from simulation to the clinical setting, strong evidence that simulator models discriminate among different levels of experience, varied outcome measures among studies, and a need to define competent performance in both simulated and clinical settings. Furthermore, while 3 out of 4 experimental studies demonstrated transfer between the simulated and clinical environments, methodological study design issues were identified.

**Conclusions:** Our review identifies weak evidence as to whether skills learned in simulation transfer effectively to clinical practice for orthopaedic surgery trainees. Given the shift toward competency-based curricula, there is an immediate need for studies that focus on skill transfer, to ensure that simulation is effectively supplementing clinical learning.

**“Get the DNR”: Exploring the impact of an educational e-Module on internal medicine residents’ attitudes and approaches to goals of care conversations**

L. Branfield Day<sup>1</sup>, S. Saunders<sup>2</sup>, L. Steinberg<sup>1</sup>, S. Ginsburg<sup>1</sup>, C. Soong<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, ON; <sup>2</sup>Mount Sinai Hospital, Toronto, ON

**Introduction:** Discordance between patients’ expressed and documented preferences at the end of life is common. Although junior trainees frequently lead goals of care conversations, lack of training can result in poor communication. Based on a needs assessment, we developed an interactive electronic learning module (e-Module) for conducting patient-centered goals of care discussions. The purpose of this study was to evaluate the impact of the e-Module on residents’ attitudes toward goals of care conversations.

**Methods:** First-year internal medicine residents (n = 11) from the University of Toronto selected using purposive sampling underwent semistructured interviews before and after completing a goals of care e-Module. Interviews were anonymized, transcribed, and open-coded using NVivo. Using a constructivist grounded theory approach, we developed a framework to understand the attitudes of residents to goals of care conversations before and after viewing the module.

**Results:** Before the module, participants described limited training and negative emotions toward goals of care conversations. Many focused on code status and procedure choices (eg, ventilation) instead of eliciting patient-centered values. Pressure to “get the DNR” led to conflicting feelings and distress. After the module, participants approached conversations with a greater focus on patient values and process. They felt more prepared and comfortable, recognizing the complexity of conversations and the importance of patient-centeredness.

**Conclusions:** A novel goals of care e-Module allowed residents to develop a patient-centered and standardized approach to goals of care conversations while improving confidence and preparedness. This resource could be an effective strategy toward attaining a critical communication competency among learners with the potential to enhance accurate goals of care documentation.

## Developing adaptive expertise through narrative shifts and workplace learning

A. Kawamura<sup>1</sup>, I. Harris<sup>2</sup>, K. Thomas<sup>1</sup>, B. Mema<sup>3</sup>, M. Mylopoulos<sup>4</sup>

<sup>1</sup>Holland Bloorview Kids Rehabilitation Hospital, Toronto, ON; <sup>2</sup>University of Illinois at Chicago, Chicago, IL, United States; <sup>3</sup>The Hospital for Sick Children, Toronto, ON; <sup>4</sup>University of Toronto, Toronto, ON

**Introduction:** The complexities of our health care system demand that physicians be flexible and adaptive in their use of knowledge and experience to solve problems in clinical practice. This complex problem solving is an essential skill for adaptive experts. Despite its importance, little is known about how adaptive expertise develops in residents. Therefore, the purpose of this study was to explore how pediatrics residents develop adaptive expertise through workplace learning.

**Methods:** A constructivist grounded theory study was conducted, using 102 hours of participant observations and 34 semistructured interviews as data sources and purposeful sampling of 10 subspecialty residents from the Department of Pediatrics at the University of Toronto. Data collection and analysis occurred iteratively and themes were identified through constant comparative analysis by a team of researchers.

**Results:** Residents navigated complexity in clinical consultations by enabling families to express their own narratives and integrating these with their medical knowledge to provide care. At times, a “narrative shift” was needed to effectively navigate the complexity. Residents used this narrative shift purposefully to create new communication strategies, resulting in an opportunity for learning. Critically, this learning was modulated by the resident’s effectivities and the constraints of the workplace environment.

**Conclusions:** Narrative shifts are adjustments in the physician’s understanding of a patient’s narrative that impacts clinical care. Narrative shifts prompted the development of adaptive expertise. The workplace learning environment supported adaptive expertise development by providing opportunities that prepare residents for future learning through active experimentation, deeper conceptual learning, and multiple perspectives.

## Barriers and enablers to direct observation of clinical performance—A qualitative study using the theoretical domains framework

W. J. Cheung<sup>1</sup>, A. Patey<sup>2</sup>, J. R. Frank<sup>3</sup>, M. Mackay<sup>1</sup>, S. Boet<sup>2</sup>

<sup>1</sup>University of Ottawa, Ottawa, ON; <sup>2</sup>Ottawa Hospital Research Institute, Ottawa, ON; <sup>3</sup>Royal College of Physicians and Surgeons of Canada, Ottawa, ON

**Introduction:** Direct observation is essential to assess medical trainees and provide them with feedback to support their progression from novice to competent physicians. However, learners consistently report infrequent observations, and calls to increase direct observation in medical training abound. This study applied a theory-driven approach using the Theoretical Domains Framework (TDF) to systematically investigate factors that serve as barriers and enablers to direct observation in residency training.

**Methods:** Semistructured interviews of faculty and residents from various specialties were conducted. An interview guide based on the TDF was used to capture 14 theoretical domains that may influence direct observation. Interview transcripts were independently coded by 2 researchers using direct content analysis, and specific beliefs were generated by grouping similar responses. Relevant domains were identified based on the frequencies of beliefs reported, presence of conflicting beliefs, and perceived influence on direct observation practices.

**Results:** Twelve resident and 13 faculty interviews were conducted, with a total of 10 different specialties represented. Ten TDF domains were identified as influencing direct observation. Discord between faculty and resident intentions to engage in 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.

**Conclusions:** This study identified key barriers and enablers to direct observation. These influencing factors provide a basis for the development of potential strategies aimed at embedding direct observation as a routine pedagogical practice in residency training.

## Looking back: Using early career pediatricians' experiences to inform postgraduate program design

B. Schrewe<sup>1</sup>, A. Rowan-Legg<sup>2</sup>

<sup>1</sup>University of British Columbia, Vancouver, BC; <sup>2</sup>University of Ottawa, Ottawa, ON

**Introduction:** Completing training is a rite of passage common to all physicians, yet our knowledge of the components in postgraduate pediatric education that equip learners for successful transition to practice is limited. As such, in order to optimally design training programs, it is critical to develop a better sense of what early career pediatricians (ECPs) experience as they navigate this time of transition.

**Methods:** We created and distributed a 23-question survey via e-mail to 481 Canadian ECPs in September 2017, specifically to those who received Royal College certification in 2011 or later. Survey responses were obtained confidentially through an online platform (SurveyMonkey). Descriptive statistics and thematic analysis were used to analyze responses to closed-ended and free text questions, respectively.

**Results:** The response rate was 42%; 68% of respondents self-identified as general pediatricians. Factors facilitating transition to practice included dedicated mentorship, supportive new colleagues and workplace environment, and ease of finding work. Identified challenges included billing, finances, and practice management; adjusting to a different scope of practice and learning local resources; managing comfort levels; and achieving work-life balance. Nearly half of respondents expressed interest in mentoring new ECP colleagues, while a majority wanted better transition support during postgraduate training.

**Conclusions:** Our findings suggest that ECPs find clear value in mentorship, but desire further support to adapt to new practice contexts and activities. As a result, we must consider strategies in both individual programs and nationally that effectively prepare learners prior to transition and align with needs in the first years of independent practice.

## Contextual drivers of learner health advocacy decisions

R. Kahlke<sup>1</sup>, M. Hubinette<sup>2</sup>, T. Van der Goes<sup>3</sup>, J. Clark<sup>2</sup>, I. Scott<sup>2</sup>

<sup>1</sup>Royal College of Physicians and Surgeons of Canada, Ottawa, ON; <sup>2</sup>University of British Columbia, Vancouver, BC; <sup>3</sup> University of British Columbia, Nanaimo, BC

**Introduction:** Within the CanMEDS competency framework, the health advocate role has proven to be among the most difficult to teach and assess, likely because some forms of advocacy rely on learners' willingness to act against "normal" individual and systemic practices. Our study examined how learners conceive of advocacy in diverse contexts and how they make decisions about how and when to advocate in the face of possible social consequences.

**Methods:** This constructivist grounded theory study drew on several data sources. We analyzed existing learner-generated assessment data to develop sensitizing concepts while we concurrently collected and analyzed 1-hour semistructured interviews with undergraduate students and residents in family, pediatric, and internal medicine in diverse practice contexts.

**Results:** Learners bring their knowledge, skills, and values to advocacy decisions and they learn to interpret social norms, available resources, their social position, and patient factors when deciding to advocate. Sometimes that interpretation reveals clear advocacy channels (advocacy is normative). Additionally (and sometimes coexistent with advocacy channels) learners perceive that advocacy will involve friction with colleagues, patients, or the system itself (is counter-normative). Learners navigate between their own values and skills, local channels, and potential friction when making advocacy decisions.

**Conclusions:** Our model of learner advocacy decision-making builds on recent definitional work to understand how and why learners decide to advocate in context. It also supports educators in analyzing how their contexts might influence learners' advocacy decisions and how they can support learners in making decisions to advocate appropriately, even when advocacy may involve friction.

## Empowering subspecialty residents' competency in professionalism: A Balint group in adolescent medicine

S. Jassemi<sup>1</sup>, C. Trevelyan<sup>2</sup>, K. Hick<sup>3</sup>

<sup>1</sup>The Hospital for Sick Children, Toronto, ON; <sup>2</sup>University of Toronto, Toronto, ON; <sup>3</sup>SickKids Hospital, Toronto, ON

**Introduction:** Adolescent Medicine (AM) physicians are increasingly encountering emotionally complex patients. An educational gap exists in supporting trainees when managing difficult patient-physician dynamics, which may destabilize trainees' self-efficacy, an important component of the CanMEDS Professional role. Balint groups have been shown to improve physician self-efficacy in understanding and navigating complex clinical relationships.

**Objective:** We described the impact of Balint groups on AM trainees' professional competencies, including their self-efficacy in managing challenging physician-patient dynamics.

**Methods:** We utilized a mixed-methods experimental study design over the 2017–2018 academic year with 10 monthly Balint group sessions for all 6 AM trainees at the University of Toronto. We will compare pre- and postintervention Psychological Medicine Inventory (PMI) and clinical case vignette scores. Postintervention semistructured interviews were conducted in June 2018. We will analyze interview transcripts and session notes by the Balint group facilitator for themes using a critical approach.

**Results:** The average baseline total PMI score is 70.0 (SD = 9.36), which is similar to baseline scores in the literature. Data from facilitator session notes suggest several emerging themes, including trainees' low self-efficacy, role confusion, isolation, autonomy, system constraints, and interprofessional conflict. Qualitative feedback from a midpoint quality improvement survey suggests the BG promotes insight into counter-transference, decreases isolation and anxiety, and connects trainees.

**Conclusions:** Initial results identify low self-efficacy in AM trainees when navigating challenging patient-physician dynamics, and indicate that Balint groups may be a valuable addition to AM subspecialty training curricula by supporting trainee Professional competence in understanding and caring for emotionally complex patients.

## What European gynecologists need to master: Consensus on medical expertise outcomes of pan-European postgraduate training in obstetrics and gynecology

J. E. van der Aa

OLVG Teaching Hospital, Amsterdam, Netherlands

**Introduction:** European harmonization of training standards in postgraduate medical education in obstetrics and gynecology (Ob-Gyn) is needed because of the increasing mobility of medical specialists. Harmonization of training will provide quality assurance of training and promote high-quality care throughout Europe. Pan-European training standards should describe medical expertise outcomes that are required from the European gynecologist. This paper reports on consensus development on the medical expertise outcomes of pan-European training in Ob-Gyn.

**Methods:** A Delphi procedure was performed among European gynecologists and trainees in Ob-Gyn, to develop consensus on outcomes of training. The consensus procedure consisted of 2 questionnaire rounds, followed by a consensus meeting. We invited 142 gynecologists and trainees to participate, representing a wide range of European countries. They were selected through the European Board and College of Obstetrics and Gynaecology and the European Network of Trainees in Obstetrics and Gynaecology.

**Results:** Sixty people participated in rounds 1 and 2 of the consensus procedure, 38 (63.3%) of whom were gynecologists and 22 (36.7%) were trainees. Twenty-eight European countries were represented in this response. Round 3 of the consensus procedure was performed in a consensus meeting with 6 experts. The entire consensus procedure resulted in a core content of training standards of 188 outcomes, categorized in 10 topics.

**Conclusions:** European consensus was developed regarding the medical expertise outcomes of pan-European training in Ob-Gyn. The outcomes will be described in core trainings standards, aimed at harmonizing training in Ob-Gyn in Europe to promote high-quality care.

## Reciprocal relationship between role and identity in professional identity formation during residency: A qualitative study

W. L. Santivasi, H. Nordhues, F. Hafferty, B. Vaa, J. Ratelle, T. Beckman, A. Sawatsky

Mayo Clinic, Rochester, MN, United States

**Introduction:** Professional identity formation (PIF) should be a focus of medical education. The conceptualization of PIF includes psychological and sociological theories, but the process of PIF during residency remains unclear. Social cognitive theory (SCT) provides a lens to view resident PIF. We explored tensions experienced by residents to characterize PIF during residency.

**Methods:** We conducted semistructured interviews with 23 internal medicine residents (5 postgraduate year 1s [PGY-1s], 9 PGY-2s, and 9 PGY-3s). Using constructivist grounded theory, we identified themes and explored relationships between themes. Using SCT to frame our data analysis, we refined our thematic categorization to explain PIF during residency.

**Results:** Regarding PIF, we identified themes within the categories of "roles," "identity," and "context." A key feature of PIF during residency was the reciprocal relationship between identity and role in clinical practice. Residents discussed ideals of a "good doctor" at the start of residency (eg, "knows everything about medicine"), affecting their enactment of the roles of a good doctor. Experience, feedback, and role models reshaped their ideals ("knows his or her limitations and resources"). Participants described how enacting roles changed their sense of identity, and how their identities informed which roles they adopted. Residents reframed their identity to deal with tensions between the ideal and the reality of the practice of medicine.

**Conclusions:** Residents undergo PIF, in part, through reciprocal interactions between their identities and the roles they fill in clinical practice. SCT, with its focus on the reciprocal relationships between person, behavior, and context, provides a framework to understand PIF during residency training.

## The educational time-out: A model for structured perioperative teaching and learning

J. Xu, S. Rai, J. Davies, M. Manojlovic Kolarski, F. Laliberte, A. Vescan, E. Monteiro

University of Toronto, Toronto, ON

**Introduction:** In the complex operating room environment, surgical resident education is often overshadowed by many factors, including unclear staff expectations, time pressures, and cognitive load from competing responsibilities. Inspired by the World Health Organization Surgical Safety Checklist and the new competency-based medical education format, we aimed to define the operating room educational landscape and develop a perioperative education checklist to structure and enhance surgical resident education.

**Methods:** Staff (n = 29) and residents (n = 19) in the Otolaryngology-Head and Neck Surgery Residency Program at the University of Toronto were surveyed to characterize the current gaps in perioperative teaching. An initial "educational timeout" ("E-timeout") was designed to address feedback themes. The E-Timeout was further refined by a series of 2-week plan-do-study-act (PDSA) cycles at multiple teaching sites from feedback on usability and effect on educational experience. The final version of the E-Timeout includes a preoperative brief (Identification, Clinical Background, Anatomy, Relevant Steps) and a postoperative debrief (Assessment of Operation, Surgeon Feedback, Knowledge of Post-Operative Plan). A standardized visual schematic with memorable acronyms was created.

**Results:** Our initial survey results demonstrated significant discordance between resident and surgical teacher perceptions in resident preoperative preparation, preoperative role distribution, intraoperative resident participation, and postoperative debriefing. Our postimplementation data reveal that the E-Timeout was successful in addressing the aforementioned discrepancies to structure communication and facilitate goal-oriented resident education, patient care, and competency milestone assessment.

**Conclusions:** The most challenging next step is practical implementation of the E-timeout into the established perioperative routine. This intervention invokes all CanMEDS competencies and is easily reproducible in other procedure-based specialties at any center.

## **Fingerprints of teaching styles: How supervisors manage control over the scalpel of surgical trainees during surgery**

P. Nieboer<sup>1</sup>, M. Huiskes<sup>2</sup>, F. Cnossen<sup>2</sup>, M. Stevens<sup>1</sup>, S. Bulstra<sup>1</sup>, D. Jaarsma<sup>1</sup>

<sup>1</sup>University Medical Center Groningen, Groningen; <sup>2</sup>University of Groningen, Groningen, Netherlands

**Introduction:** One of the most remarkable aspects of teaching in the operating room is that supervisors entrust surgical trainees the scalpel while they are responsible for patient outcome. Control and autonomous task performance are as communicating vessels: the more control supervisors apply, the less autonomy remains for surgical trainees to master surgical procedures. However, how supervisors control the scalpel of surgical trainees as the procedure unfolds remains unclear. This study presents a descriptive model of supervisors' behaviors that enables us to describe, analyze, and categorize supervision styles, which in turn may feed into the development of teaching programs for surgical supervisors.

**Methods:** Based on the transcriptions of 3 videotaped standardized procedures (total hip replacement), we identified, analyzed, and coded all 180 verbal initiatives of the supervisor using conversation analysis. To obtain a complete overview of supervisors' behaviors, we investigated teams with different expertise levels.

**Results:** Control strategies form a step-up model from minimum up to maximum control over the surgical trainee: Supporting (14%), Assessing (23%), Exploring (10%), Suggesting (16%), Instructing (19%), Correcting (5%), and Taking Over (1%). Individual control behaviors are determined by task complexity and expertise level of surgical trainees.

**Conclusions:** This study provides insights in how control is realized in real time. The control strategies supervisors apply are like fingerprints of their individual teaching styles. The descriptive model presented in this study allows us to characterize, compare, and evaluate supervising styles. As such, it offers a tool for individual feedback for supervisors and on-the-job training to improve teaching.

## The impact of out of program periods on time in general surgical training: A UK national database study

E. Elsey<sup>1</sup>, J. West<sup>2</sup>, G. Griffiths<sup>3</sup>, D. Humes<sup>2</sup>

<sup>1</sup>University of Nottingham, Newark; <sup>2</sup>University of Nottingham, Nottingham; <sup>3</sup>Ninewells Hospital, Dundee, United Kingdom

**Introduction:** General surgery specialty training in the United Kingdom takes 6 years and allows trainees to take time out of program (OOP). US studies have highlighted an increasing trend for taking time out for research during surgical training. The UK practice of OOP time and formal research in surgical training has not previously been evaluated. This study aimed to evaluate UK OOP trends and impact on time in training in general surgery.

**Methods:** Data from the Intercollegiate Surgical Curriculum Programme (ISCP) database for all UK general surgery trainees registered from August 1, 2007 were used. Trainees were classified as "completed training" or "in training." Periods of OOP were identified and time in training calculated (unadjusted and adjusted for OOP periods) with a predicted time in training for those in training.

**Results:** Of those in training (n = 994), a greater proportion had undertaken OOP compared with those who had completed training (n = 360; 54.5% versus 45.9%;  $P < .01$ ). A greater proportion of individuals in training had undertaken a formal research period compared to those who had completed training (35.1% versus 6.1%,  $P < .01$ ). Total unadjusted training time in the completed training group was a median 6.0 years (interquartile range [IQR] 6.0–7.0) compared with a predicted unadjusted training time in the in training group, with an OOP period recorded of median 8.0 years (IQR 7.0–9.0).

**Conclusions:** Trainees are increasingly taking time out of surgical training, particularly for research, with a subsequent increase in total training time. The impact of this on competency attainment should be considered along with future program planning.

## The Building Excellence in Surgical Training (BEST) course: An innovative approach to induction for new surgical residents

E. Stewart-Parker<sup>1</sup>, H. Allen<sup>2</sup>, B. Das<sup>3</sup>, J. Brecknell<sup>4</sup>, S. Vig<sup>5</sup>

<sup>1</sup>Queen Elizabeth Hospital, London; <sup>2</sup>Kings Learning Institute, London; <sup>3</sup>Core Surgical Trainee, London Deanery, London; <sup>4</sup>London Postgraduate School of Surgery, London; <sup>5</sup>Health Education England, London, United Kingdom

**Introduction:** UK surgical residents rotate through different hospitals to acquire skills to become competent, safe surgeons. While a regional “Deanery” oversees training and ensures national standards, residents frequently feel underprepared and daunted by the challenge of achieving competencies. Induction is provided locally by hospitals whose focus is policies rather than harnessing training opportunities. We designed a regional induction course for residents to address this, enhance patient safety, and create peer-trainer support networks.

**Methods:** The 3-day Building Excellence in Surgical Training (BEST) course was held the week before residency commenced. New London residents (cohort 90) were invited. BEST comprised 3 components: (1) practical skills day on surgical technique; (2) simulation module teaching nontechnical skills to improve team-working and patient safety; and (3) advice on how to achieve work-based assessments and engage with educational opportunities (eg, research). Qualitative and quantitative data were collected via immediate and 6-month feedback on the courses’ impact on residents.

**Results:** BEST has run for 3 consecutive years, involving more than 200 residents. Immediate feedback revealed: confidence improved in 100% of cohort; 95.9% felt they gained trainers’ confidence; 97.9% agreed they got to know their peers; and 100% believed it would aid patient safety. At 6-months these results were largely maintained, with 90.5% feeling the technical skills module had been useful. The practical advice and supportive environment were cited as particularly successful components.

**Conclusions:** The BEST course not only provided residents with the practical and professional skills required to make best use of their training opportunities and maintain patient safety, but also helped individuals feel valued and supported.

## Current evidence on spatial reasoning in surgical education

K. Dunn<sup>1</sup>, P. Kalun<sup>2</sup>, N. Wagner<sup>2</sup>, T. Pulakunta<sup>1</sup>, R. Sonnadara<sup>2</sup>

<sup>1</sup>Dalhousie University, Halifax, NS; <sup>2</sup>McMaster University, Hamilton, ON

**Introduction:** Mentally rotating objects and understanding the spatial relationships between structures is critical for surgical trainees. However, the breadth of literature on visual-spatial ability (VSA) in surgical education makes it challenging for educators to make informed decisions on incorporating VSA into their programs. The purpose of this scoping review was to summarize the current literature on how VSA relates to surgical performance.

**Methods:** The following databases were searched in July 2017 using key words related to VSA and surgery: Ovid-MEDLINE, Embase, ERIC-ProQuest, and Cochrane Library. Experimental studies and reviews were included.

**Results:** Of the 540 articles identified, 89 articles were included in the final review. Article synthesis revealed 4 themes. First, 38 articles indicated a significant correlation between VSA and performance on surgical simulation tasks. Articles also revealed conflicting evidence regarding whether VSA aptitude testing should be incorporated into trainee selection, and whether 2-dimensional or 3-dimensional teaching models are more effective. Lastly, 4 neurological imaging articles indicated that areas of the brain involved in visual-spatial tasks are also activated during surgical simulation tasks.

**Conclusions:** This review presents strong evidence supporting the correlation between VSA and surgical simulation performance. However, there remains conflicting evidence for if and how programs should incorporate VSA into surgical training. More so, future research must determine whether VSA also correlates with surgical performance in the operating room. We hope that elucidating the relationship between VSA and surgical performance will lead to the development of more efficient training methods, which educators may then incorporate into their training programs.

## Developing an interactive machine learning–based teaching aid to increase diagnostic accuracy in prenatal hydronephrosis

L. C. Smail, K. Dhindsa, M. McGrath, L. Braga, S. Becker, R. Sonnadara

McMaster University, Hamilton, ON

**Introduction:** Machine learning (ML) provides a novel means to enhance resident training in interpreting diagnostic images. Advances in ML allow us to provide immediate feedback for learning and explore the learning process in new ways. This leads to new opportunities for intelligent computer-aided self-learning and personalized evaluation. Competence by Design places great emphasis on feedback, therefore we propose developing an educational tool that automatically generates informative feedback based on the inner workings of a ML algorithm. It will also model resident learning curves and identify patterns in errors to enhance learning.

**Methods:** We are piloting our tool as a web-based multiple-choice training program for classifying prenatal hydronephrosis from renal ultrasound images in a controlled study. Residents classify images on which our ML model has already been trained. The ML model sorts these images by difficulty based on the model complexity required for each image, allowing us to adapt difficulty to individual resident progress. The ML algorithm generates feedback for incorrect answers by highlighting parts of the image with a heat map indicating regions, and their degree of clinical importance. Finally, the ML model analyzes the types of errors residents make to identify patterns, indicating the need for targeted educational intervention.

**Results/Conclusions:** Exploiting the information that ML algorithms contain will result in robust teaching aids that will increase residents' learning rates and diagnostic accuracy. In future work, we will expand the systems' feedback capabilities, further develop ways of modeling individual learning curves and error patterns, and expand to other diagnostic imaging domains.

## **An e-Learning approach to teaching clinicians how to correctly identify ultrasonographic features of mediastinal lymph nodes**

D. Hylton, Y. Shargall, C. Finley, J. Agzarian, C. Fahim, W. Hanna

McMaster University, Hamilton, ON

**Introduction:** Several ultrasonographic features of mediastinal lymph nodes visualized via endobronchial ultrasound are predictive of malignancy. Despite validation, clinicians express difficulty in correctly identifying these features. This is likely due to a lack of educational tools and standards concerning ultrasonographic features. In preparation for Competence by Design implementation, an e-Learning module was developed to teach residents and fellows in respirology and thoracic surgery how to correctly identify ultrasonographic features.

**Methods:** An e-Learning module was designed using test-enhanced learning theory. This theory asserts that repeated testing promotes improved information retention. Core competencies required to identify the ultrasonographic features were broken down into knowledge and demonstrable skills. The module consisted of a baseline knowledge assessment, an education component, practice simulations, and a postmodule assessment. During the practice component, participants were asked to self-identify the ultrasonographic features that remained difficult to identify. Efficacy of the module was evaluated by assessing trends in identification difficulties.

**Results:** Twenty-two clinicians completed the module (8 residents, 12 fellows, and 2 staff). Trend analyses indicated negative slopes (which are indicative of substantial decreases in perceived identification difficulty) for each ultrasonographic feature except for small axis length and central hilar structure. Echogenicity and central necrosis had the largest negative slopes. Shape and margin had moderately sized negative slopes. Forecasting suggests that continued practice would result in further decreases in identification difficulties.

**Conclusions:** Completion of the education module resulted in reduced difficulties in identifying ultrasonographic features capable of predicting mediastinal malignancy. Further research into the validity of the e-Learning module and potential clinical implications is warranted.

## Using a modified flipped classroom format to deliver academic half-days: A study of feasibility and acceptability

X. Liu, C. Gomez-Garibello, N. Sun

McGill University, Montreal, QC

**Introduction:** Academic half-days (AHDs) are widely used by residency programs to deliver Medical Expert contents. Most AHDs are consisted of didactic lectures. The flipped classroom is a well-recognized instructional format that requires learners to view didactic content prior to class and uses classroom time for active learning. Class size and time required for preclass preparation were identified as challenges to its application. We evaluated the feasibility and acceptability of using a modified flipped classroom format to deliver AHD for a large residency program.

**Methods:** The McGill University Internal Medicine Residency Program includes 120 residents. We surveyed all residents who attended AHDs during the 2017–2018 academic year. The intervention (modified flipped classroom) consisted of preparatory online lectures followed by in-class, case-based discussion facilitated by audience polling technology. Feasibility was assessed by (1) whether residents engage in preclass preparation as intended, and (2) the technical feasibility of accessing online lectures and using audience polling technology for in-class learning. Acceptability of the format by residents was measured using the Flipped Classroom Perception Instrument. Data were analyzed using descriptive statistics.

**Results:** A significant proportion of residents engaged in preclass preparation, and the amount of preparation time spent increased as residents grew more familiar with the format. Technical feasibility similarly improved with time. Acceptability of the format was consistently high.

**Conclusions:** This modified flipped classroom format showed promise as a more active instructional method for AHDs for medium-to-large residency programs. Future research should evaluate the impact of this new format on residents' performance on examinations and in clinical settings.

## The chief resident incubator: A virtual community of practice

M. Gisondi<sup>1</sup>, F. Zaver<sup>2</sup>, A. Chou<sup>3</sup>, M. Sheehy<sup>3</sup>, M. Lin<sup>4</sup>

<sup>1</sup>Stanford University, Palo Alto, CA, United States; <sup>2</sup>University of Calgary, Calgary, AB; <sup>3</sup>Brigham and Women's Hospital, Boston, MA, United States; <sup>4</sup> University of California, San Francisco, San Francisco, CA, United States

**Introduction:** The Emergency Medicine Chief Resident Incubator is a year-long curriculum for chief residents that aims to provide participants with a virtual community of practice, formal administrative training, mentorship, and opportunities for scholarship.

**Methods:** The Chief Resident Incubator was designed by Academic Life in Emergency Medicine ([www.aliem.com](http://www.aliem.com)), a digital health professions education organization in 2015. Using constructivist social learning theory, a 12-month curriculum covers interviewing skills, contract negotiations, leadership, coaching, branding, conflict resolution, wellness, and career longevity. The Incubator is a virtual community of practice using Slack, a messaging and digital communication platform. Ancillary technology Google Hangout on Air and Mailchimp were used to facilitate learner engagement. A hidden curriculum was incorporated throughout the year with multiple online publications, competitions for guest grand round presentations, and use of digital technologies in medical education.

**Results:** A total of 584 chief residents from 212 residency programs across North America have participated over the first 3 years of the Chief Resident Incubator. Over 27 000 messages have been shared on Slack. A total of 32 Google Hangouts with faculty mentorship have occurred over the course of the inaugural Incubator. Scholarship included 26 published academic blog posts, 2 open access In-Training Examination prep books, a senior level online curriculum with 9 published modules, and 3 book club reviews.

**Conclusions:** The Chief Resident Incubator is a virtual community of practice that provides longitudinal training and mentorship for chief residents. This Incubator framework may be used to design similar professional development curricula across various health professions using an online digital platform.

## Developing program-specific e-Learning modules to aid surgical skill acquisition and knowledge retention in the setting of a junior arthroplasty rotation

L. Xuan

University of Ottawa, Ottawa, ON

**Introduction:** Increases in technology and techniques, as well as increases in documentation requirements and restrictions in weekly working hours, have made surgical residency challenging. In order to address this, competency-based programs and surgical simulation have emerged to improve procedural competency, but gaps still remain. These are also very labor intensive and costly. Given the popularity of surgical videos as a learning tool among surgical trainees who are millennials, a series of recorded, program-specific, e-Learning modules were developed for the arthroplasty block within the orthopaedic program at the University of Ottawa. The purpose of our educational tool was to (1) create a cost-effective resource enabling efficient skill acquisition in arthroplasty surgery, and (2) improve long-term knowledge retention.

**Methods:** The modules created consist of a combination of surgical video obtained using head-mounted Go-Pro and a summary manual outlining surgeon-specific techniques in a stepwise approach. These were then supplemented with preoperative preparation and postoperative management guidelines, as well as hardware techniques manuals and key literature within the field. All modules were hosted on a hospital provided Office 365 database and available on any mobile device.

**Results/Conclusions:** Through this novel medium, we have created a standardized and accessible resource for junior orthopaedic residents. Among participants (n = 30), 96.6% of residents in our pilot program found the e-Learning modules to be a valuable learning tool for skill acquisition and case preparation. Moving forward, we hope to further validate its ability to improve skill acquisition and retention as well as improve overall patient care.

## **Pediatrics surgical residency training in Taiwan: A cross-institutional collaboration and engagement through social media in helping and auditing**

Y. Chen, P. Lin

Far Eastern Memorial Hospital, New Taipei City, Taiwan

**Introduction:** Due to the progress of prenatal diagnosis coupled with a declining birth rate, many rare congenital surgical diseases are even rarer. Thus, pediatrics surgical trainees may not have sufficient clinical experiences and adequate training quality. A cross-institutional collaboration through social media was developed to strengthen pediatrics surgical training in Taiwan.

**Methods:** At first, we defined the core surgical competences that meets the qualification of the specialty. Then we setup an online network through social media, LINE, to let all trainers and trainees from different institutions shared and gathered the information about the defined index surgical cases. The trainees could participate the operations at different centers, thus enriching their training. A questionnaire designed to approach participants' perceptions of this cross-institutional collaboration network were collected and analyzed.

**Results:** Questionnaires with a response rate of 53.4% were returned and all used LINE as a major social media tool. All participants agreed that the LINE group helped establish training partnership with other centers, 96.8% agreed this can facilitate the cross-institutional resources sharing, and complementarity, and build the training consensus among different institutions, and 87.1% agree that through social media can motivate the sharing of index surgeries as well as help and audit trainees to accomplish the training requirements.

**Conclusions:** Cross-institutional collaboration through social media is useful for pediatrics surgical training. By providing the information of index surgery and cross-institutional training can help trainees' qualification in Taiwan. This collaboration platform can be applied on the training of other surgical subspecialties with limited resources.

## Residents' perspectives of a flipped academic half-day program in physical medicine and rehabilitation

A. Sussan, J. Trier, R. Egan, F. Langshaw, I. Siqueria, I. Maness, N. Dalgarno

Queen's University, Kingston, ON

**Introduction:** Academic half-days (AHDs) are educational events to deliver core information to medical residents. Flipped AHDs deliver content outside of the classroom, with more engaging activities in class, yet little is known about their effectiveness. The purpose of this study is to determine physical medicine and rehabilitation (PM&R) residents' perspectives about flipped AHDs where online modules are completed prior to face-to-face faculty-facilitated sessions.

**Methods:** Six faculty-facilitated flipped AHDs in 2 core rehabilitation areas were designed. Residents involved in the pre- or post-flipped AHDs were interviewed (both n = 5). Qualitative data were analyzed using thematic design.

**Results:** Residents believed the flipped AHDs improved engagement. Reviewing material online provided opportunities during face-to-face sessions to discuss cases and engage in question/answer periods, which rarely occurred in traditional AHDs. Residents perceived that flipped AHDs better prepared them for clinical work, examination preparation, and developed their competencies in CanMEDS roles (particularly Medical Expert and Scholar). The flipped AHD content was designed by faculty, which was perceived as higher quality and important. Residents found the flipped AHDs saved them time from preparing for and presenting at the AHD, but found the pre-face-to-face work time-consuming. Some residents preferred completing new cases at each AHD rather than repeated cases with increasing complexity.

**Conclusions:** Faculty-facilitated flipped AHDs can be beneficial for residents' learning and engagement. Preparation and skill development are key outcomes for flipped AHDs. Independently learning fundamentals prior to face-to-face sessions informs a deeper understanding of content and improves confidence in clinical skills for PM&R residents.

## Facebook facilitates networking and collaboration between international emergency medicine residents

C. Lee<sup>1</sup>, C. Hsu<sup>2</sup>, H. Lin<sup>3</sup>, S. Liao<sup>1</sup>, C. Liu<sup>3</sup>

<sup>1</sup>Chang Gung Memorial Hospital, Taipei; <sup>2</sup>Kaohsiung Veterans General Hospital, Kaohsiung; <sup>3</sup>National Taiwan University Hospital, Taipei; Taiwan

**Introduction:** Shift work and disperse training location hinder emergency medicine (EM) residents networking and collaboration. In Taiwan, 97 EM residents are separated into 39 training programs. Enhancing resources sharing and networking are critical.

**Methods:** The Emergency Medicine Resident Network (EMRN) was launched in December 5, 2015, as a Facebook group platform operated by 7 EM volunteer physicians from 3 hospitals. Online and offline activities were created to enhance resources sharing, networking, and collaboration. Daily post on EM topics on Facebook group by members are the core activity. Theme experience online sharing is held annually. Residents' lecture competition, interview with physician leaders, and international residents' forum were offline activities to facilitate real world contact.

**Results:** The EMRN Facebook group has 2550 members from 28 countries, including Taiwan, Hong Kong, United States, Malaysia, and Macau. There are 1617 posts, 2727 comments, and 41 950 likes in the past 2 years. Two online theme-sharing activities were held in 2016 and 2017. More than 50 senior EM physicians shared their thoughts and experiences. The first Taiwan EM residents' lecture competition was held in 2017 to enhance residents' presentation skills. Interviews with international EM residents' association leader, and senior EM physicians from Taiwan and Hong Kong were arranged to facilitate experience sharing. The first Hong Kong and Taiwan EM Residents Forum was held in June 2018.

**Conclusions:** Social media platform facilitates networking, collaboration, and resources sharing between small scale and even international residents training programs regardless of financial support.

## Author Index

- Acker, Amy – 055  
Acuna, Jenny – 076, 077  
Agzarian, John – 119  
Ahluwalia, Reena – 070  
Aimer, Margaret – 052, 094  
Al Youha, Sarah – 087  
Alidina, Zenita – 073  
Allen, Hayley – 116  
Almandhari, Hilal – 022  
Almond, Ric – 001, 002, 003, 004, 005  
Amin, Nalin Kumar – 023  
Ananny, Lesley – 088  
Armson, Heather – 065  
Arnstead, Neil – 045  
Arntfield, Shannon – 088  
Ashamalla, Shady – 103  
Austin, Michael – 068  
Ayoub, Mohammed – 022  
Azzam, Joseph – 007  
Babani, Prakash – 073  
Baldwin Jr, DeWitt C. – 091  
Bandiera, Glen – 010, 053  
Banerjee, Diponkar – 074  
Baptiste, Sue – 085  
Bates, Joanna – 086  
Becker, Suzanna – 118  
Beckman, Thomas – 081, 084, 112  
Beesley, Theresa – 039  
Bergey, Bradley – 097  
Bergin, Fiona A. – 017  
Bezjak, Andrea – 093  
Biddulph, Michael – 019  
Bishop, Alexandra – 019  
Bishop, Kelly – 079  
Bismilla, Zia – 022  
Bodley, Janet – 049  
Boehm, Kaitlin – 087  
Boet, Sylvain – 107  
Bogie, Bryce JM – 058  
Bosma, Mark – 017  
Bouchard, Mary V. – 055  
Boudreau, Michelle – 063  
Bowes, David – 012  
Braga, Luis H. – 118  
Branfield Day, Leora – 036, 105  
Braund, Heather – 016, 029  
Brecknell, John – 116  
Bridge, Suzanne – 095  
Brigham, Timothy – 091  
Brydges, Ryan – 041  
Bulstra, Sjoerd – 114  
Bustraan, Jacqueline – 008  
Calder, Lisa – 068  
Campbell, Douglas – 100  
Campbell, Holly – 012  
Campisi, Paolo – 045  
Caners, Kyla – 057, 059, 064  
Card, Sharon E. – 040  
Carrió, Silvia – 078  
Casey, Margaret – 037  
Casey, Stephen – 072  
Caudle, Jaelyn – 053  
Cavalcanti, Rodrigo – 032  
Cervin, Cathy – 010  
Chan, Teresa M. – 057, 059, 062, 064  
Chan, Wilfred – 079  
Chaplin, Tim – 018  
Chartier, Lucas – 070, 072  
Chau, Vicky – 014  
Chen, Yun – 123  
Cherniak, Rebecca – 049  
Cheung, Warren J. – 107  
Chisholm, Janice – 037  
Chou, Adaira – 121  
Clapham, Glenda – 068  
Clark, Jenn – 109  
Clarke, David B. – 098  
Crossen, Fokie – 114  
Cofie, Nicholas – 018  
Colbourne, Terry – 036  
Connan, Veronik – 022  
Connelly, Robert J. – 066  
Cook-Chaimowitz, Lauren – 057, 059, 064  
Cowley, Lindsay – 088  
Cristancho, Sayra – 088  
Croke, Jennifer – 093  
Cullen, Michael W. – 081  
Dagnone, Damon – 016, 050, 053, 054, 099  
Daigle-Maloney, Trisha – 012  
Dalgarno, Nancy – 029, 079, 124  
Dandavino, Mylene – 034  
Daniels, Lia – 083  
Daniels, Vijay – 030, 056  
Das, Bibek – 116  
David, Victoria – 033, 035  
Davies, Debrah – 072  
Davies, Joel – 113  
De Beaufort, Arnout Jan – 008  
De Leon, Jackie – 070  
DeCarlo, Kristen – 091

Dedy, Nicolas – 103  
DeFina, Rachel – 090  
Dennis, Ashley – 090  
Desanghere, Loni – 040, 089, 092  
Dhindsa, Kiret – 118  
Dijkhuizen, Kirsten – 008  
DiLabio, Julia – 022  
Dizon, Stephanie – 027  
Dore, Kelly – 007, 010  
Dow, Todd – 009  
Driessen, Erik – 080  
Dube, Rebecca – 061  
Dudek, Nancy – 021  
Duffy, Melissa – 006  
Dukelow, Adam – 026  
Dunn, Krista – 117  
Durant, Stephen – 041  
Dzaja, Nancy – 007  
Edwards, Patrick – 079  
Egan, Rylan – 016, 018, 029, 038, 039, 050, 124  
Ellaway, Rachel – 086, 095  
Elliott, Mark – 040  
Elsy, Elizabeth – 043, 115  
Emack, Jeffrey – 029  
Epstein, Ian – 048  
Eva, Kevin – 080  
Ewa, Vivian – 090  
Eymann, Alfredo – 011, 078  
Facioni, Clara – 011  
Fahim, Christine – 025, 051, 119  
Faingold, Diego – 011, 078  
Fares, Leo – 036  
Farrell, Laura – 056  
Farrugia, Michele – 049  
Faulkner, Dan – 020  
Fedorkow, Donna – 007  
Fenerty, Lynne – 098  
Fichtinger, Gabor – 102  
Figari, Marcelo – 011, 078  
Finan, Emer – 022  
Finlayson, Gordon N. – 095  
Finley, Christian – 119  
Flynn, Leslie – 038, 050, 054  
Fowler, Amanda – 024  
Frank, Jason R. – 001, 002, 003, 004, 005, 053, 107  
Frisina, Adrian – 028  
Furqan, Zainab – 073  
Galilee, Alena – 098  
Gamage, Tania – 028  
Gaudet, Jonathan Earl Clark – 095  
Gautier, Luke – 019  
Gawad, Nada – 006, 024  
Gilfoyle, Elaine – 101  
Gillis, Megan – 019  
Gingerich, Andrea – 056  
Ginsburg, Shiphra – 041, 105  
Gisondi, Michael – 062, 121  
Glennie, Andrew – 019  
Glover Takahashi, Susan – 061  
Gofton, Wade – 021  
Gomez-Garibello, Carlos – 120  
Gottlieb, Michael – 062  
Grady, Colleen – 075, 079  
Grantcharov, Teodor – 103  
Green, Christopher – 048  
Griffiths, Gareth – 043, 115  
Gu, Jeffrey J. – 018  
Guiliani, Meredith – 093  
Guimond, Jean-Gilles – 095  
Hadjinicolaou, Aristides – 034  
Hafferty, Frederic – 084, 112  
Hall, Andrew K. – 016, 053, 099  
Hall, Jena M. – 050  
Hamid, Jemila – 014  
Hammad, Nazik – 029  
Hamstra, Stanley J. – 082  
Hanmore, Tessa – 055  
Hanna, Wael – 119  
Harms, Sheila Christine – 058  
Harris, Ilene – 106  
Hastings Truelove, Amber – 054  
Hatala, Rose – 056  
Haupt, Sebastian – 009  
Hayward, Andrew – 019  
Hazelton, Lara – 063, 077  
Heeneman, Sylvia – 093  
Hick, Katherine – 071, 110  
Ho, Kevin – 001  
Hodwitz, Kathryn – 020  
Holden, Matthew – 102  
Holmboe, Eric – 082  
Hong, Murray – 098  
Hsu, Chen-Mei – 125  
Hubinette, Maria – 109  
Huiskes, Mike – 114  
Humes, David – 043, 115  
Hunter, Andrea J. – 047  
Hurley, Bernard – 013  
Hussain, Alicia – 054  
Hylton, Danielle – 119  
laboni, Andrea – 073  
Ibrahim, Andrea – 006

Izukawa, Terumi – 014  
Jaarsma, Debbie – 114  
Jalbert, Rochelle – 040  
Jalink, Diederick – 103  
Jassemi, Sara – 110  
Jenkins, Danielle – 087  
Joukhadar, Nadim – 015  
Kaba, Alyshah – 069  
Kahlke, Renate – 109  
Kalun, Portia – 104, 117  
Kam, April J. – 085  
Kaspy, Kimberley – 034  
Kassam, Aliya – 096  
Kawamura, Anne – 106  
Kelly, Stephen – 023  
Kennedy, Tara – 056  
Kherani, Irfan – 013, 036  
Klarich, Kyle – 081  
Kljujic, Dragan – 031  
Knarr, Nadia – 075  
Könings, Karen – 065  
Krawchenko-Shawarsky, Adriana – 036  
Kreuger, Sharyn – 010  
Kureshi, Nelofar – 098  
Kwok, Edmund – 068  
LaDonna, Kori – 046, 088  
Lafreniere, Anthea J. – 074  
Laliberté, Denis – 001, 004, 005  
Laliberte, Frederick – 113  
Lamont, John – 007  
Langshaw, Frederick – 124  
Lavery, Colin – 079  
LeBlanc, Constance – 063  
Lee, Ching-Hsing – 125  
Lees, Mackenzie C. – 083  
Liao, Shao-Feng – 125  
Liederman, Zachary – 100  
Lim, Howard – 044  
Lin, Hao-Yang – 125  
Lin, Michelle – 062, 121  
Lin, Pei-Chun – 123  
Lingard, Lorelei – 026  
Liu, Barbara Arlena – 014  
Liu, Cheng-Heng – 125  
Liu, Xing – 120  
Livingston, Patricia – 037  
Lizius, Anne – 058  
Lo, Alexander – 073  
Lockyer, Jocelyn – 033, 035, 065  
Lorber, Sharon – 071  
Lord, Jason A. – 095  
Lum, Hilary – 070  
Mackay, Meredith – 107  
Mackin, Robin – 085  
MacLellan, Anne-Marie – 001, 002, 003, 004, 005  
MacLeod, Anna – 048  
Magcalas, Federico Webster – 072  
Malcolm, Janine – 027  
Maness, Ian – 124  
Mann, Steve – 039  
Manojlovic Kolarski, Mirko – 113  
Marcotte, Laura – 042  
Mathur, Siddhi – 049  
McColl, Tamara – 018  
McConnell, Allison – 026  
McConnell, Meghan – 047, 058  
McDougall, Allan – 021  
McEwen, Laura A. – 050, 066  
McGrath, Melissa – 118  
McGurn, Ballie – 001, 002, 003  
McLeod, Magnus – 048  
Melvin, Lindsay – 032, 041  
Mema, Briseida – 101, 106  
Millar, Barbara-Ann – 093  
Milne, Emily – 093  
Mimeault, Richard – 024  
Mintz, Marcy – 033, 035  
Monteiro, Eric – 045, 113  
Morash, Joel – 019  
Moussa, Ahmed – 022  
Mungroo, Rani – 036  
Muttalib, Fiona – 101  
Mylopoulos, Maria – 106  
Nardi, Lorelei – 031  
Nessim, Carolyn – 006  
Nieboer, Patrick – 114  
Niec, Anne – 085  
Nordhues, Hannah – 084, 112  
Norris, Mireille – 014  
Nousiainen, Markku – 025, 104  
Oandasan, Ivy – 031  
O'Beirne, Maeve – 090  
O'Brien, Tara – 032  
Olsen, Sharla Rae – 056  
Oxner, Bill – 019  
Pack, Rachael – 026  
Paetow, Glenn – 062  
Palacios, Maria – 095  
Pardhan, Alim – 057, 059, 064  
Pasricha, Suvercha – 071  
Patey, Andrea – 107  
Perez Raffo, Gabriela – 011  
Pero, Rebecca P. – 042

Peters, Rachel – 067  
Petrucci, Jessica – 100  
Phillips, Tara – 002, 004, 005  
Piquette, Dominique – 041  
Pugh, Debra – 027  
Pulakunta, Tejodhar – 117  
Purgina, Bibianna – 074  
Rai, Sunita – 113  
Raiche, Isabelle – 006, 024  
Rajda, Malgorzata – 063  
Rassos, James C. – 041  
Ratelle, John – 084, 112  
Reboiras, Fabiana – 011, 078  
Reid, Mary-Anne – 029  
Rekman, Janelle – 021  
Rich, Jessica V. – 053, 099  
Richardson, Glen – 019  
Rigby, Louise – 060  
Ring, Justine – 102  
Roberts, Lynn – 079  
Robertson-Frey, Tanya – 040, 089, 092  
Rockey, Paul H. – 091  
Rohr, Betty – 040  
Ronson, Ashley – 003  
Rowan-Legg, Anne – 108  
Ruano Cea, Elisa – 034  
Ruland, Lucia – 066  
Russell, Dana – 010  
Samargandi, Osama – 087  
Sanchez, Mariana – 011, 078  
Sandhu, Gurtej – 030  
Santivasi, Wil L. – 084, 112  
Saperson, Karen – 058  
Sardiwalla, Yaeesh – 015  
Sargeant, Joan – 017, 065  
Saunders, Stephanie – 105  
Sawatsky, Adam – 084, 112  
Saxena, Anurag – 040, 089, 092  
Schabort, Inge – 010  
Schmölzer, Georg M – 022  
Schrewe, Brett – 086, 108  
Schultz, Karen – 075, 079  
Schwartzberg, Joanne – 091  
Scott, Chris – 081  
Scott, Ian – 109  
Scott, Stephanie A. – 019, 080, 097  
Sebok-Syer, Stefanie S. – 026  
Sedran, Robert James – 026  
Shah, Rupal – 032  
Shargall, Yaron – 119  
Sheahan, Guy – 103  
Shearer, Cindy – 017, 037, 063, 076, 077  
Sheehy, Maggie – 121  
Shepherd, Lisa – 026  
Sherbino, Jonathan – 053  
Silver-Smith, Christine A. – 063  
Siqueria, Izabelle – 124  
Sligl, Wendy – 095  
Smail, Lauren C. – 118  
Smrke, Alannah – 044  
Smyth, Jennifer – 088  
Smyth, Michael – 009  
Soleas, Eleftherios – 038  
Sonnadara, Ranil – 023, 025, 051, 104, 117, 118  
Soong, Christine – 105  
Stairs, Jocelyn A. – 097  
Steinberg, Leah – 105  
Stevens, Martin – 114  
Stewart-Parker, Emma – 116  
Stockley, Denise – 038, 050, 054  
Strobel, Stephenson – 067  
Stroud, Lynfa – 041  
Sun, Ning-Zi – 120  
Sussan, Askari – 124  
Szulewski, Adam – 016, 099  
Taber, Sarah – 001, 002, 003, 004, 005  
Taher, Ahmed K. – 072  
Tang, David – 015, 087  
Tavares, Walter – 041  
Thakkar, Niels – 020  
Thoma, Brent – 018  
Thomas, Karen – 106  
Thomas, Megan M. – 096  
Tomiak, Anna – 029  
Toubassi, Diana – 067  
Trevelyan, Chris – 110  
Trier, Jessica – 055, 124  
Trinkaus, Martina Andrea A. – 100  
Ungi, Tamas – 102  
Vaa, Brianna – 084, 112  
van den Bogaard, Maartje – 008  
van der Aa, Jessica E. – 111  
Van der Goes, Theresa – 109  
Van Diepen, Kelly – 057, 059, 064  
Van Melle, Elaine – 053  
van Wylick, Richard – 050  
VanEyck, Nancy – 080  
Vazquez, Lucia – 078  
Vescan, Allan – 113  
Vig, Stella – 116  
von Maltzahn, Maia – 014  
Wagner, Natalie – 023, 025, 104, 117  
Walker, Ross – 050

Walsh, Catharine M. – 022  
Walsh, Michael – 033, 035  
Warren, Andrew – 017, 063  
Wasserman, Jason – 074  
Watling, Christopher – 046, 086  
Watts, Karen – 012  
Weersink, Kristen – 053, 099  
Welsford, Michelle – 057, 059, 064  
West, Joe – 043, 115  
White, Jonathan S. – 083  
White, Shannon – 068  
Williams, Connie – 047  
Williams, Geoff – 076, 077  
Wolfrom, Brent – 075, 079  
Wong, Camilla – 014  
Woodward, Mary – 047  
Woolner, Victoria – 070  
Xu, Josie – 113  
Xu, Victoria YY – 014  
Xuan, Lisa – 122  
Yaghmour, Nick – 091  
Yamazaki, Kenji – 082  
Yan, James – 104  
Yen, Wendy – 020  
Yeo, Caitlin T. – 102  
Zaulan, Oshri – 101  
Zaver, Fareen – 062, 121  
Zetkulik, Marygrace – 065  
Zevin, Boris – 102, 103  
Zheng, Bin – 083

## Keyword Index

Academic half-day – 120, 124  
Academic quality – 011  
Adaptation – 086  
Adaptive expertise – 106  
Admission – 006, 013  
Advance care planning – 069  
Advocacy – 109  
Analgesia – 070  
Assessment – 007, 014, 018, 022, 023, 024, 025, 026, 032, 050, 075, 080, 081, 082, 100, 101, 103, 107  
Assessment calibration – 016  
Autonomy – 084  
Balint group – 110  
Barriers – 036  
Burnout – 091  
CanMEDS – 028, 033, 096, 110  
Cardiology – 081  
CaRMS – 007, 010  
CBME – 030, 037, 038, 039, 050, 061, 095  
Chief resident – 076, 078, 121  
Childhood trauma – 071  
Coaching – 046, 047, 065  
Collaboration – 100, 123, 125  
Communication – 014, 068, 105  
Competency-based medical education – 019, 022, 023, 025, 026, 027, 028, 029, 031, 033, 034, 041, 042, 043, 051, 052, 053, 055, 058, 078, 096, 099, 100  
Competency by design – 032, 035, 040, 044, 045, 048, 051, 095, 119  
Confidence – 083, 116  
Constructivist ground theory – 088  
Context – 109  
Contextual learning – 086  
Control strategies – 114  
Critical care medicine – 095  
Cross institutions – 123  
Culture – 046, 092  
Curricular design – 108  
Depression – 091  
Digital communication – 062  
Direct observation – 107  
Distributed leadership – 040  
Diversity of learning environments – 086  
DNR – 105  
Early detection – 082  
EBUS – 119  
Narcissism – 006  
Neonatal resuscitation – 022, 047  
Networking – 125  
Neurological surgery – 098  
Nontechnical skills training – 088  
Online education – 074, 077  
Operative experience – 043  
Ophthalmology – 013  
OR teaching – 114  
Orientation – 094  
Orthopaedic – 019, 104  
OSCE – 019, 023  
Pain management – 070  
Pathology – 074  
Patient safety – 066  
Patient-centered care – 072  
Perioperative surgical education – 113  
Physical medicine and rehabilitation – 124  
Policy institutions – 011  
Postgraduate medical education – 014, 093, 111  
Practice sharing – 067  
Professional development – 062  
Professional identity formation – 084, 112  
Professionalism – 060, 110  
Proficiency-based training – 103  
Program evaluation – 031, 038, 053, 076  
Psychiatry – 058  
Qualitative research – 107  
Qualitative study – 008  
Quality feedback – 029  
Quality improvement – 045, 069, 070, 113  
Rapid-cycle evaluation – 053  
Rating scale anchors – 021  
Reflection – 046  
Reliability – 007  
Remediation – 017, 063  
Resident evaluation – 051  
Resident perceptions – 039  
Resident selection and matching – 007, 008, 010, 012, 013  
Residents as teachers – 048  
Resuscitation – 099  
Self-efficacy – 110  
Self-regulated learning – 018  
Shame-based learning – 087  
Simulation – 018, 024, 028, 069, 098, 099, 100, 101, 103, 104  
Skills development – 075, 079  
Social cognitive theory – 084, 112  
Social media – 125  
Structured support – 108

Structured teaching models – 113  
Supervision – 056, 114  
Surgery – 019, 043, 080, 083, 117, 122  
Surgical coaching – 049  
Teaching aid – 118  
Team competence – 101  
Teamwork – 069  
Technical skills – 024, 025  
Tensions in residency – 112  
Thoracic – 119  
Transition to independent practice – 108  
Trauma-informed care – 071  
Ultrasound – 118  
Virtual reality – 098  
Visual-spatial ability – 117  
Wellness – 093  
Workplace-based assessment – 021, 029, 032,  
041, 052, 065, 099  
Workplace learning – 060, 106