

## 2015 ICRE Conference Research Abstracts

Since 2012, the *Journal of Graduate Medical Education (JGME)* and the Royal College of Physicians and Surgeons of Canada have jointly selected the Top Three 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.

Annually, more than 200 abstracts are submitted, and undergo a peer-review process. Three winning abstracts are announced ahead of 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 at this session. Commencing with ICRE 2014, the selection of the Top Five Resident Papers was included in this award process.

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



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*Author names are underlined to indicate presenters.*



## How was it for you? Findings from the University of Calgary resident exit survey

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### Introduction

Understanding the personal factors as well as influences of the learning environment on residency experience is critical. This can be difficult to assess during regular interactions and routine assessments. Residents may feel uncomfortable discussing issues due to perceptions of power imbalance, difficulty initiating change, and/or concern over future job opportunities. The objective of this study was to determine how the resident learning environment can be improved to foster professionalism and better transition into practice.

### Methods

In this mixed methods study, a comprehensive, anonymous, online exit survey was conducted for residents completing their training. Qualitative and quantitative data were collected over 2 years and reviewed for trends and themes, respectively. Qualitative data from open-ended questions were coded separately by 2 investigators and triangulated with quantitative data.

### Results

In 2013 and 2014, a total of 219 residents completed training. We received a 70% response rate over 2 years with 153 residents participating in the online exit survey. While the overall learning environment was shown to be positive, residents reported challenges with balancing work and personal life as well as managing stress. Career prospects and finding employment were reported as stressors despite a strong sense of being prepared for future clinical work.

### Conclusions

There are opportunities to enhance preparation for clinical practice, particularly in stress management. The results provide a baseline for developing a framework to establish specific activities to address deficiencies identified in the learning environment and the professionalism competency. The findings create an opportunity to improve a supportive, learning environment that cultivates professionalism.

## **Aligning the Canadian medical education accreditation system across the medical education continuum**

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### **Introduction**

One of the recommendations of the Future of Medical Education in Canada Postgraduate Project is the alignment of accreditation standards. The recommendations states: "Accreditation standards should be aligned across the learning continuum (beginning with undergraduate medical education and continuing through residency and professional practice), designed within a social accountability framework, and focused on the health care needs of Canadians." This recommendation also points out that "ways need to be found to reduce the burden of paper, time, and human resources that are devoted to accreditation."

### **Methods**

Representatives from the accrediting organizations have reviewed areas of possible alignment. A standards mapping exercise across the continuum using the World Federation of Medical Education (WFME) standards, a comparison of accreditation processes and terminology, and a focus on outcomes are some of the methods used to date.

### **Results**

The organizations have agreed to organize their standards using 6 WFME accreditation domains: (1) institutional governance; (2) program organization; (3) education program; (4) learners, teachers, and administrative personnel; (5) resources; and (6) continuous improvement. Each organization has mapped its standards to the new domains. The comparison of accreditation processes identified several common elements, including program/institutional self-study; external assessment; survey/reviewer report; accreditation decision; accreditation cycle/follow-up; and evaluation and feedback. Recommendations on alignment of these processes, as well as the establishment of outcomes-based systems, are the next steps.

### **Conclusions**

This alignment will produce streamlined accreditation systems focused on outcome indicators emphasizing physicians' preparedness for practice throughout the course of their professional career.

## Does a previsit, document-based review predict program quality? A national pilot project of Canadian residency education accreditation

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### Introduction

A pilot project was conducted for residency program accreditation enhancement at 3 Canadian medical schools. The trial included the possibility of program exemption from onsite review, based on a previsit document review.

### Methods

We evaluated 178 programs across the 3 medical schools using a priori rules: 51 programs were automatically scheduled for onsite review; 127 were reviewed for exemption. Of the programs recommended for exemption, 40% (28 of 71) were randomly selected for onsite review; these selected programs were compared with those programs not recommended for program exemption. Sensitivity and specificity were calculated for the ability of the document-based prereview to accurately predict the onsite review outcome for programs.

### Results

The prereview was associated with 80% sensitivity and 36% specificity. The positive predictive value was 21%; the negative predictive value was 89%. Accuracy was 42.5%. Forty-four of 56 programs (79%) were identified as needing onsite review resulted in an accreditation outcome of “follow-up at the next regular survey” (RS). Eleven percent (3 of 28) of randomly selected programs received an accreditation status other than RS, with 2 of the 3 having serious concerns regarding the learning environment.

### Conclusions

Program exemption was associated with modest accuracy, specificity, and positive predictive value; a number of programs that could have been exempted were not, resulting in significant duplication and decreased efficiency. In addition, while associated with relatively high sensitivity and negative predictive value, the process nevertheless resulted in some programs with serious concerns being recommended for exemption. A document-based review cannot replace onsite reviews in the Canadian accreditation process.

## Can changes to the accreditation process for Canadian residency programs lead to improved efficiency? A national pilot project

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### Introduction

Accreditation involves external evaluation of an education program against pre-established standards. The existing accreditation process for Canadian residency programs is resource-intensive. It is not known if the process can be made more efficient without harming accreditation decision making.

### Methods

In response to recommendations from a 2012 taskforce, a pilot project was carried out at 3 Canadian medical schools in 2013 to trial a new process. Two modifications to the standard process were implemented: (1) separation of the review of institution and program standards; and (2) exemption of selected programs from onsite review. The modified process was evaluated based on time, workload, efficiency, effectiveness, and cost. Stakeholders' perceptions were obtained (online survey of 13 groups; 6 stakeholder focus groups). Descriptive and inferential statistics were used to analyze quantitative data; content analysis was used to extract common themes from narrative responses. Operational data were used to evaluate costs of the modified process.

### Results

Although there was overall satisfaction, the modified process remained time- and labor-intensive. Separation of the 2 reviews did not address their interdependent nature, and was considered less efficient and less informative for subsequent program reviews, while creating increased risk of administrative error. Although there was some support for program exemption, the process reduced opportunity for resident input and increased the use of resources.

### Conclusions

Overall, this accreditation pilot did not improve efficiency, increasing the amount of work with no cost savings and few enhancements. These results inform future endeavors toward continuous quality improvement of residency programs through accreditation.

## The social validity of a national assessment center for selection into general practice training

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### Introduction

Internationally, recruiting the best candidates is central to the success of training programs and the quality of the medical workforce. We explored candidates' perception of the fairness of a National Assessment Centre (NAC) approach for selection into Australian general practice (GP) training, where candidates were assessed by a multiple mini interview (MMI) and a written Situational Judgment Test for suitability to undertake GP training.

### Methods

In 2013, 1930 medical practitioners attended 1 of 14 NACs within Australia. A survey was distributed to each candidate at the conclusion of their assessment, including open-ended questions aimed at eliciting candidates' perceptions of the selection process. A framework analysis was informed by the theoretical lens of Social Validity Theory.

### Results

Qualitative data were available from 46% (886 of 1930) candidates, who found the NAC experience fair and informative for their training and career goals, but wanted to be provided with more information. Candidates valued being able to communicate their skills during the MMI, but found some difficulty in interpreting the questions, and some had concerns that a lack of relevant GP experience may inhibit their performance. They also expressed a desire for formative feedback during the interview process.

### Conclusions

During any job selection process, not only is the organization assessing the candidates, but the candidates are also assessing the organization. However, a focus on the candidate experience throughout an organization's selection process may provide benefits to both candidates and the organization, regardless of whether or not candidates secured the jobs.

## Resident selection in Canada: What do program directors think about best practice recommendations?

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### Introduction

Residency selection processes across Canada are often ambiguous, resulting in significant stress and uncertainty for medical students. In such a high-stakes and competitive environment, where there is often perceived inequity, students can become overfocused on maximizing their chances of selection by a chosen program, potentially at the expense of their overall undergraduate learning.

To improve the transition experience from undergraduate to postgraduate training, there is a need to understand the residency selection processes that are used across the country. There is also a need to improve transparency and fairness of these processes.

### Methods

One medical school recently convened a diverse working group to develop a series of 24 best practices recommendations around resident selection. Our study invited approximately 600 residency program directors in Canada to complete an online survey to investigate (1) their level of agreement with the recommendations; (2) their thoughts on the feasibility of implementing each recommendation; and (3) the current level of compliance with each recommendation in their program. The Likert scale and narrative responses to each recommendation will be analyzed quantitatively and thematically.

### Results

The survey closed March 23, 2015. Program directors' levels of agreement, impressions of implementation feasibility, and current level of compliance along with ad hoc thoughts will be presented for each recommendation.

### Conclusions

This study will provide valuable baseline information on current residency selection processes across Canada and will also provide important feedback from program directors on their levels of support for implementation of each of the best practice recommendations.

## Acceptability and feasibility of multiple mini interviews for emergency medicine resident selection

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### Objective

To determine the feasibility of using multiple mini interviews (MMI) in the selection of emergency medicine residents.

### Methods

Interviewed applicants were assessed using traditional interviews and a 12-station MMI. Afterward, both applicants and assessors completed satisfaction surveys. Final ranking of applicants was completed in the traditional manner by members of the panel interview group who were blinded to the results of the MMI. Survey results were analyzed using descriptive statistics and *t* tests to assess differences based on demographic variables. The reliability of the MMI was calculated, and the 2 rank order lists (traditional and MMI) were compared using the Wilcoxon signed rank test.

### Results

Applicants (79.2%) and assessors (91.7%) found the MMI acceptable. Applicants favored a hybrid of traditional and MMI interviewing techniques (70.8%) over traditional interviews alone (16.7%) or MMI alone (12.5%). Interviewers favored a hybrid (83.3%) over MMI alone (16.7%). There were no differences based on gender, age, prior MMI exposure, or type of current practice. Reliability of this MMI was poor (Cronbach's alpha = 0.238). Rank scores based on MMI and traditional interviews were not correlated ( $P = .88$ ).

### Conclusions

Use of the MMI in the assessment of emergency medicine residency candidates is acceptable to applicants, and favored by assessors. Lack of correlation with traditional interview scores suggests that MMI is measuring a different variable, which selection committees may find helpful in guiding decision making. Further research is required to determine if either selection measure is a better predictor of in-program performance.

## Choosing wisely: Selection factors that predict first-year resident performance

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### Introduction

Although cognitive metrics, such as United States Medical Licensing Examination (USMLE) scores, strongly influence how programs rank candidates, they are not reliable predictors of residency performance. In this study, we conducted a criterion-related validation study of the relative efficacy of cognitive and noncognitive variables in predicting resident performance in pediatrics and general surgery.

### Methods

The study was conducted using archival data (USMLE scores, structured interviews, and program rank) for 161 pediatrics and 84 general surgery applicants. Criterion data included Accreditation Council for Graduate Medical Education milestone scores for 29 residents. All applicants were asked structured interview questions designed to measure key interpersonal competencies. Multiple regression analyses were used to determine the relative efficacy of all predictors in relation to milestone performance.

### Results

Results demonstrated that USMLE scores were not useful predictors of resident performance. In contrast, structured interview scores were useful predictors of composites of systems-based practice ( $r = 0.40$ ;  $P < .05$ ; 95% CI 0.40 to  $-0.36$ ) and interpersonal and communication skills ( $r = 0.41$ ;  $P < .05$ ; 95% CI 0.41 to  $-0.35$ ). Program rank was a significant predictor of systems-based practice ( $B = 0.70$ ;  $P < .05$ ; 95% CI 0.70 to  $-0.48$ ), medical knowledge ( $B = 0.73$ ;  $P < .05$ ; 95% CI 0.73 to  $-0.53$ ), and an overall performance composite ( $B = 0.62$ ;  $P < .05$ ; 95% CI 0.62 to  $-0.53$ ) after controlling for USMLE and structured interview scores.

### Conclusions

This preliminary study reinforces previous findings that USMLE scores have limited utility in predicting residency performance. Structured interviews deserve further investigation as residency selection tools and the current holistic ranking process successfully predict some aspects of resident performance.

## Reference letters for subspecialty medicine residents: Pearls or perils?

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### Background

The letter of reference is currently an integral part of candidate selection for internal medicine subspecialty programs. However, evaluators are questioning the utility of reference letters due to frustrations with overly positive and indiscriminate applicant portrayals. Given the recent shift to competency-based curriculum and evaluation, there is an urgent need for reference letter reform.

### Objectives

Our objectives included (1) determining the current view of reference letter utility and validity from a Canadian perspective; (2) identifying specific facets of reference letters that affect quality; and (3) developing guidelines for letter writers that produce more accurate representations of candidates and better predict future performance.

### Methods

A questionnaire was designed and administered to Canadian internal medicine program directors to gain their perspectives on reference letter validity, and challenges with writing and reviewing them. A large audit was subsequently conducted to elicit strengths, weaknesses, and gaps in current reference letters.

### Results

Results of the program director questionnaire (53% response rate) were consistent with the literature in stating that letters are excessively positive, lack standardization, and do not help distinguish candidates. Our preliminary reference letter audit (100/1440) confirms that the Canadian Resident Matching Service (CaRMS) guidelines are inconsistently followed, rating scales are highly variable, and writers struggle to diversify their letters.

### Conclusions

There are identifiable limitations to using reference letters for internal medicine subspecialty candidate selection. Based on these results, we aim to develop letter writing guidelines in partnership with CaRMS. The guidelines will standardize and streamline the information provided so that more accurate representations of candidate suitability and future performance can be obtained.

## **Toward transparency: Selection strategies of residency training programs in the Netherlands**

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### **Introduction**

In view of a decreasing number of training positions, a decreasing length of training programs, and an overall attrition rate of 10%, adequate selection of future residents becomes more and more important in the Netherlands. Optimizing these selection processes—that are mainly locally or regionally controlled—requires a clear picture of current selection methods and their perceived efficiency.

### **Objective**

The aim of this study was to assess selection strategies of residency training programs in the Netherlands.

### **Methods**

We performed an exploratory qualitative study by interviewing 24 program directors of the Leiden University Medical Centre. In semistructured interviews, we gathered information on selection methods and perceptions of efficiency and need for improvement.

### **Results**

The interviews confirm the variety in selection procedures (for example, 24 different selection committees and scoring methods) used in Dutch residency training programs. Although the majority of the program directors are satisfied with current practices, there is a clear call for improvement.

### **Conclusions**

The results show a variation in selection workarounds and will be used as input for further research. The overarching goal is to contribute to the ongoing refinement of selection methods of residency training programs to ensure that we adequately select the right residents for the future medical workforce.

## Attrition in residency programs: Gaining insight in influencing factors

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### Background

Resident attrition, on average 10% in the Netherlands, has a major impact at various levels: individual residents, residents' groups, programs, and financial resources. Available publications on resident attrition mainly focus on attrition data and/or single factors, but a comprehensive picture of factors related to attrition is lacking.

### Objective

This study aims to identify factors influencing attrition from residency training.

### Methods

A literature search was conducted to clarify the concept of attrition and identify factors related to residents' or program directors' decisions to leave a program. Potentially relevant factors were translated into a digital questionnaire. This was sent to all (N = 117) residents and program directors who reported the decision to quit a residency program in the Netherlands in 2014. We used the results in a second literature review to see whether these match with and/or contribute to current knowledge about factors related to resident attrition.

### Results

With a response rate of 77.8%, the results on the questionnaire provided valuable insight into factors related to resident attrition. Among other factors, a "disturbed work-life balance," "mismatch between expectations on specialty content and reality," and "'culture' within a specialty" played a role for a majority of the residents.

### Conclusions

This study provides insight into potential factors, timing, and future plans of residents leaving a program. These outcomes may be used in future research to redefine the concept of resident attrition, reconsider attrition as a problem ("good/necessary" versus "avoidable"), and target factors that might be prevented or improved by designing effective interventions.

## Asking the right questions: An evidence-based revision of interview questions to improve CaRMS selection

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### Introduction

Selecting the most appropriate candidates for residency training is crucial. To improve our selection process, we conducted a study to determine evidence-based interview questions.

### Methods

Literature review (factors contributing to need for remediation in residency) and data mining. Files of past residents in difficulty were examined to look for common indicators that could be targeted through interviews. Next, a modified Delphi with clinical teaching experts resulted in specific interview questions for CaRMS 2015. Wording and scoring were revised until consensus was reached.

### Results

The literature review revealed that deficiencies in professionalism, resiliency, and problem-solving approaches were common factors in need for remediation. The file review confirmed these areas, as well as sincere interest in the specialty. Key papers from the literature review were reexamined to determine if there were validated questions to ask of candidates. Once essential aspects of key factors were identified, the Delphi process began to develop specific interview questions. Questions went through multiple iterations before finalized forms. Lastly, a scoring schematic for the individual questions was determined, which included specific elements to watch for in responses. Informally, faculty reported that they were pleased with the new questions; answers given by candidates were more informative than previously. Additionally, scores for candidates showed greater range than in previous CaRMS rankings.

### Conclusions

While much effort is required to develop evidence-based interview questions, initial results suggest that the new questions better distinguish between candidates. Long-term evaluation will include determining how many residents selected in this process will require remediation.

**Learning from the past to avoid repeating it: Data-mining resident files to improve CaRMS selection**

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**Background**

Despite best efforts in selection, approximately 6% to 10% of accepted residents encounter difficulties during training. In this study, we examined the Canadian Resident Matching Service (CaRMS) applications of past residents who required remediation to determine if there were common indicators of difficulty.

**Methods**

Secondary data analysis. Program directors identified 30 residents in difficulty (“cases”). Matched controls (“controls”) were also identified. CaRMS application materials were extracted from files of all residents in the study (deidentified and coded). Each component of the CaRMS application was analyzed.

**Results**

Multiple indicators were identified (commonalities among cases/notable differences between cases and controls). In the common CV, cases did not have much variety in their work or volunteer roles, and had few leadership positions. For clinical electives, total time was not as big an indicator as was the degree to which applicants described their electives. Cases gave vague descriptions, while controls gave detailed descriptions. For reference letters, there were certain words that occurred with much greater frequency for the controls, such as “exceptional” and “well-rounded.” For the personal letter, cases were more likely to be vague, especially about specialty choice, and have inconsistencies within the personal letter. Controls had highly descriptive personal letters that emphasized and gave supporting evidence for specialty choice.

**Conclusions**

The results suggest that data from past residents can be used to improve CaRMS selection processes. These results framed a revision of our file review process. Long-term evaluation of the 2015 cohort will indicate if this process is valid as a better way to select residents.

## **Boosting residency competencies development and improving health care performances through Healthcare Matrix implementations in surgical residents**

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### **Introduction**

The Healthcare Matrix (HM) provides a blueprint to help residents learn the core competencies in patient care. We implemented the matrix in grand rounds (GR) and mortality and morbidity conferences (M&M) in the department of surgery since 2013 to enhance surgical residents' competency development and patient care capabilities.

### **Methods**

Residents had used HM to review all M&M and GR cases with all faculty members. We applied the annual competencies evaluation to examine their achievements. Moreover, we surveyed 6 medical quality indicators, which were "admission over 30 days," "prescription antibiotic for outpatient," "returned to emergency department within 3 days after discharge," "against medical advice discharge," "completed inpatient consultation within 24 hours," and "completed discharge note within 3 days" to review that HM could help the residents to link mastery of the competencies with improvements in quality of care.

### **Results**

Comparing 2013 and 2014 surgical residents' annual competency evaluations revealed all 6 competencies had received improvements in which practice-based learning and improvement and systems-based practice had statistical significance ( $P < .05$ ). Reviewing the 6 medical quality indicators retrospectively and using comparisons, we found 5 indicators showed significantly improvement. The sole exception was the rate of completed inpatient consultation within 24 hours.

### **Conclusions**

The achievements of implementation HM with faculty professional collaborative efforts are particularly encouraging. HM discussions can boost surgical residents' competency developments and were used to improve the quality of health care service. It is worthy of consideration to be used in other medical fields.

## Use words that count: A content analysis to identify words and phrases that commonly appear in effective formative feedback

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### Background

Good formative feedback is essential to learning and teaching. Ende (1983) provided the foundation for current recommendations on effective formative feedback within medical education settings; however, although researchers have advanced understanding of the many factors influencing the quality and impact of feedback, there continues to be a lack of consistency regarding both how to deliver feedback and what should be included to offer trainees the most value. This study identified words, phrases, and patterns found in current effective feedback practices.

### Methods

We examined documented feedback on assessment forms collected over 3 years (2010–2013, n = 4807). Feedback was coded using the Formative Feedback Evaluation Tool (FFET). This validated tool allows for standardized rating of feedback by scoring 5 essential elements that comprise effective feedback. Based on the FFET quality score, the feedback was divided into poor feedback and effective feedback. Poor and effective feedback groups underwent content analysis. Frequency counts and context analysis were used to identify key words in effective feedback.

### Results

Comparison between word frequency in poor feedback and effective feedback groups showed significantly greater presence of the words *because* (7.40), *consider* (5.78), *next time* (26.00), *recommend* (5.22), *suggest* (6.86), and *try* (11.80). The overall number of words did not differ significantly between poor and effective feedback.

### Conclusions

The results of this study will be useful for faculty development. Key words for effective feedback may help cue clinical teachers to share better formative feedback with their trainees. The takeaway message is: Use words that count, rather than count words.

## General versus technique-specific surgical skills assessments: Do we need to reinvent the wheel?

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### Background

Reliable and valid methods of evaluating operative performance are essential for surgical training programs and education research. Laparoscopic surgery entails a unique skill set, but it is unclear whether it requires a specific assessment form or whether more general assessment tools can be applied. The primary purpose of this study was to assess the concurrent validity of 2 previously validated assessment scales. One of these scales was designed specifically to assess laparoscopic skills and the other to assess more general surgical skills. Construct validity and reliability of both scales were also assessed.

### Methods

Postgraduate year (PGY) 1–5 general surgery and urology residents (N = 33) performed a live human laparoscopic cholecystectomy. Three attending surgeon raters scored their performance using previously validated objective structured assessment of technical skills (OSATS) and Global Operative Assessment of Laparoscopic Skills (GOALS) global rating scales.

### Results

Pearson's correlation coefficient between OSATS and GOALS was 0.975 ( $P = .01$ ). Evidence of construct validity was demonstrated for both OSATS and GOALS with senior residents (PGY 3–5) demonstrating significantly higher scores than the junior (PGY 1–2) group ( $P < .001$ ). Both OSATS and GOALS demonstrated reliability with a Cronbach's alpha of 0.959 and 0.957, respectively.

### Conclusions

Reliability and construct validity were confirmed for both OSATS and GOALS global rating scales. The near total correlation between the 2 scales questions the need for separate laparoscopic assessment tools. This study highlights the real strengths of OSATS, the use of which allows for more consistent nomenclature and standardized skills assessment across surgical platforms.

## When is a resident “good to go”? Final results from a modified Delphi survey to define and benchmark entrustable professional activities for family medicine residency training

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### Introduction

A new competency-based assessment program was implemented in the Calgary Family Medicine (FM) Residency Program in 2012. The competencies, which were developed from CanMEDS-FM, were helpful for curriculum design but proved difficult to use on a day-to-day basis for resident assessment. ten Cate has written about the use of entrustable professional activities (EPAs) to bridge the gap between competencies and actual clinical practice, especially in relation to the assessment of residents. This study describes the development of a set of EPAs for FM residency education.

### Methods

Four rounds of a survey, involving 5 respondent groups (Calgary/non-Calgary faculty, program leadership, and Calgary/non-Calgary residents), were completed between 2012 and 2014 using a modified Delphi technique (n = 277). The groups were asked for agreement on the EPAs and the expected resident supervision levels over 2 years for 11 office-based EPAs.

### Results

Fourth round analysis shows a high level (> 90%) of agreement on 20 of the 23 EPAs, with fair (k = 0.220) to almost perfect (k = 0.911) agreement between the 5 groups. Analysis shows fair (k = 0.21–0.4) to almost perfect (k = 0.81–1.00) agreement between groups on the expected supervision levels for each of the 11 clinic EPAs at 5 different time points during training.

### Conclusions

There is a high level of agreement on a set of 23 EPAs for FM residency training in Canada and the associated supervision levels for 11 of them. These EPAs are now used in the assessment program for FM training in Calgary both on a formative and summative basis.

## Does laparoscopic simulation predict intraoperative performance? A comparison between the Fundamentals of Laparoscopic Surgery (FLS) and LapVR evaluation metrics

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### Background

Considerable resources have been invested in both low- and high-fidelity simulators for surgical training. To our knowledge no investigation has compared the 2 head-to-head for operative assessment purposes. The purpose of this study was to assess the Fundamentals of Laparoscopic Surgery (FLS) low-fidelity video trainer and the LapVR (high-fidelity VR simulator) for (1) construct and (2) predictive validity using a human cholecystectomy model.

### Methods

A total of 26 participants performed tasks from the FLS program, the LapVR simulator, and a human laparoscopic cholecystectomy. Performance was evaluated using standardized FLS metrics, automatic computer evaluations, and objective structured assessment of technical skills (OSATS) previously validated rating scale.

### Results

Construct validity was demonstrated for overall FLS score ( $P < .001$ ), and 3 of the 4 individual tasks demonstrated significance. Results were mixed for the VR simulator. Construct validity was demonstrated completely for 1 of the 5 VR tasks, incompletely for 3, and not at all for 1 task.

Predictive validity was demonstrated for the overall FLS score, with the overall FLS score explaining 41.5% of the variation in OSATS operative score. Additionally, all 4 of the individual FLS tasks demonstrated significance. Three of the 5 VR tasks were significantly associated with OSATS scores, with clipping, knot tying, and cutting explaining 45.1%, 35.9%, and 39.9% of the variation in OSATS operative score, respectively.

### Conclusions

Efforts should be focused on utilizing the well-validated, less costly FLS video trainer for assessment of laparoscopic skills. The higher-cost LapVR remains experimental in resource-constrained training programs.

## **How do clinical competency committees make decisions about internal medicine residents' achievement of the milestones? A pilot study using a grounded theory approach**

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### **Introduction**

In internal medicine, the Accreditation Council for Graduate Medical Education (ACGME) requires clinical competency committees (CCCs) to rate residents' achievement of the 22 reporting milestones. CCC faculty may not be well versed in combining various types of quantitative and qualitative assessment data (obtained over the course of various learning experiences and created by a variety of raters) in order to make determinations as to a given resident's competence. Thus, how do CCCs make decisions about residents' achievement of the milestones?

### **Methods**

All 16 CCC members were invited to participate. Using Schon's reflective practice as a conceptual framework, CCC faculty were asked to complete a questionnaire about their experience providing milestone ratings. Using the constant comparative analysis approach, the data were coded by the principal investigator. An iterative process was used to reach agreement on the coding guide. Thematic saturation was reached (based on data collected to date). An outside expert reviewed the coding procedure. Member checking was performed.

### **Results**

Of the 16 invited CCC members, 7 chose to participate. A total of 9 themes were identified. The ability to generate milestones ratings for residents primarily involves the following factors: (1) faculty comments; (2) knowledge of the milestones and assessment methods; (3) the "hidden curriculum" (eg, "hearsay" from other colleagues); and (4) contextual influences (eg, ACGME expectations, workload etc).

### **Conclusions**

Despite being able to use the MedHub generated numerical average ratings to complete the milestone reports for the ACGME, our CCC recognized the importance of qualitative data to their decision-making process.

## Development of the Ottawa Clinic Assessment Tool (OCAT)

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### Purpose of Study

The shift toward competency-based medical education has triggered consideration of how to implement feasible assessment tools. Performance in clinic is vital to surgical practice, yet no assessment tool currently exists to assess daily performance in outpatient clinics for surgery residents. To address this gap, we developed a competency-based assessment tool, the Ottawa Clinic Assessment Tool (OCAT).

### Methods

A consensus group of surgical educators gathered to generate features reflective of competent independent clinical performance in clinic. The research team utilized these features to develop items for the OCAT. A 6-month pilot study was conducted in orthopedics, general surgery, and obstetrics and gynecology. Two feedback sessions evaluated the OCAT for clarity and utility.

### Results

The OCAT has 11 items rated on a 5-point scale, 2 of which are not completed if technical procedures were not performed. A total of 79 residents completed OCAT forms from 44 staff surgeons (132 forms). Analysis of variance showed an effect of postgraduate year (PGY), with post hoc tests revealing PGY-1 and PGY-2 scores lower than PGY-3, PGY-4, and PGY-5 ( $P < .05$ ). A generalizability analysis showed the largest contributor to variance was participants' results. Analysis of qualitative data indicated the rating scale was practical and useful for surgeons and residents.

### Conclusions

Surgical programs will require a daily clinic assessment tool to define resident competency progression. This novel assessment tool was well received by the residents and staff. It successfully discriminated between senior and junior residents and demonstrates promise as a reliable tool to assess resident performance in clinic.

**Multisource feedback: Everyone has a say, but who is listening?**

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**Introduction**

Multisource feedback involves the collection of feedback from multiple groups of assessors, including those who do not traditionally have a hierarchical responsibility to evaluate physicians. Theoretically, the feedback collectively provides a thorough view of physician performance in daily practice in the humanistic and relational competencies. This study explored perceptions of multisource feedback and prerequisites to an effective multisource feedback program in postgraduate medical education from the perspectives of both pediatrics residents and allied health care professionals.

**Methods**

This exploratory case study utilized a pediatrics inpatient unit where multisource feedback has not yet been implemented. Three focus groups were conducted with purposefully recruited participants from 3 distinct groups: junior pediatrics residents, senior pediatrics residents, and allied health care professionals. Discussions were audio recorded, subsequently transcribed, and analyzed with thematic analysis.

**Results**

Both residents and allied health care professionals expressed a strong interest in the concept of multisource feedback. However, more in-depth discussions identified barriers to residents' acceptance of and allied health care professionals' provision of feedback. Interpersonal dynamics, concerns about understanding, and misunderstanding of roles and responsibilities and power hierarchies were identified as barriers to both accepting and providing feedback. Interest in bidirectional feedback among allied health care providers and residents were expressed by all 3 focus groups.

**Conclusions**

The barriers and prerequisites to providing and accepting multisource feedback identified suggestive limits to the efficacy of the multisource feedback process. Our findings suggest that these factors should be considered in the design and implementation of multisource feedback programs.

## **Building capacity for CBME implementation**

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### **Background**

Queens University has set the goal of implementing competency-based medical education (CBME) in all of their specialty programs by July 2017. CBME represents a paradigm shift from the traditional time- and process-based education training. Hall and Hord (2015) describe this shift as encompassing 3 phases: adopting, implementing, and sustaining. Accordingly, the first phase of our project is guided by the question, How do we prepare programs for the adoption of CBME?

### **Methods**

Throughout the project we will be guided by the concerns-based adoption model (CBAM). CBAM provides an overall framework and perspective on the process of change in educational institutions. More specifically, in this phase of adoption we will use the stages of concern (SoC) questionnaire. The SoC questionnaire is a validated tool designed to capture readiness for change as well as the type and level of resources required to support the adoption of CBME across the institution. The SoC questionnaire results will be augmented with interviews with the postgraduate program directors.

### **Results**

The SoC questionnaire is based on 7 specific categories of concerns about the innovation. We will show how the results, when combined with the interview data, provide us with an institutional profile of readiness for change and strategies required for moving forward.

### **Conclusions**

The CBAM can be a powerful model for guiding the adoption of educational innovations. Our results should help to provide the larger medical community with a framework and tools as we shift to CBME.

## Is neurology ready for competency-based medical education?

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### Background

The CanMEDS Framework was first launched in 2000 with a view to enhancing resident preparedness for practice, and has become deeply embedded within Canadian postgraduate medical education. Fifteen years later, we prepare to move to a new era of competency-based medical education (CBME) and the launch of CanMEDS 2015. This study examined the current state of curricula and assessment for the CanMEDS roles in pediatrics and adult neurology, in consideration of whether they are ready for this new era in postgraduate medical education.

### Methods

A 13-item, electronic needs assessment survey was developed and distributed electronically through the national specialty committee with the assistance of the Royal College of Physicians and Surgeons of Canada to all adult and pediatric neurology residency training program directors in Canada.

### Results

The response rate was 87% (n = 23). Program directors expressed a need for neurology-specific resources across all roles, with Health Advocate being rated higher than the others. From the 18 programs that responded to assessment modalities, across all CanMEDS roles, the ITERs were most prevalent (16–18 of 18 programs), with reflective essay writing, portfolios, and short answer examinations being used infrequently (0–2 of 18, 1–4 of 18, and 1–7 of 18, respectively).

### Conclusions

Residency education in Canada is evolving to a competency-based model, where sophisticated assessment methods based on direct observation and reflection will be critical. The high prevalence of ITER use and relatively low prevalence of assessment methods that are congruent with the competencies to be assessed within the CanMEDS framework suggest that significant change is needed to prepare neurology training programs to move to CBME over the next few years.

## **Mitigating risk during implementation of competency-based medical education in Canadian residency programs**

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Competency-based medical education (CBME) has emerged as an important concept in recent years with interest and debate on the ongoing paradigm shift in Canadian medical residency programs. The Royal College is adopting an outcomes-based approach to the design, implementation, assessment, and evaluation of medical education programs. The College of Family Physicians Canada (CFPC) has already transitioned family medicine programs in Canada to a competency-based curriculum with the launch of the Triple C in 2010.

What are risks of implementing a CBME system? What are some CBME success stories or best practices, and what strategies have been used to make this a successful model? What are some risks and best practices for the timing of certification examinations in CBME models?

To answer these questions, Resident Doctors of Canada (RDoC) undertook an extensive review of the research related to implementing a competency-based approach in medical education. RDoC consulted with the CFPC Section of Residents and surveyed residents in programs already implementing a competency-based approach.

To be successful, milestones must be designed carefully and with clear applicability to clinical practice. Implementation of this new curriculum needs significant support not only from clinician educators but also from residents, faculty members, and stakeholders. Identifying the factors that could limit the impact of CBME, as well as determining strategies that could encourage its adoption, are critical to successful implementation of this new competency model.

## Scoping review of postgraduate epidemiology of competence

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### Introduction

The competence of health care professionals is important to the quality of health care. While previous research discussed risk and support factors related to the competence of health professionals, a thorough exploration is currently lacking. This review examined the literature about the risks and supports to the competence of across the lifespan/career of physicians, pharmacists, occupational therapists, and physical therapists starting in field-based education (eg, residency of physicians).

### Methods

A scoping review methodology was used to search relevant databases (eg, MEDLINE, Embase) and grey literature, yielding 3160 abstracts. Calibration of researchers was undertaken to achieve consistency. First, title and abstract inclusion/exclusion criteria were recorded. Next, articles were reviewed for inclusion per criteria (eg, health care professional, lifespan/career, and risk or support to competence). Data extraction included information on study design, location, and type of study, and specific risks and supports to competence.

### Results

Results include (1) most information is available about the risks and supports to practicing physicians followed by residents; (2) most frequently the focus was the CanMEDS Medical Expert competency or competence in general; (3) most frequently the attention was on continuing education as a support; and (4) little information about supports that may moderate or manage the most common risks (eg, age; wellness; complaints history; type, location, and performance in training).

### Conclusions

This scoping review informs both practice and research about what is known about the risks and supports to the development, maintenance, and enhancement of competence throughout the lifespan/career of health professionals.

## Entrustment in practice: a competency-based curriculum assessed

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### Introduction

The entrustable professional activity (EPA) is a commonly used approach in competency-based curricula for entrusting residents. However, knowledge about where the entrustment decision is based upon is limited. Therefore, we looked into an EPA-based training program to find out which factors are taken into account during the decision to hand over trust to a resident.

### Methods

The e-portfolio of the Dutch obstetrician and gynecology training is used for selecting all entrustment decisions for obstetric activities from January 2010 until April 2014. Entrustment is based on an argumentation of both resident and program director. All argumentations were labeled and template analysis is used to analyze the differences between entrustment decisions more closely.

### Results

In total, 5139 entrustment decisions have been selected and analyzed, with 49% of all argumentations being about the experience of the resident. In just over 16% the performance of the resident on technical skills was considered, while 0.4% was about the level of performance on generic competencies. The qualitative analysis confirmed these findings.

### Conclusions

Experience seems to be the most influential factor in entrusting a resident. Often, the performance of the resident is an argument for entrustment as well. However, there only seems to be attention for the technical skills, and there is little consideration for the generic competence of a resident. Based on the portfolio data we can conclude that despite the introduction of competency frameworks and EPAs the formal handover of trust is still mainly based on the experience and technical skills.

## Follow the leader: The need to enhance supervisory skills in competency-based education

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### Background

The implementation of competency-based education (CBE) within postgraduate medical education will necessitate more direct observation of trainees. A burgeoning evidence base supports the use of CBE assessment tools; however, less research is available on supervisory practices. The present study examined resident perceptions of clinical supervision in order to shape CBE faculty development opportunities within the department of psychiatry at McMaster University.

### Methods

Psychiatry residents participated in a 64-item online survey rating supervisor behaviors, including qualities of a good supervisor, orientation to clinical rotations, and the use of direct observation in supervision. Residents were asked to rate the frequency of supervisor behaviors within a specific clinical rotation (1, never; 2, sometimes; 3, often; and 4, always).

### Results

Of all eligible residents, 74% completed the survey. Survey items showed high internal consistency (Cronbach's alpha = 0.921). Median scores were calculated to identify behaviors that were frequently (median = 4) or infrequently (median = 1) endorsed by residents. Frequently endorsed behaviors included using understandable language to explain concepts (mean [M] = 3.93); acting respectfully (M = 3.83); actively listening to residents (M = 3.72); listening to residents' reports on patients (M = 3.72); allowing residents to develop their own ideas (M = 3.59); responding adequately to questions (M = 3.55); providing adequate access during supervision (M = 3.45); encouraging residents to bring up issues (M = 3.45); and asking residents' opinions on interventions (M = 3.41). Behaviors infrequently endorsed included explaining limits of confidentiality (M = 2.0); observing patient sessions through videotapes/audiotapes or 1-way mirror (M = 2.17 and M = 2.28); assigning e-learning material (M = 1.86); and asking residents to present on specific topics (M = 1.69).

### Conclusions

The present study identified supervision strengths and areas for focused CBE faculty development at McMaster University.

## **Introduction of a longitudinal competency-by-design rotation into a block-based surgical residency program—a solution to providing adequate case volume in competency-based education**

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### **Introduction**

Many clinical experiences relating to orthopaedic surgery competencies are encountered “on-call” and are not available in prescheduled rotations. Educational objectives of residents’ required on-call experiences are usually undefined. We introduced a longitudinal competency-by-design rotation in emergency orthopaedic surgery that runs concurrently within a subspecialty block system. We hypothesize that the longitudinal rotation will provide value to the on-call learning experience and will capture those competencies related to the delivery of emergency specialty care.

### **Methods**

Faculty identified core competencies from subspecialty rotations corresponding to clinical encounters commonly experienced after hours. These competencies were reorganized under a longitudinal rotation that spans 2 senior years of the 5-year residency program. The longitudinal rotation runs concurrently with preceptor-based subspecialty rotations during the after-hours and weekend call shifts for which residents are scheduled.

A 4-month study period was identified. A survey was designed to assess the perceived clarity of the objectives of the on-call experience. The longitudinal rotation was introduced midway through the study period. The survey was administered prior to introduction of the rotation and again 2 months after implementation.

### **Results**

Eight subspecialty rotations contributed to the content, and 8 senior orthopaedic surgery residents were assessed pre- and postimplementation. We report descriptive results of the on-call learning experience pre- and postimplementation.

### **Conclusions**

A longitudinal rotation can be adapted into other competency-by-design programs to address learning objectives that are commonly encountered outside scheduled clinical hours. The longitudinal emergency rotation provides structure and value to the on-call learning experience.

## **A qualitative study exploring residents' perceptions on substandard medical practices**

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### **Introduction**

Although patient safety is the top priority in all medical practices, residents are in a vulnerable position to conduct substandard practices threatening patient safety. This study aimed to identify substandard practices conducted by residents and to explore their perceptions in those practices.

### **Methods**

We recruited 20 residents from 17 clinical departments and conducted semistructured interviews in person. Participants were asked to describe their experiences or observations of substandard practices during residency training. All interviews were recorded and transcribed, and a thematic analysis was conducted by 4 researchers.

### **Results**

A total of 10 descriptors representing 3 categories of substandard practices were extracted from the transcripts: (1) overtreatment, (2) unsafe practice, and (3) irresponsibility in patient care.

The residents considered some misconducts (eg, clinical procedures by not fully competent residents) more attributed to external factors, such as the training environment and the hospital culture, while some others (eg, rejecting or delaying treatment of patients in the emergency department) were attributed to individual character, competence, and ethical standards. "Conducting excessive medical tests" and "improper aseptic technique" were described as what residents often conduct without awareness of the problem.

### **Conclusions**

Residents reported diverse substandard practices throughout their training and perceived these practices in the context of not only individual competence, but also training systems. To improve patient safety, professionalism education during residency training should be reinforced, and a systems approach at the institutional level is needed.

## Taking a closer look at handover practices in internal medicine: Does use of a handover tool help?

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### Background

Miscommunication at handover is a leading cause of medical error. Many residents receive little training in handover. This study was designed to survey handover practices among Dalhousie University's internal medicine (IM) residents after implementation of a handover tool.

### Methods

A handover tool was developed to meet the needs of IM residents on medicine consults in the emergency department of the Queen Elizabeth II Health Sciences Centre hospital in Halifax, Nova Scotia. This tool was piloted for 1 month in November 2014. Feedback was then obtained using structured interview questions with the 2 senior medical residents who had used the tool.

### Results

Both residents identified barriers to providing handover prior to the tool's introduction. These included lack of a standardized format, time constraints, and that pertinent patient details were sometimes unknown. Both residents agreed the preprinted handover tool was easy to understand and simple to complete. However, barriers to its success included poor uptake in the emergency department as a whole and persistent concerns about time constraints. It was felt more education about the tool might help, and the tool could be shortened and simplified further.

### Conclusions

A standardized tool can be helpful in improving residents' awareness of handover. However, we found it had poor uptake and was thought to have little effect on patient safety. Handover tools must be simple, quick, and easy to complete. Their purpose must be understood by the entire health care team. This project has led to revision of our handover tool, and increased effort to integrate handover teaching into our program.

## A structured safe prescribing training for first-year residents in a teaching hospital in Qatar

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### Introduction

Medication systems are complex and errors may occur at any stage, from prescribing, transcribing, and dispensing to administration. Medication errors are most likely to occur when the prescriber lacks relevant knowledge about medications, patients, or communicating the order in a safe manner. Improving physicians' skills about prescribing a safe and complete medication order increases patient safety and reduces errors significantly. This study is about assessing the effect of interprofessional collaborative training (medical and pharmacy) on junior physicians' prescribing skills during their service orientation.

### Methods

A total of 153 junior residents enrolled in a 3-hour workshop in January 2014. The session includes didactic presentations, medication reconciliation exercise, facilitated small group discussions, real examples of prescribing errors, and safe prescribing videos. Scenario-based prescription writing assessment was used before and after the session, with assessments being specialty-based (medical, surgical, obstetrics and gynecology, and pediatrics). Five domains for session assessment included patient and prescriber identifications (ID), complete prescription (CP), safe prescription (SP), clear instructions (CI), and legible hand writing (LW). Categorical analysis using a Chi square test was used to detect significance between before and after the assessment.

### Results

Four of 5 domains of safety compliance showed a significant improvement: ID, 40% to 98%; CP, 79% to 98%; SP, 62% to 91%; CI, 60% to 88% (each  $P$  value is  $< .01$ ); and nonsignificant in LW, 89% to 92% ( $P = .44$ ).

### Conclusions

This interprofessional collaborative training was successful in improving prescribing skills of physicians in training introduced at their rotation. Inclusion of other health care disciplines (eg, nursing) to this model is worth a future study.

## **Can rotation evaluations provide relevant information, and a means to follow-up, on weaknesses identified during an onsite accreditation survey?**

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### **Introduction**

Residency education programs are constantly changing, and program evaluation is a key component to measure and monitor the intended and unintended outcomes of implemented changes. This study aims to compare the identified strengths and weaknesses of 2 types of program evaluations: the onsite accreditation survey and the regularly scheduled rotation evaluations collected for the same time period. By identifying similarities and differences between the results of these evaluations, programs and faculty committees can better determine which methods, or combination of methods, to employ when taking a utilization-focused approach to program evaluation.

### **Methods**

The accreditation survey reports from 42 programs were reviewed and 10 rotation specific weaknesses were identified. A total of 467 rotation evaluations pertaining to these 10 weaknesses were coded using qualitative research techniques. Crosstab tables analyzed the propensity of positive versus constructive comments, B standard areas addressed, and matches between the concerns raised in the 2 evaluation types.

### **Results**

There was no correlation found between the onsite survey weaknesses and the rotation evaluation comments from the same time period. Of the 171 comments from program evaluations that were analyzed, only 9% of those related to identified accreditation weaknesses. In 1 (of 10 cases) the comments accurately reflected the weakness identified on the onsite survey report.

### **Conclusions**

It would be difficult to use rotation evaluations to follow up on progress made to address weaknesses identified within accreditation reports. Further research is necessary to determine if there is a role for rotation evaluations to provide new information and perspectives within the internal review process.

## Consequence validity of third-year clinical clerkship assessments—a quantitative survey

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### Background

Medical education researchers have suggested that the validity framework of the *Standards for Educational and Psychological Testing* should be used to justify the interpretation assigned to assessment results. Within this framework, the fifth source of validity evidence is consequential, which describes the impact and consequences of assessments. This study explores medical student and faculty perspectives of the consequences of third-year clinical clerkship assessments at the University of Ottawa.

### Methods

Fourth-year medical students and undergraduate medical education faculty were surveyed on consequence validity of clerkship assessments using 5 key domains: knowledge acquisition, self-improvement, preparation for future examinations, career planning, and accuracy.

### Results

Students report objective structured clinical examinations to be the most useful assessment form across all 5 key domains. Both students and faculty perceive assessments to be most useful when given at a combination of different times. Faculty report time constraints, personality traits, and type of assessment as important contributing factors to the utility of assessments, whereas the majority of students view rapport with preceptor as the most important factor. Faculty describe retaliation from students as a consequence to constructive feedback and view the large number of assessments as a potential contributing factor to their decreased utility.

### Conclusions

This research provides educators with valuable insight into the consequential validity of third-year clinical clerkship assessments from both student and faculty assessor perspectives. These findings have the potential to enhance the delivery of medical education and optimize student learning via improved, evidence-based assessment techniques.

## **A resident-driven curriculum map: Successes, challenges, and next steps for developing competency-based medical education in Canada**

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### **Introduction**

One challenge in transitioning to competency-based medical education (CBME) is determining where residents will meet specific competencies. Curriculum mapping is a tool used to address this by linking objectives to curriculum elements. In preparation for CBME, our internal medicine (IM) program developed a resident-driven electronic curriculum map using One45. We strove to map curriculum for all elements of formal teaching. In addition, we wanted to understand the experiences of other Canadian IM programs with curriculum mapping.

### **Methods**

We distributed an electronic survey to the 16 other Canadian IM programs regarding their experience with curriculum mapping and compared it to our own.

### **Results**

Of the 63% of programs that completed the survey, 50% had developed a curriculum map. Forty percent indicated plans to develop one. Two programs indicated they used electronic programs and resident involvement to develop their maps. Academic half-day (AHD) was a key component of the maps. Programs used their curriculum map to plan AHD content and to identify gaps and redundancies. No other program planned to use their curriculum mapping to transition to CBME. Identified challenges included a large time commitment and ensuring that all structured clinical teaching was accounted.

### **Conclusions**

Despite these challenges, a small number of IM programs have created curriculum maps. Our next step is to use our map to transition to CBME by identifying redundancies and gaps and determining where residents can gain different competencies.

## Survey of former program directors: Job satisfaction, challenges, and career development

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### Introduction

Despite its pivotal role in postgraduate education, there is a paucity of information regarding how program directors (PD) in Canada perceive their role, with respect to training and support, challenges, and career development after completion.

### Methods

PDs who had completed their term from 2007–2013 (n = 693) were identified by the Educational Unit of The Royal College of Physicians and Surgeons of Canada. Individualized e-mail requests to complete a 57-question online survey were sent to each former PD.

### Results

A total of 258 questionnaires were completed (37.2% response rate) with respondents across 17 Canadian universities. Median PD term duration was 6 years, with 50% of respondents assuming the role within 5 years of initial faculty appointment (78% within 10 years). One-third of former PDs felt unprepared for the role while only 23% felt prepared or very prepared. Of the respondents, 40% and 26% identified spending 10 to 19 and 20 to 29 hours per week on program-related activities, respectively, with 42% reporting spending 10 to 19 hours per week outside of business hours. Accreditation and program documentation were identified most frequently as the greatest challenges. While the majority of respondents (96%) indicated no specific career mentorship when stepping down as PD, 54% agreed the role led to other career opportunities. Importantly, 69% would recommend the role of PD to others.

### Conclusions

We believe this is the first survey to review the experience of the PD in Canada. Survey results will be helpful in identifying areas of faculty development needed by PDs, potentially standardizing support mechanisms and development of programs by universities and the Royal College.

## Speaking up among clinician educators in residency training

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Speaking up (SU) is defined as a sincere manner of communication and has been shown to have a preventive effect on human error.<sup>1</sup> Little is known about SU among clinician educators for the quality of residency training. In order to determine how clinician educators demonstrate SU in formal educational team meetings and what factors influence this, we carried out an explorative, multicenter, multispecialty study.

We selected teams of clinician educators using purposeful sampling. The team meetings were observed, audio recorded, and analyzed. Subsequently, the program directors reflected on the behaviors of SU during the meetings in an interview. All audio fragments were analyzed interactively using template analysis based on SU.<sup>1</sup>

From October 2013 to July 2014, 10 teams participated, and 5 SU behaviors were identified: talking about mistakes, asking questions, seeking help, feedback, and sharing information. However, the way SU was displayed often did not contribute to effective communication. We identified 3 factors influencing SU behaviors: relational (power, feeling safe, and handling conflict), cultural (history, meeting, and feedback), and professional factors (commitment to education, contribution by residents).

Clinician educators demonstrate SU, whereby it appears that problematic topics are only discussed to a limited degree without taking action. If clinician educators, as CanMEDS role models in communication and collaboration, develop SU, it is important to take into account the influencing factors. A sincere and direct team communication during educational team meetings could have a positive effect on the quality of resident training.<sup>2</sup>

<sup>1</sup> Edmondson AC. *Teaming: How Organizations Learn, Innovate, and Compete in the Knowledge Economy*. San Francisco, CA: Jossey-Bass; 2012.

<sup>2</sup> Okuyama A, Wagner C, Bijnen B. Speaking up for patient safety by hospital-based health care professionals: a literature review. *BMC Health Serv Res*. 2014;14:61.

## Role modeling of clinical tutors: A focus group study among medical students

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### Introduction

Role modeling by clinicians assists in development of medical students' professional competencies, values, and attitudes. Three core characteristics of a positive role model include (1) clinical attributes, (2) teaching skills, and (3) personal qualities. This study explored medical students' perceptions of their bedside clinical tutors as role models during the first year of the medical program.

### Methods

The study was conducted with a cohort of 301 medical students who had completed the year 1 medical program in 2013. Nine focus groups (n = 59) were conducted. Thematic analysis was used to code and categorize data.

### Results

Students identified both positive and negative characteristics and behavior displayed by their tutors. Characteristics and behavior that students would like to emulate as medical practitioners in the future included:

- Clinical attributes: good knowledge base; articulate history taking skills; ability to explain and demonstrate skills at the appropriate level for students; and empathy, respect, and genuine compassion for patients.
- Teaching skills: development of rapport with students; provision of time toward the growth of students academically and professionally; provision of a positive learning environment; understanding of the curriculum and assessment requirements; immediate and useful feedback; and provision of patient interaction.
- Personal qualities: respectful interprofessional staff interactions; preparedness for tutorials; demonstration of a passion for teaching; and demonstration of a passion for their career choice.

### Conclusions

Excellence in role modeling entails demonstration of excellent clinical care, teaching skills, and personal characteristics. Our findings reinforce the important function of clinical bedside tutors as role models, which has implications for faculty development and recruitment.

## Unravelling teamwork of clinician educators

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Clinician educators are jointly responsible for the quality of residency training, yet it is not fully known how they work together.<sup>1</sup> We aimed to unravel teamwork of clinician educators with the overarching research question: What is the nature of teamwork of clinician educators in quality of residency training?

We used different methods in 4 separate studies, including qualitative research designs, psychometric analysis, and mixed methods.

Based on the perceptions of the clinician educators, we developed a valid, reliable, and feasible instrument for measuring teamwork in clinical educational teams for residency training. Established on a sample of 132 clinical education teams, we identified 8 themes: *task expertise*, *team expertise*, *decision making*, *team leadership*, *feedback culture*, *team results*, *resident engagement*, and *resident empowerment*, which are determinative for evaluation teamwork of clinician educators. To understand communication behaviors during formal meetings, we have learned that clinician educators discuss mistakes and conflicts mainly in a general sense, and are often neither directed at the individual nor adequately result-oriented. Three factors—*relational*, *cultural*, and *professional*—influenced the interaction by clinician educators during formal meetings.

The nature of the teamwork of clinician educators can be characterized as clinician educators do train residents passionate, but not as a team with collective ambitions, shared values, common goals, and clear team results. If learning and working as a team received more attention, the clinician educators will be better able to share responsibility and anticipate the changing demands of the environment.<sup>2</sup>

<sup>1</sup> Mathieu J, Maynard MT, Rapp T, Gilson L. Team effectiveness 1997–2007: a review of recent advancements and a glimpse into the future. *J Mgmt.* 2008;34(3):410–476.

<sup>2</sup> Edmondson AC. *Teaming: How Organizations Learn, Innovate, and Compete in the Knowledge Economy*. San Francisco, CA: Jossey-Bass; 2012.

## Milestones: The road to faculty development

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### Introduction

The Accreditation Council for Graduate Medical Education (ACGME) milestones for evaluation of graduate medical education mark a change in evaluation paradigms. We propose that a similar approach be taken for resident assessment of teaching faculty. We believe this will establish objectivity for faculty evaluation and provide faculty with improved evaluation data.

### Methods

The 11 ACGME surgical milestones were used to develop a faculty evaluation. The residents have historically answered 16 questions in new innovations (NI), using a 5-point Likert scale. Three weeks after completing the NI evaluation, residents were asked to evaluate faculty using the milestone questionnaire. Residents completed a 7-question survey using a 9-point scale (1, disagree, to 9, strongly agree), comparing the new milestones to the previous system.

### Results

Thirteen of 32 surgery residents completed the NI question evaluations (3760 data points) and 13 completed the milestone evaluations (1800 data points). The number of residents completing both or neither is not known; responses are anonymous. The milestones and NI questions are structured differently; no statistical correlation was measured. Milestone responses had far fewer top range scores (21% versus 42%) and had a wider spread.

Residents completed 17 surveys (116 responses) to evaluate the new milestone system. Surveys indicated that milestones were easier to use (6.13), effective (6.82), efficient (6.11), and more objective (6.69/6.75) than the NI Likert evaluations.

### Conclusions

Our data indicate that milestones are more objective in evaluating surgical faculty and mirror the new paradigm in resident evaluations. Residents found this was an easier, effective, efficient, and objective evaluation of faculty.

## Integration of daily faculty evaluations in the emergency department

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### Introduction

The daily encounter card is an existing paradigm of learner evaluation in the emergency department, but it has not been consistently paralleled with faculty evaluation.

### Methods

The goal of this project was to ensure that there are daily evaluation forms of faculty working in the emergency department.

### Results

A web-based form, which is accessible via smartphone or computers and can be easily tabulated, was introduced in 2013. Due to concerns regarding learner anonymity, faculty members may only receive performance evaluations once they have an aggregate of 3 evaluations. Prior to the implementation of this new daily faculty evaluation system, 19% of faculty members did not receive any feedback since they had not yet received 3 evaluations in a given year.

In 2014–2015, faculty members across 3 clinical sites were made eligible for daily evaluations, which were linked to the resident daily encounter cards. In the initial year, faculty members (ie, non-locum attending physicians) received the following average number of evaluations in a 12-month cycle: Site 1: 5.3/–3.8, Site 2: 10.6/–10.2, and Site 3: 21.4/–15.3. Large standard deviations are likely due to differences in faculty requirements between various ranks of teaching staff.

All 3 sites had increased number of faculty members who were eligible to receive faculty evaluation feedback (Site 1: 86%, Site 2: 86%, Site 3: 94%).

### Conclusions

Our system is a proof of concept that daily faculty evaluations are feasible and may increase the frequency of available feedback to faculty members.

**Resident assessment of faculty: Residents' perceptions of utility**

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**Introduction**

Resident written assessments of faculty are used to provide feedback on clinical teaching in performance reviews. Previous studies have identified barriers that may prevent residents from providing honest, useful feedback. This study sought to determine if residents feel confident in the anonymity of online feedback to faculty, believe their feedback is used to modify clinical teaching, and are aware of the process by which their assessments are delivered to faculty.

**Methods**

We designed an anonymous, online survey for internal medicine residents using the above objectives. Of 99 eligible residents, 60 completed it.

**Results**

Only 44% of respondents were confident that their online feedback is anonymous. Although 100% of respondents felt honest feedback was important, only 54% admitted to providing it. Main barriers to providing honest feedback were concerns regarding anonymity and the belief that assessments would not modify clinical teaching. Although 70% of residents believed faculty deem resident feedback honest and fair, and 79% believed faculty view resident feedback as integral to professional development, only 8% thought faculty would modify behaviors based on resident feedback "often"; 66% felt they would do so "sometimes." More than half of respondents (60%) had minimal or no understanding of the feedback process. Presently, resident feedback is collated and distributed to faculty annually to preserve anonymity. Residents suggested their comments be synthesized into general feedback, and delivered to faculty sooner to effect timely changes.

**Conclusions**

Residents desire reassurance that their feedback is anonymous and are skeptical that it modifies clinical teaching. Future directions include resident education on the feedback process.

## A model for the initiation and enhancement of fellowship training

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### Introduction

Fellowship has been labeled “the invisible phase of postgraduate training” as it is neither funded nor accredited and therefore subject to variability in resource allocation and organizational support. The majority of publications on the subject are descriptions of the current status of fellowship training in a single content area, typically focusing on clinical volumes and resources, with a paucity of information on curriculum and assessment.

This exploratory sequential mixed methods study examined the current status and ongoing educational, administrative, and organizational needs of fellowship training in our department of medicine from the perspectives of division heads, fellowship directors, current fellows, and recent graduates.

Data were categorized as foundational needs, support, or enhancements. Foundational needs included resources (supervisors, clinical and research material, salaries) as well as access to advanced degree programs and procedures for recruitment, registration, licensure, and privileges. In the absence of these elements, a program could not operate. Supports were elements that enrich the functioning of established programs. They included learning objectives, assessment processes, career guidance, dedicated administrative support, and hospital resources such as office space. Potential enhancements were described as being current problems or challenges in well-established programs. This included formal academic sessions, a transition/orientation process, clear definition of the fellow role, and stability of funding.

### Conclusions

Based on this data, a model was developed that linked the type of fellowship program (individualized, clinical, or research) to this matrix of needs. This model may be used to systematically analyze and support the development of fellowship programs.

## Canadians studying abroad—their journey into the Canadian and American medical systems

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### Introduction

The number of Canadians leaving Canada to study medicine abroad is growing. According to the Medical Council of Canada (MCC), there were only 47 Canadians studying abroad (CSAs) in 2001 who attempted the evaluating examination (EE), a prerequisite for international medical graduates taking the Canadian medical licensing examinations. By 2012, there were 630 of them, an increase of 1340%.

We hypothesize that CSAs are not only attempting to enter the Canadian medical licensing process but are also seeking entry to graduate medical education programs in the United States, a process that requires certification by the Educational Commission for Foreign Medical Graduates (ECFMG). The purpose of this study is to test our hypothesis.

### Methods

There were 4542 CSAs who attempted the MCC EE between 1994 and the spring of 2014. We merged this cohort with initial registration data obtained from the ECFMG, resulting in 3226 matches.

### Results

Preliminary analyses indicate that almost 60% of the 3226 candidates start the Canadian and American licensing processes within a 1-year period. For the matched cohort (n = 3226), most students (80%) attended medical school in 1 of 8 countries. The presentation will provide more detail concerning the characteristics of individuals who attempt to enter both the Canadian and American medical systems.

### Conclusions

Many CSAs seek educational and practice opportunities in both Canada and the United States. Knowing more about these individuals will help certification and licensing bodies develop sound workforce policies.

## Factors contributing to resident transfers: A survey of Canadian residents

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### Introduction

Lifestyle and work hours have commonly been cited as major factors for resident attrition from surgical specialties; however, the rate of attrition in the United States has not noticeably decreased following the implementation of work hour reduction. The objective of this study is to examine the factors contributing to the decision to transfer specialties during residency, and to determine if unique factors exist for the transfers from a surgical specialty.

### Methods

From December 2014 to February 2015, an anonymous online survey in both English and French was distributed to current Canadian residents who have transferred specialties. This survey was distributed through and at the discretion of the university postgraduate medical education office; 4 schools declined participation.

### Results

Thirty-nine residents participated in the survey, with an estimated response rate of 10%. Eighteen respondents had transferred from a surgical specialty. Most respondents were women (79%), aged 30 or older (69%), and had transferred in the postgraduate year (PGY)–1 or PGY-2 (56%). Concern about finding employment in the initial specialty was an important factor for changing specialty for surgical and nonsurgical trainees. Work hours, lack of work-life balance, and burnout were cited as factors more frequently by trainees initially in a surgical specialty. Better mentorship and support from the residency program were common themes proposed by respondents as factors that affected their decision to transfer.

### Conclusions

Improved career counseling, mentorship, and work-life balance are factors that may reduce resident attrition, especially from surgical residencies.

## Resident attrition from surgical specialties in Canada

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### Introduction

Premature career decision making and switching between specialties during training is an ongoing issue in Canada. In the United States, the attrition rate from general surgery programs is around 20%, mostly to nonsurgical specialties and early in training. Resident attrition can be disruptive to both the trainee and the home program. Surgical resident attrition in Canada has not been clearly reported in the literature. The objective of this study is to determine the rate and pattern of attrition from surgical residencies in Canada, with a focus on general surgery.

### Methods

Resident data by surgical specialty, including the number of resident transfers and total residents by postgraduate year from 1996–2012 was obtained from the Canadian Post MD Education Registry. The cumulative risk of attrition during residency training was calculated by estimating the number of residents who started in 1 specialty but subsequently switched disciplines. Changes in discipline that could potentially be subspecialization were excluded.

### Results

From 1996–2012, the annual rate of attrition in general surgery ranged from 4.8% to 11.6%, with the estimated cumulative risk of attrition between 25% and 48% and a net annual loss of residents from the discipline ranging from 19 to 54 residents per year. The majority of transfers were to another surgical specialty. Among the surgical specialties, the highest rates of attrition were seen in neurological surgery, general surgery, and cardiac surgery.

### Conclusions

Resident attrition from general surgery and surgical specialties in Canada is high, but has been declining over the years. This has implications for workforce planning and residency education.

## Teaching radiology residents procedural skills and CanMEDS competencies for an ultrasound-guided leg biopsy using a video education tool with hybrid simulation

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### Introduction

Competency-based education challenges residents to achieve milestones under restricted work hours. Educational videos and hybrid simulation can supplement traditional training to reinforce knowledge and skills in a low-risk environment. The purpose of this study is to determine the effectiveness of an educational video for teaching residents procedural skills and CanMEDS competencies for an ultrasound-guided leg biopsy procedure with hybrid simulation.

### Methods

Postgraduate year 2 to 5 diagnostic radiology residents ( $n = 19$ ) participated in this study at a large teaching hospital. Stratified random sampling of residents by postgraduate year was used to create a group that viewed the educational video and a control group that did not. Residents performed a biopsy procedure using hybrid simulation with a standardized patient, technologist, and a simulation leg. Two blinded radiologists evaluated the performances using a standardized evaluation that rated introduction, informed consent, procedural skills, postprocedural care, collaboration, professionalism, and overall performance. Statistical analyses included linear regression and agreement.

### Results

Residents who viewed the educational video scored higher than the controls (83% versus 72%,  $P = .026$ ) when controlling for procedural experience. The sum score of the procedural steps was in agreement with the global rating given for overall performance (ICC = 0.779). The performance score increase gained from the educational video was not affected by previous procedural experience or postgraduate year.

### Conclusions

Our educational video is an effective tool for supplementing procedural training for residents at all levels of training. Further studies to evaluate retention of skills and translation to clinical practice would be valuable.

## Trends in selection of a surgical career among Canadian medical students from 1996–2013

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### Introduction

In Canada, the number of students interested in surgical careers has declined. An increased need for surgical specialists has been predicted for some Canadian provinces to deliver timely, high-quality care to the aging population. The purpose of this study is to assess trends in the selection of surgical careers and subspecialties among Canadian medical students since 1996.

### Methods

The mean percentage of Canadian medical students selecting surgery as a first-choice career from 1996–2004 and 2005–2013, and a subspecialty from 1998–2005 and 2006–2013, were compared using an independent *t* test. Data were provided by the Canadian Residency Matching Service.

### Results

A decreased percentage of students selected a surgical career from 2005–2013 (mean = 31.0%) compared to 1996–2004 (mean = 37.7%;  $P = .007$ ; 95% CI 2.26–11.12). This trend was also noted in the following specialties comparing 1998–2005 to 2006–2013: cardiothoracic surgery (1.84 versus 0.57%;  $P = .001$ ; 95% CI 0.87–1.67), urology (3.92% versus 3.08%;  $P = .035$ ; 95% CI 0.68–1.61), plastic surgery (4.91% versus 3.31%;  $P = .001$ ; 95% CI 0.80–2.40), and ophthalmology (5.17% versus 3.87%;  $P = .012$ ; 95% CI 0.34–2.27).

### Conclusions

While issues of supply and demand are complex, decreased interest in surgical careers represents 1 piece of the puzzle and could be factored into workforce projections. As educators, we must wonder why this is occurring and focus on improving the surgical learning environment of medical students through mentorship, positive preclinical and clinical learning experiences, and career counseling. This will help attract the best medical students to surgical residency programs and provide Canada the surgical workforce of the future.

**Standards and context: Lessons from history**

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**Introduction**

Historical research is increasingly recognized in medical education as providing important insights into current educational practices. Medical education journals give academic voice to issues of importance in our field. As the journal *Medical Education* nears its 50th anniversary, there is an opportunity to reflect upon the development of education scholarship and research in our field and better understand historical and societal factors that have shaped residency education.

**Methods**

We conducted a critical discourse analysis of the journal *Medical Education* over its 50 years of publication. We examined the journal using a systematic cluster sample in which articles from every fifth year of the journal (1966 onward) were studied. Within this dataset, we focused particular attention on the editorials and commentaries, analyzing them discursively for statements, keywords, and metaphors.

**Results**

Many recurrent themes emerged from the data. There was ongoing attention to improving the tools, techniques, and practices of residency education. Several key discursive areas were identified, and in each there was tension between a desire to standardize and recognition of the limits of standardization. We present detailed findings from 1 particularly dominant theme that elucidates this tension, that of the academy versus the community: places and spaces for medical education.

**Conclusions**

*Medical Education* has provided an important academic space for stakeholders to discuss the development of objective measures and at the same time allowed continued reflection on areas in which attempts to standardize may lead to undue rigidity.

## Well-being of Alberta family medicine graduates

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### Introduction

Healthy physicians are important to the health care system because physician well-being influences patient care. This study examined how family medicine graduates rate their health, life stressors, and stress management strategies.

### Methods

This was a retrospective, self-administered survey of 709 graduates who completed family medicine residency training at the University of Alberta or University of Calgary during 2006–2011, inclusive. Graduates were asked to rate their personal and professional well-being, general health status, overall level of stress, recent stressors, and how they managed stress. Descriptive data analyses were conducted using SPSS version 22.

### Results

A total of 310 (44%) graduates responded. Personal well-being, professional well-being, and general health were rated very good or excellent by 72%, 77%, and 75% of respondents, respectively. Among graduates, 39% recently experienced high or extremely high levels of stress. Significant life events included family illness (28%), personal health issues (18%), discord between colleagues (16%), or death of a family member/friend (13%). Sixty-one percent had primary caring responsibility for children. Stress management strategies included talking to family/friends (89%), physical activity (78%), time away/vacations (77%), and talking to colleagues (70%). Nineteen percent felt moderately to extremely isolated mainly due to limited interaction with colleagues, lack of time, or age/gender gap between colleagues.

### Conclusions

Most family medicine graduates were healthy and reported a strong sense of personal and professional well-being; however, high levels of stress from various sources prevailed for many. Stress management typically involved social contact with family/friends/colleagues. Strategies to reduce professional isolation may lower stress levels, thereby enhancing physician well-being and patient care.

## Evaluating mind fitness training and its potential effects on surgical residents' wellness: A mixed methods pilot study

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### Introduction

Residents' wellness is essential for both the individual physician and the quality of care they deliver. Therefore, it is important to maintain or possibly enhance residents' wellness. We investigated (1) the influence of mind fitness training (MFT) on quality of care-related wellness characteristics and explored (2) residents' perceptions of MFT.

### Methods

We conducted a multicenter mixed methods study in 8 teaching hospitals from September 2012 to February 2014. A total of 89 surgical residents were invited to complete pre- and postintervention wellness measurements: work engagement, empathy, job and specialty satisfaction, and stress perception. Twenty-two residents voluntarily participated in MFT and were additionally invited to evaluate MFT in (semi)structured postintervention interviews.

### Results

Response rates pre- and postintervention were 100% and 91%, respectively, in the intervention group, and 70% and 66%, respectively, in the control group. In the intervention group, residents' specialty satisfaction increased by 0.23 point on a 5-point Likert scale (95% CI 0.23–0.24,  $P < .001$ ) while stress scores changed by –0.94 point on a 10-point scale (95% CI –1.77 to –0.12,  $P = .026$ ). No substantial changes were observed in the control group. Participation in MFT was positively associated with residents' empathy ( $b = 7.22$ ; 95% CI 4.33–10.11;  $P < .001$ ) and specialty satisfaction ( $b = 0.42$ ; 95% CI 0.18–0.65;  $P = .001$ ). Residents positively evaluated MFT with median scores of 6.80 for training design and 7.21 for outcome (10-point scale). In addition, residents reported to perceive improvement in focusing skills, were more aware of their own state of mind, and felt calmer.

### Conclusions

MFT could improve residents' empathy, work satisfaction, stress perception, and focusing skills, and was positively evaluated by surgical residents.

## **Burnout among anesthesiology residents: An exploratory study of the need for and effect of peer support group participation**

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### **Introduction**

The literature suggests that anesthesia residents are at increased risk of burnout compared to other specialties. Our exploratory, mixed methods study examined the effect of monthly peer support meetings on burnout and stress within our McMaster University.

### **Methods**

All current McMaster anesthesia residents ( $n = 35$ ) were included. A sequential mixed methods design was used. Nine monthly peer support groups were held. Residents' burnout and stress were measured prior to the first meeting and after the ninth meeting with the Maslach Burnout Inventory (MBI) and Perceived Stress Scale (PSS). Mean pre- and post-MBI subscale and PSS scores were compared using paired  $t$  tests ( $P$  values  $< .05$  considered statistically significant). Subsequently, a focus group interview was conducted to expand upon quantitative data. Transcripts were analyzed qualitatively to identify themes and subthemes.

### **Results**

Eight of 35 residents (22.9%) participated. The pre- and post-MBI subscales were consistent with "high burnout" with a nonsignificant trend toward lower burnout after participation. The pre- and post-PSS scores were consistent with "high stress" and likewise showed no significant difference. Focus group themes included unique sources of stress during anesthesia residency, the essential role of peer support in stress mitigation, and the need for peer support integration into residency.

### **Conclusions**

Anesthesia training is uniquely stressful and residents are at high risk of burnout. Despite no significant changes in measures of stress and burnout, residents assert the crucial importance of peer support. More in-depth investigations are required to examine resident burnout and the effective development of postgraduate anesthesia peer support programs.

## Mentorship in palliative care residency

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### Introduction

There is a paucity of research on mentorship in medicine, particularly within palliative care (PC), despite mentorship being seen as pivotal to success. This project aimed to assess the number and type of mentorship programs in accredited PC residency programs in Canada, and to ascertain trainees' perceptions on mentorship.

### Methods

Online survey distributed to PC program directors, current residents, and recent graduates. Descriptive analysis.

### Results

Twelve program directors (92% response rate) and 28 current or recent trainees completed the survey. Only 5 PC residency programs (42%) have a formal mentorship program in which mentors are selected with or for each resident. Twenty-three residents (82%) had at least 1 mentor, with 16 (57%) having a formal mentor, and 18 (64%) having an informal mentor. For those who had both formal and informal mentors, 6 (54%) attributed more importance to the formal mentor and 5 (46%) attributed more importance to the informal mentor. Program directors also were divided in their opinion of whether formal or informal mentors were of greater value.

Mentors were seen as useful advisors, role models, confidantes, and coaches by residents. These roles aligned with the expectations of program directors for mentors. Barriers in the resident/mentor relationship were difficulties in making contact and time constraints preventing regular meetings.

### Conclusions

Palliative care is a quickly expanding field in which residents face challenges on a daily basis. Expansion of formal mentorship to all residency programs may provide valuable support for residents.

## **Under the microscope: Resident experiences of the remediation process and their struggle for confidence, competence, and well-being**

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### **Introduction**

Much of the literature on remediation in postgraduate medical education addresses the process from a program perspective. There is little research exploring remediation from the resident's point of view. Trainee's stories of their remediation experiences told to staff at the Office of Resident Wellness appear to emulate aspects of a problematic relational dynamic called the "set-up-to-fail syndrome" described in the business management literature. The purpose of this study was to better understand the impact of the remediation process on residents' sense of their professional identity, well-being, relationships, learning, and performance, and to explore whether their perceptions of the process correspond to aspects of the set-up-to-fail syndrome.

### **Methods**

Using an Interpretative Phenomenological Analysis approach, interviews were conducted with 9 residents who were actively engaged in, or had recently completed, a formal remediation process at the University of Toronto. Themes were developed from the transcribed interviews.

### **Results**

Residents described feeling assigned to a stigmatized role as "the identified problem resident." Their new "problem" role was seen as inviting greater negative scrutiny, creating isolation, increased anxiety, poorer performance, lowered confidence, and reduced learning opportunities. Negative interactions with supervisors heightened these perceptions. Positive learning relationships were viewed as key opportunities to improve knowledge and performance and to gain back confidence and autonomy.

### **Conclusions**

Residents' descriptions of their role as the "problem resident" correspond to aspects of the set-up-to-fail syndrome. These findings create opportunities for both faculty and residents to better understand and manage set-up-to-fail dynamics and stigma concerns.

## How do you develop a fatigue risk management plan for residents? A resident informed framework for residency programs

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### Introduction

The National Steering Committee on Resident Duty Hours recommends the development of fatigue risk management plans (FRMPs) for residents. Information, however, on how residents' experience, recognize, and manage fatigue is limited. The objective of this study was to explore residents' experiences and recognition of fatigue and their fatigue risk management strategies in order to develop a framework for FRMPs.

### Methods

Residents were asked to participate in focus groups and individual interviews to explore the phenomenon of experiencing, recognizing, and managing fatigue. Residents were recruited across all 58 programs using a convenience sampling method until saturation was achieved. A phenomenological study design and data analysis approach were used. Focus groups were audio recorded, transcribed, and coded. Two independent coders coded and analyzed the data. A framework was developed from the findings to assist programs in developing FRMPs.

### Results

Fifty-four residents participated and represented more than half of participating programs. Programs included those at high risk for fatigue. Residents perceived substantial threats to managing fatigue in their learning environment, including burdens imposed by unnecessary administrative tasks and maintaining work-life balance. A framework for developing FRMPs included (1) resident advocacy, (2) use of time management tools, (3) protected time, and (4) training essentials.

### Conclusions

Reducing duty hours and increasing sleep are not the only potential options for managing fatigue. Our results provide a framework for programs when developing resident FRMPs. Implementation of these components can contribute to the success of resident fatigue management, resident wellness, as well as patient safety.

## **Making sense of fatigue: Implications of social constructs of fatigue in clinical training and practice**

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### **Introduction**

Fatigue management is an enticing concept, even within the context of existing resident duty hour restrictions around the world. In Canada, where resident duty hours are not nationally legislated, fatigue risk management strategies (FRMS) have been proposed as an alternative to reduced hours. FRMS that exist in other industries predominantly approach fatigue as a physiological or cognitive construct. It is unclear whether or not the 2 constructs sufficiently capture residents' lived experiences of fatigue during training. Prior to implementing FRMS, we require a better understanding of how residents make sense of fatigue within their clinical training environment.

### **Methods**

Using constructivist grounded theory, we conducted semistructured interviews with 21 residents from 7 surgical and nonsurgical disciplines at 1 Canadian institution in 2014. Iterative data collection and analysis informed theoretical sampling to sufficiency. Research ethics approval was obtained.

### **Results**

Residents described shared understandings about the nature, meaning, and implications of fatigue in their clinical training environments. Five fatigue stories were identified: fatigue is (1) situationally dependent, (2) inescapable and therefore acceptable, (3) a temporary training phenomenon, (4) manageable through experience, and (5) surmountable when required.

### **Conclusions**

This study elaborates our understanding of fatigue as a social construct. The 5 fatigue stories highlight tension between residents' social constructions and existing physiological and cognitive premises that predominantly inform fatigue management discussions. Attending to the social aspects of fatigue may maximize the feasibility and uptake of strategies for managing fatigue during residency training.

## The effect of a night float call system on resident fatigue, cognition, and motor function

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### Introduction

In response to governing body restrictions, residency programs have adopted rotating night float systems to reduce the number of continuous working hours. We aim to objectively measure the impact of a night float (NF) as compared to traditional call (OC) on resident quality of life, fatigue, and cognitive and motor function.

### Methods

Thirteen residents on night float and 15 on overnight call were tested prospectively at 3 time points: morning precall, immediately postcall, and the first day back. Fatigue was assessed subjectively using the Brief Fatigue Inventory (BFI) and objectively using the Computerized Test of Information Processing (CTIP), the Roadsigns Perception Test (RSPT), and the Purdue Pegboard (PP).

### Results

NF residents were not significantly fatigued postcall, with fatigue levels returning to precall levels by the following workday. OC residents were significantly fatigued postcall without recovery. Manual dexterity testing showed no decline in NF group, but significant decline without recovery in the OC group. CTIP scores were not consistently affected by NF or OC. RSPT testing showed NF group accuracy did not decline postcall and had higher scores the next workday compared to precall.

### Conclusions

Residents under an OC system experience more significant and persistent fatigue postcall as compared to a NF system. Fatigue was demonstrated subjectively, as well as objectively using motor and cognitive testing. In contrast to previous research, the impact of fatigue on motor function in our study is more impressive than on cognitive function. Future research will investigate the clinical impact of fatigue-induced detriments on patient care.

## **Resident duty hour modification affects perceptions in medical education, general wellness, and ability to provide patient care**

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### **Introduction**

Resident duty hours have recently been under criticism, with concerns for resident and patient well-being. Historically, call shifts have been long, and some residency training programs have now restricted shift lengths. The Internal Medicine Residency Program at Dalhousie University recently moved from a traditional call structure to a day/night float system. This study evaluated resident perceptions of duty hour impact on key domains before and after implementation of this reform.

### **Methods**

This prospective study included a final, paired cohort of 23 senior residents from an internal medicine training program in Canada. They were evaluated immediately before and 6 months after implementing duty hour reform using an anonymous online survey. A questionnaire using a 5-point Likert scale related to 3 major domains: (1) senior resident wellness, (2) ability to deliver high-quality health care, and (3) medical education experience. Pre- and postintervention scores are presented as means and compared using a *t* test for paired samples.

### **Results**

Residents perceived significant changes in many domains with duty hour reform. These included improved general wellness, less exposure to personal harm, fewer feelings of isolation, less potential for error, improvement in clinical skills expertise, increased work efficiency, more successful teaching, increased proficiency in medical skills, more successful learning, and fewer rotation disruptions.

### **Conclusions**

With implementation of duty hour reform, senior residents feel there were significant enhancements in their quality of life, medical education experience, and ability to provide health care to patients. Residents feel the new call structure allows for more successful teaching and results in less frequent disruption of clinical rotations.

## Impact of “home call” on residency training in an otolaryngology–head and neck surgery program: A pilot study

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<sup>3</sup>Children’s Hospital of Eastern Ontario, Ottawa, ON

### Introduction

This study sought to evaluate the impact of home call on surgical education for residents in the setting of resident duty hour restrictions.

### Methods

Postgraduate year 2 through 4 residents in the University of Ottawa Department of Otolaryngology (n = 9) were asked to characterize the time elapsed and nature of the call event as either urgent or nonurgent according to a guideline provided by the authors. Residents also completed the Stanford Sleepiness Scale on the day of call and postcall to establish fatigue as a proxy for resident well-being.

### Results

The pilot study analyzed 36 call logs. Fifty percent of residents qualified for a postcall day according to the Professional Association of Residents of Ontario guidelines. Residents received a mean 6.7 pages per night (5PM–7AM), of which 76% of pages were for nonurgent issues. On average, sleepiness postcall was 1.5 points higher (95% CI 0.22–2.73,  $P = .03$ ) in residents who qualified for a postcall day. The academic activities missed postcall included clinic (33%), operative experience (17%), and research (17%). Residents did not take a postcall day despite meeting requirements based on time elapsed and fatigue in 33% of calls.

### Conclusions

The authors identified a disproportionately high amount of nonurgent calls that residents received over the course of their call and observed increased resident fatigue postcall. These results provided insight into the events encountered on call in a home call setting that may impact academic performance in residency programs. The authors are optimistic this will stimulate further investigations into educational reform.

## Off-service resident experiences of night float during their pediatrics core rotation

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### Introduction

A comprehensive night float model is in place for all residents in the McMaster Pediatrics Residency Program. The night float is our program's innovative strategy for addressing the need to limit resident duty hours, and is designed to improve resident well-being, patient safety, and continuity. In the 2013–2014 academic year, after being implemented for just pediatrics residents the year before, the night float was extended to include off-service residents rotating through pediatrics. Previous surveys had shown highly positive feedback from pediatrics residents. The experiences of the off-service residents had not been formally evaluated.

### Methods

A survey was electronically sent to all 71 postgraduate year 1 off-service residents rotating through pediatrics in 2013–2014, with a 56% response rate. The survey included questions about how residents felt the night float system influenced their educational experience, perception of patient care, and quality of life compared with the 24-hour, 1-in-4 system they would be familiar with from other rotations. Most answers were based on a Likert scale and analyzed according to proportion; 2 questions seeking constructive feedback required qualitative answers. With each question, the respondent had an opportunity to elaborate on their answer.

### Results

About 90% felt patient care and quality of life were "somewhat" or "very" positively affected compared to a 24-hour system. Two-thirds felt it "somewhat" or "very" positively influenced their learning.

### Conclusions

This survey confirmed positive experiences among off-service residents during the night float. Results demonstrated benefits for learning, wellness, and perception of patient care. Findings mirror those of the pediatrics residents.

## **Standardized patient simulation more effective than didactic teaching for improving residents' communication skills when discussing goals of care and resuscitation: A randomized controlled trial**

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### **Purpose**

Communication skills are important, particularly when discussing goals of care and resuscitation with seriously ill patients. Standardized patients (SPs) have been used to teach communication skills, but few studies have evaluated their effectiveness for teaching medical trainees to communicate about goals of care and resuscitation. To determine whether SP simulation offers any benefit over didactic sessions alone for improving skill or comfort level for internal medicine residents when discussing goals of care or resuscitation.

### **Methods**

A single-blind, randomized, controlled trial of didactic teaching plus SP simulation versus didactic teaching alone. Subjects were first-year residents in an internal medicine training program. Main outcomes were changes in communication comfort and skill between baseline and 2 months posttraining assessed using the Consultation and Relational Empathy (CARE) measure during an SP encounter.

### **Results**

We enrolled 94 residents over a 2-year period. Both groups reported a significant improvement in comfort when discussing goals of care with patients. The intervention group showed a significant increase in CARE scores postworkshop compared with preworkshop (35.0 versus 31.7, respectively,  $P = .048$ ). CARE scores in the control group did not change following the workshop (35.6 versus 35.9,  $P = 0.4$ ). Improvement in comfort scores and perception of benefit were not associated with improvements in CARE scores.

### **Conclusions**

Simulation training is superior to didactic training alone for improving communication skill among first-year internal medicine residents when discussing goals of care and resuscitation, although there were baseline differences between the groups. Standardized patients can help prepare medical trainees to have these important conversations.

## Lumbar puncture simulation in pediatrics residency training: Improving procedural competence and decreasing anxiety

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### Background

Pediatrics residents must become proficient with performing lumbar punctures (LP). Residents traditionally learn LP by observing a senior colleague, which can lead to uneven skill acquisition and trainee discomfort. We present results utilizing a simulation approach.

### Methods

All pediatrics residents at our institution were invited to participate. Residents were asked to report their postgraduate year (PGY), prior LP attempts, and self-reported anxiety scores as measured by the State-Trait Anxiety Inventory (STAI) prior to completing the preintervention testing. Using a comprehensive lifelike simulation model, a staff physician observed and scored the resident on procedural skill, using a previously published 21-point scoring system. After baseline assessment, residents took part in an interactive lecture on LP technique. Repeat STAI and procedural skill scoring was performed within 1 to 3 months of the teaching session.

### Results

Of the residents who completed pretesting (N = 20), 16 of 20 (80%) completed the postintervention testing. The majority of participants were female (75%); PGY training: PGY-1 (38%), PGY-2 (25%), PGY-3 (25%), PGY-4 (12%). Procedural skill improved in 15 of 16 residents (paired *t* test, *P* < .001). Overall anxiety scores were higher at baseline than at posttesting (mean, SD) 44.8 (12.1) versus 39.7 (9.4), NS. PGY-1 residents experienced the largest reduction in anxiety at posttest (paired *t* test, *P* = .04), but this effect was not seen consistently in the more senior years.

### Conclusions

The use of a lifelike simulation model, combined with an interactive training session, improves pediatrics resident LP performance skill and significantly reduces anxiety at the early stage of residency training.

**Virtual reality versus bench top simulation in the acquisition of arthroscopic skill: A randomized control trial**

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**Purpose**

With modern restrictions in resident work hours, attempts have been made to incorporate simulation training to accelerate surgical skill acquisition. To our knowledge, no studies have compared skill acquisition between virtual (VR) and bench top (BT) simulators concurrently. We hereby aim to directly compare 2 surgical simulation setups in a randomized control study, assessing efficiency in skill transfer from the lab into the operating room.

**Methods**

Thirty-two surgical novices performed a baseline 10-minute diagnostic examination on both VR and BT simulators. Participants were randomized to train in either modality over a 5-week period. Posttesting consisted of (1) repeat arthroscopy on both modalities, (2) cadaveric arthroscopy, and (3) a surprise task assessing skill transfer. Outcomes included the Global Rating Scale, Arthroscopic Checklist, and procedural time.

**Results**

Both VR and BT groups demonstrated improvements in scores. Within-group analysis showed significant improvement in both groups. Posttest crossover analysis showed increased improvement in all 3 primary outcomes for the VR group. There were no differences in between the VR and BT groups for primary outcomes in the cadaveric knee. Mean VR group Global Rating Scale scores and procedure time improved in the skill transfer evaluation.

**Conclusions**

Surgical simulation training is a powerful tool in the efficient training of surgical residents. We aimed to identify potential strengths of 2 different setups in the design of an arthroscopic curriculum for our institution. Both BT and VR arthroscopic simulators are effective training modalities to accelerate surgical skill acquisition.

## Assessing learning climate in residency: Revisiting the D-RECT tool

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### Introduction

The learning climate impacts resident learning and ultimately quality of patient care. Improvement of the learning climate requires evaluations based on valid and reliable tools. The 50-item Dutch Residency Educational Climate Test (D-RECT) has been developed, yet additional validation of its final form and on the level of use, the department, is needed. This study aims to reassess internal validity and reliability of the D-RECT.

### Methods

Departments utilizing the D-RECT in 2012–2013 in the Netherlands were included. Exploratory factor analysis and confirmatory factor analysis on both resident and department levels determined its final form. Internal validity was evaluated using interscale correlations and corrected item-total correlations. Reliability was assessed using Cronbach's  $\alpha$  and generalizability theory.

### Results

In total, 291 departments (2306 evaluations) in 48 hospitals were included (response rate 62%). The final questionnaire contained 35 items in 9 constructs: teamwork, role of specialty tutor, coaching and assessment, formal education, resident peer collaboration, work adaptation to residents' competence, patient sign-out, educational atmosphere, and accessibility of supervisors. Confirmatory factor analysis (CFI = 0.89/0.92; TLI = 0.88/0.91; SRMR = 0.06/0.04; RMSEA = 0.04/0.04), interscale correlations (< 0.70), corrected item-total correlations (> 0.40), and Cronbach's  $\alpha$  (> 0.70) were acceptable on both department and resident levels, respectively. Overall learning climate assessment required 3 evaluations, and construct assessment required 8 evaluations.

### Conclusions

This study reaffirms reliability and internal validity of the D-RECT in measuring postgraduate learning climate, which can serve as a starting point for quality improvement initiatives in residency programs. The instrument is now shorter, requiring fewer resident evaluations, and may therefore be more suitable for practice.

## Self-directed learning among internal medicine residents: A qualitative study using grounded theory

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### Introduction

Self-directed learning (SDL) overlaps with competencies in graduate medical education. Previous qualitative studies revealed that residents have difficulty practicing SDL. We created a theory to explain the SDL process within residency training.

### Methods

Grounded theory was used to understand SDL during residency training. We conducted 7 focus groups (FG) with 46 internal medicine residents. FG guides were developed from literature and expert review. A trained facilitator moderated FGs, which were transcribed verbatim. Transcripts were reviewed using open coding and analytic memos to guide subsequent FGs. Constant comparison and axial codes were used to identify themes. A theoretical model for SDL was developed, refined until theoretical saturation was achieved, and confirmed with member checks.

### Results

SDL started when triggers uncovered knowledge gaps and proceeded through objectives, resources, application, and self-evaluation. Patient care was the main SDL trigger. Additional triggers were faculty, peers, media, and examinations. Themes impacting SDL included motivations, barriers, context, and external feedback. SDL was driven by internal and external motivations (fear of “looking stupid”). Barriers included time, excessive information, and inability to focus. Context included curricula and social environment. Feedback from faculty, peers, and patients informed each step of SDL. Residents wanted faculty who could guide their SDL, and who practiced “collaborative self-directed learning” instead of always asking, “Why don’t you look that up?”

### Conclusions

The process of SDL appears to progress from the identification of knowledge gaps to self-evaluation. This model may serve to cultivate learning environments that optimize SDL and competency-based assessment in resident education.

## Real world implementation of a standardized handover program (I-PASS) on a pediatrics clinical teaching unit

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### Introduction

A standardized handover curriculum (I-PASS) has been shown to reduce preventable adverse events in a large multicenter study. We aimed to study the real world impact of the implementation of this curriculum on handover quality, duration, and critical care calls.

### Methods

A prospective intervention study was conducted. We implemented the I-PASS curriculum via faculty education sessions and resident workshops. Resident handover was video-recorded and written lists were collected for 2 weeks pre- and postintervention. We examined the inclusion of key elements on handover lists pre- and postintervention using logistic regression models accounting for multiple handovers per patient. Duration of handover was compared using a linear regression model adjusting for number of patients. Qualitative content analysis was used to describe observable differences in video recordings and written critical care call records.

### Results

A total of 1275 handovers were included, comprising 364 inpatients. There was a significant increase ( $P < .05$ ) in 7 of 11 key elements (including illness severity, action items, and contingency plans) and a significant decrease in written physical examination findings postintervention. No significant change was found in handover duration. Video analysis revealed observable differences in handover structure, consistency, and detail. There was no significant difference in the number of critical care calls, although postintervention all patients requiring critical care calls were correctly identified as requiring close monitoring during handover.

### Conclusions

Handover training resulted in consistent inclusion of key elements without significant increase in handover duration. Qualitative analyses suggest appropriate identification and response to severely ill patients using the I-PASS model.

## Thinking on the front line: Understanding resident decision making in clinical practice

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### Introduction

Clinical reasoning is foundational to medical practice, but the cognitive processes involved have been difficult to elucidate. Attention has been paid to cognitive biases and their role in diagnostic errors, but less attention has focused on the processes underlying successful diagnosis. We aimed to elucidate the factors associated with successful resident physician clinical decision making to support clinical reasoning in training programs.

### Methods

We applied a qualitative research framework based on grounded theory. We interviewed 11 postgraduate year 2 internal medicine residents, probing their descriptions of successful diagnoses. Data collection and analysis occurred in an iterative fashion and a constant comparison process was employed for analysis. Identified themes were used to develop theory regarding resident physician clinical reasoning.

### Results

We identified 4 major themes. Resident attitude, clinical skills, and thorough assessment contribute to their diagnostic success (Mechanics). This is further facilitated by resident factors (curiosity, sense of duty, level of training) and contextual factors (timing of assessment, validation by colleagues; Facilitators). Experience with successful decision making contributes to increased confidence in their abilities and perceived improved reasoning (Outcomes), and we also identified barriers to diagnostic success (Barriers).

### Conclusions

There are specific methods used by residents to achieve diagnostic success that incorporate the CanMEDS roles of Medical Expert, Professional, and Scholar. Residents reflect on successes to further improve their clinical competence. This process occurs independently of their training program or supervising physician. Future studies should explore whether application of these methods and minimizing the identified barriers improves diagnostic success.

## Exploring professional identity formation among newly qualified doctors who pursue additional training

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### Background

Unemployment is a concern among Canada's newly qualified specialists and subspecialists. Many pursue additional training as an alternative to unemployment, continuing as a trainee with a consultant's credentials. How is this situation experienced by those caught between conflicting professional identities and roles?

### Objective

This study explores 7 doctors' experiences, the effects of further training on their professional identity formation (PIF), and how these effects are reconciled on a personal level.

### Methods

This phenomenological study is theoretically grounded in communities of practice (COP) and their influence on PIF. Interviews were conducted with 7 qualified Canadian specialists (3 females) who pursued additional training in response to a lack of available positions in their respective specialties. Template analysis was iteratively applied to generate theoretical constructs capturing their lived experiences.

### Results

Participants spoke of further specialization delaying transition to practice as the new norm, with varying degrees of utility and value, and often in competition with their social and personal lives (parenting, partnerships). Participants experienced an ambiguity of identity as they fluctuated between the roles of learner and qualified professional within their professional and academic communities.

### Conclusions

Doctors pursuing further training may experience identity dissonance through the designation of multiple roles and unclear expectations from their COP. They may also be at risk of "transitional paralysis" with personal and societal implications. Long-term effects of additional training are unknown. Its utility, influence on securing employment, and future job satisfaction are areas for further research that may inform future medical trainees and training programs alike.

## Strategies of medical residents to confront uncertainty situations

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### Introduction

Uncertainty is inherent to physicians' everyday practice, and how clinicians deal with uncertainty can have important clinical consequences. There is a dearth of published research about the management of uncertainty in residents in training.

### Methods

Based on a theoretical model of the process through which residents face uncertainty, developed in a previous qualitative study, a quantitative instrument was built to explore the strategies that residents use in typical uncertainty situations, according to its type and their academic level. The sampled population was 8596 residents from the Medical Specialties Program at UNAM Faculty of Medicine in Mexico City in 2013. The questionnaire had 36 typical situations of uncertainty in residency training programs, with 12 response options including 11 strategies identified in our previous qualitative study. Two variants of logistic regression analysis were performed by type of uncertainty and academic level.

### Results

A total of 2481 residents answered the online questionnaire. The probability that a resident found himself/herself in a situation of uncertainty was 0.69 globally. The most prevalent strategy to deal with uncertainty was to consult a physician of higher hierarchy, with a probability of 0.71. The response "I have not been in that situation" tends to diminish in frequency as the resident's academic level increases.

### Conclusions

Exposure to uncertainty should be addressed in medical education to help residents cope with different types of situations during their clinical practice. This could promote patients' safety, improve residents' learning and satisfaction, and help achieve institutional goals.

## **The usefulness of a course in nonverbal communication for training the team leader function with musical exercises**

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### **Introduction**

To investigate the usefulness of musical exercises for the team leader function 1 year after course completion.

### **Methods**

With the use of musical exercises, medical students were trained in the team leader function. The course focused on authority, eye contact, body language, and cooperation. The students received personal feedback during the course from an orchestra conductor. The students evaluated immediately after the end of the course, and 1 year after in order to describe transfer the clinic.

### **Results**

The immediate evaluation of the course was very positive and the students reported that they could use the techniques learned. After 1 year, the students described how they have focused on the personal feedback and found that focusing on the elements they were recommended to work with has made a difference in their ability to act nonverbally.

### **Conclusions**

Personal feedback on nonverbal skills has great transfer to the students' behavior measured after 1 year.

## Talking the talk and walking the walk: The development of an innovative motivational interviewing curriculum for residents

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### Introduction

The literature has shown that motivational interviewing (MI) education can be successfully implemented within the residency education environment; however, little research has described how to implement such a curriculum. We propose that residents' MI skills and confidence will increase following participation in a MI curriculum.

### Methods

Twenty-one first- and second-year family medicine residents at North York General Hospital participated in the study intervention, an 8-hour MI curriculum, using a pre-/posttest design. Residents completed pre- and postcourse confidence questionnaires and the Helpful Responses Questionnaire (HRQ). Wilcoxon rank test was used to assess rank differences between pre- and postcourse self-confidence ratings, and paired *t* tests were used to assess effect sizes of the curriculum on HRQ responses. Study outcomes included residents' self-perceived confidence in using MI skills, and MI skill performance measured by HRQ scores.

### Results

Twenty-one of 30 residents (70%) completed the MI course. Residents demonstrated an increase in confidence ratings after the course (mean before course: 4.19, 2.1 SD; mean after course: 6.71, SD 1.1;  $P < .001$ ). Both reviewers found an improvement in HRQ scores after course completion (Reviewer 1: mean difference = 6.05, 95% CI 2.83–8.26; Reviewer 2: mean difference 4.19, 95% CI 2.19–6.19;  $P < .001$ ).

### Conclusions

There was a statistically significant increase in residents' confidence and performance in MI skills. This study was limited by a small sample size at a single training site. Future directions include wider dissemination of the MI curriculum to resident trainees and allied health professionals across multiple sites.

## Establishing core competencies for a structured mentoring program in pediatrics residency training

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### Objectives

Different frameworks of core competencies have been described in pediatrics residency training; however, competencies for mentoring program within these programs have not been reported. We sought to identify and establish core competencies for mentoring program in pediatrics residency training.

### Methods

A convenience sample of all the faculty members and residents at the Department of Pediatrics in King Abdulaziz Medical City in Riyadh was recruited for the study. A self-administered questionnaire with 43 items covering the 7 roles of CanMEDS core competencies of Medical Expert, Communicator, Scholar, Professional, Manager, Health Advocate, and Collaborator was used.

### Results

Response rate was 76% (44 of 58) from the faculty, and 91% (62 of 68) from the residents. Almost all faculty members and residents felt that mentoring is very important in pediatrics. Two-thirds of the resident and faculty members think that mentoring has been important to their career. Of the 7 CanMEDS roles, Medical Expert, Scholar, Manager, and Collaborator were identified as being essential for mentoring.

### Conclusions

Most of the pediatrics residents and faculty surveyed think that mentoring is important in pediatrics. More than two-thirds of faculty and residents have been mentored at a certain point of their career and 75% of faculty members realize their important roles in mentoring the residents. We were able to recognize Medical Expert, Scholar, Manager, and Collaborator as key core competencies for mentoring program in pediatrics as identified by both residents and faculty.

## Development of an inventory assessing residents' attitudes toward unprofessional conduct

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### Introduction

Medical professionalism is a fundamental competency for all physicians and continuous development of professionalism during residency training is crucial. The purpose of this study was to develop an inventory to assess residents' attitudes toward unprofessional behaviors as a tool for evaluating their standards of professionalism.

### Methods

A questionnaire was developed using literature reviews and a content validity assessment conducted by an expert panel. A survey using the developed questionnaire was conducted in cooperation with the Korea Resident Association from May to July 2013. A total of 317 residents from 7 university-affiliated hospitals in South Korea participated in the survey. The construct validity of the questionnaire was assessed using exploratory factor analysis and confirmatory factor analysis, and the coefficient for the internal consistency reliability was calculated.

### Results

In the exploratory factor analysis, the questionnaire confirmed 40 items within 8 categories. These items were assessed using confirmatory factor analysis. The final version of the questionnaire was deemed to have a good fit according to the root mean square error of approximation and comparative fit index. The reliability (Cronbach's  $\alpha$ ) of the inventory was 0.97, and the reliability for all categories was acceptable.

### Conclusions

An inventory assessing residents' attitudes toward unprofessional behaviors was developed. It encompasses a wider range of residents' activities, including clinical practice, research, and publication. In addition, it reflects the authors' cultural backgrounds and includes some types of misconduct that may not commonly occur in Western medical settings.

## **The role of uncertainty in learning to become a competent family physician: Implications for training 21st century doctors**

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### **Introduction**

As the first point of patient care, family physicians are known to experience greater levels of uncertainty. Compared to medical students and experienced physicians, little is known about how family medicine residents view and manage uncertainty in their dual roles as learners and service providers.

### **Methods**

Semistructured interviews were conducted with 9 residents (5 PGY-1s and 4 PGY-2s) from a family medicine program in southern Ontario. Using an iterative inductive approach, the content of participants' interviews was thematically analyzed.

### **Results**

Despite the lack of formal teaching to deal with uncomfortable feelings of uncertainty during patient care, residents shared similar views on uncertainty and its management. The volume of patients and increasing responsibility for independently thinking through patient management plans appear to enable residents to become more comfortable with uncertainty over time. Residency was considered a safe space for moving toward clinical autonomy (to the extent possible). Most commonly, online point-of-care resources were used to obtain information to reduce uncertainty. These residents expressed concerns about experiencing uncertainty postgraduation, and considered initial employment in a group practice, in order to have the support of peer consults.

### **Conclusions**

Over time, residents learn to accept uncertainty as an inevitable component of family practice. Fast access to online point-of-care resources help today's family medicine residents to be more autonomous in developing patient management plans. Future research should explore if residents in other family medicine programs and medical specialties share similar views on uncertainty and uncertainty management.

## Unravelling communication problems

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### Background

Problems with communication in the clinical encounter during postgraduate training are frequently identified. Clarity on the type of problem(s) experienced helps guide the selection of resources, sequence of intervention, and the educational strategy used. Unravelling, whether it is content (knowledge), process (skills), or a perceptual (attitude) issue, can be challenging.

### Methods

A pilot study was done retrospectively exploring Board of Examiners, University of Toronto, Office of Postgraduate Medicine cases where residents were identified as needing additional support from a communication coach. Cases were deconstructed to identify problem type and educational interventions using multiple assessment strategies.

### Results

The most frequently identified assessment strategy was role play with standardized cases. Content knowledge was assessed using the provided answer key whereas process and perceptual issues were assessed using Martin's Communication Map (a conceptual map of an organized, patient-centered clinical encounter). When the strategies were used together, it became evident whether the communication problem was related to content, process, or perceptual. Clearly identifying the problem made it possible to sequence and focus educational interventions. For example, a disorganized approach might be due to knowledge gaps, absence of an organizing framework, or personal discomfort with the topic area. Knowledge gaps might be addressed with a targeted reading program, process by providing a framework and perceptual concerns with reflective questions.

### Conclusions

Communication problems take many forms. Clearly differentiating and correctly characterizing the problems helps determine the educational interventions, learning sequence, and strategies to provide targeted remediation.

## **Answers and rationales given by psychiatry residents to educational questions formulated by clerks during case discussions**

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### **Background**

Clinical expertise is developed in particular through feedback from supervisors. Our study sought to describe the content of the feedback provided by psychiatry residents to clerks and the rationale of their answers.

### **Objective**

Our research questions were: (1) What are the answers given by psychiatry residents to the educational questions formulated by clerks during case discussions; (2) What justifications do the residents give for their answers; and (3) Are the residents' answers and justifications similar to those given by clinician educators in psychiatry?

In 2011–2012, we conducted a qualitative study with 22 psychiatry residents from Université Laval. During an individual interview, the residents first had to answer questions concerning brief written vignettes explicitly describing an educational question of a clerk related to a case. They then had to explain the rationale of their answers. A thematic content analysis was performed.

### **Results**

The residents generated 346 answers (84 different answers) relating to the competencies of Scholar, Communicator, Manager, and Scholar [Tr. sic]; 48% of their answers were based on 21 different conceptual frameworks. Compared to their supervising staff physicians, they generated proportionately fewer answers and relied less on conceptual frameworks to justify their answers (48% versus 60%). Conversely, some of the residents' answers and justifications differed from those of the supervising staff physicians.

### **Conclusions**

This study made it possible to document the answers and rationales given by psychiatry residents during supervision by case discussions. The results will be used to develop training activities on clinical supervision.

## **A blog literacy level project: Analyzing the relationship between FOAMed resource characteristics in blog posts and knowledge dissemination**

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### **Introduction**

Growing evidence supports the use of social media in medical education. One benefit is individual customization of the learning environment. Few investigators, however, have examined the stylistic characteristics of Free Open Access Medical Education (FOAMed) resources.

### **Objective**

We investigated the ideal reading level of FOAMed blog posts.

### **Methods**

We collected posts from the BoringEM.org blog, a multiauthor, peer-reviewed emergency medicine FOAMed blog. Posts are created by students, residents, and physicians; the resulting text varies in literary ease. We used WordPress Page to extract the Flesch Reading Ease Score (FRES), a measure of literary difficulty. We used Google Analytics to track page views, unique page views, and cities reached, as markers of dissemination.

### **Results**

We included 6 months of blog posts (58 articles) in our final analysis. Pearson correlation showed no association between FRES and number of page views ( $r = 0.138$ ,  $P = .31$ ), unique page views ( $r = 0.143$ ,  $P = .29$ ), or number of cities reached ( $r = -0.002$ ,  $P = .99$ ). There was a moderate correlation between word count and number of page views ( $r = 0.38$ ,  $P < .001$ ) and word count and cities reached ( $r = 0.36$ ,  $P < .001$ ).

### **Conclusions**

We were not able to identify an optimal reading level for FOAMed posts, as FRES were not correlated with markers of dissemination. This may be due to the high reading level of medical practitioners. Ultimately, subgroup analyses examining the characteristics of our readership may shed light on the literary characteristics that appeal to these groups.

## Twitter as a consultative process in the change of “Manager” to “Leader” in CanMEDS 2015: A textual analysis

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### Introduction

The decision to change the CanMEDS role of “Manager” to “Leader” was informed by consultative processes including discussion on social media. The hashtag #mgrleaddebate was used on Twitter from September 2013 to May 2014. The purpose of this study was to explore the themes that emerged from tweets, and whether these themes were reflected in subsequent Royal College of Physicians and Surgeons of Canada documentation regarding the Manager/Leader role.

### Methods

A qualitative textual analysis of publically accessible tweets was performed by accessing all tweets incorporating #mgrleaddebate. Tweets were imported into NVivo, along with the Manager Working Group Report and Draft CanMEDS 2015 Series IV. Text was coded independently, using an inductive approach, by both authors looking for emerging themes, as well as evidence of incorporation of those themes into the Manager/Leader documents.

### Results

Important themes that emerged included the concepts of “engagement” and “followership.” The complexity of the definition of leadership and the composite nature of the role of leader were also identified as significant themes. Users of Twitter debated the need for the name change and emphasized the importance of both managerial and leadership qualities. Several of the identified themes were reflected in subsequent Royal College documents, mainly in the Working Group Report.

### Conclusions

Several themes that emerged from a textual analysis of the #mgrleaddebate tweets were reflected in the resultant Royal College documents updating the role definition of Manager to Leader. The concept of followership emerged as an important theme, which could be more prominently incorporated into the role discussion.

## Determining the reliability of the ALiEM AIR score for rating educational online learning materials

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### Background

In 2014, the Academic Life in Emergency Medicine (ALiEM) website launched the ALiEM Approved Instructional Resources (AIR) series. This series regularly reviews online medical education platforms and rates published content using the ALiEM AIR rating scale, a novel grading instrument for critical appraisal of online content.

### Objectives

The primary objective of this study was to determine the interrater reliability (IRR) of the ALiEM AIR rating scale. A secondary objective was to determine the minimum number of educator raters needed to achieve acceptable reliability.

### Methods

Nine emergency medicine educators each rated 83 online educational posts using the ALiEM AIR grading instrument. Items include Accuracy, Usage of Evidence-Based Medicine, Referencing, Utility, and the BEEM rating score. A generalizability study was completed in order to determine IRR and rating variance contributions of facets such as rater, blogs, posts, and topic.

### Results

When taking into account variance by subject topic area, the IRR for the ALiEM AIR rating scale was 0.81 over the 6-month pilot period. When taking into account variations among different blog platforms, the IRR of the ALiEM AIR rating scale was 0.60 for the same time period. Decision studies showed that a minimum of 9 raters were required to achieve this reliability. Generalizability studies showed blog type was a greater source of variance in ratings than topic.

### Conclusions

The ALiEM AIR scale is a moderate-to-highly reliable, 5-question tool when used by medical educators for rating online resources. Sources of variance in ratings may be a result of website interfaces.

## Online revision usage in MRCS part A candidates: The road to optimized performance

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### Introduction

The Part A examination comprises basic sciences with principles of surgery and is common to all UK and Irish colleges. Traditional study is now supplemented with online learning. PasTest has offered online revision since 2005 and has been used by over 20000 candidates.

### Objective

The aim of this study was to examine online revision patterns to advance revision technology and techniques.

### Methods

We analyzed PasTest data for the MRCS between January 2011 and September 2014. Comparisons were made on number of questions accessed by the pass and fail groups for each examination period. Candidates were e-mailed to determine pass or fail.

### Results

5835 customers accessed the service 9387 times. The total number of modules for which an outcome was recorded was 1218 representing 786 candidates. A total of 563 (71.1%) passed, 199 (25.3%) failed, and 24 (2.7%) had not taken the examination. Both data sets are significantly negatively skewed (Shapiro-Wilk,  $P \leq .004$ ). Values for pass candidates are not significantly different between examination periods (Kruskal-Wallis, independent samples,  $P = .154$ ). In all periods, the number of questions answered in the pass group was significantly different to the fail group (Mann-Whitney U-test,  $P \leq .0001$ ).

### Conclusions

This study showed that the level of engagement with online revision remained the same over a 3-year period and that successful candidates attempted more questions than the ones that failed. Although self-reporting can lead to positive selection bias, we included unknown outcomes with the fail group, so we will have inevitably included some who passed. Further work will focus on developing protocols to improve performance.

## **#GeriMedJC: An analysis of the growth and impact of the Twitter-based complement to the traditional Geriatric Medicine Journal Club**

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### **Background**

Twitter is a microblogging platform that overcomes physical barriers, allows unrestricted participation, and enables interactive discussions. Twitter-based journal clubs have demonstrated growth, sustainability, and worldwide communication, using a hashtag (#) to trend participation. To date, there is no reported Twitter-based geriatric medicine journal club. We describe the first 5 months of #GeriMedJC.

### **Methods**

@GeriMedJC moderates #GeriMedJC, a monthly 26-hour asynchronous journal club that complements the live, 1-hour, traditional format geriatric medicine journal club at the University of Toronto. Growth metrics, including number of tweets, number of participants, tweet amplification, and impressions, were obtained from Symplur. Thematic analysis of tweets was performed to categorize content into areas of clinical practice, medical education, health policy, and critical appraisal.

### **Results**

During its first 5 months, @GeriMedJC has grown to 217 followers, including 30%, 25%, and 16% from the UK, Canada, and United States, respectively. Most followers are physicians (35%), and two-thirds are geriatricians. There was an increase in all growth metrics with a mean of 83 tweets, 36 retweets, 16 participants, and 34 750 impressions per journal club. The content of tweets was most relevant to clinical practice, medical education, critical appraisal, and health policy, encompassing 39%, 18%, 16%, and 4% of tweets, respectively.

### **Conclusions**

There has been a steady increase in growth metrics for #GeriMedJC with demonstrated discussion in areas of clinical practice, medical education, critical appraisal, and health policy. #GeriMedJC is another example of using Twitter to engage international and interprofessional appraisal of medical literature. Future directions include demonstrating sustainability and analyzing factors associated with the growth of #GeriMedJC.

## Residents' perception of the use of an interactive e-book in learning the ethics and professionalism curriculum

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### Introduction

First-year residents in Singapore are required to fulfill competency-based requirements over a 12-month period, stipulated by the 2014 NAC-PGY1 (National Assessment Committee for Postgraduate Year 1). Mobile technology is used to deliver educational resources and activities in the hope of improving on purely didactic face-to-face lessons. The purpose of this study is to assess the residents' appreciation of this blended approach to foster self-directed learning "anytime, anywhere."

### Methods

Twenty-five residents at JurongHealth, a teaching hospital in Singapore, were asked to use their handheld devices to access an e-book containing videos, podcasts, case studies, and papers relevant to their Ethics/Professionalism module. An introductory presentation was given to familiarize users and a prestudy survey on user (self-declared) category of technological comfort was done. Their 12-week learning experience was assessed via a sequential mixed methods design: adapted CEHD iPad Initiative Student Survey and written feedback to understand the ease of access and use, enjoyment, and usefulness. The *n* size being small, the quantitative data were analyzed by calculating descriptive statistics, and qualitative content were analyzed for recurrent themes, patterns, and meanings by the principal investigator and research assistant.

### Conclusions

The residents found the interactive e-book useful, flexible, and enjoyable. They were able to apply their asynchronous learning during role-play sessions "in class," thus better preparing them for the demands of a knowledgeable, skillful, safe, caring, and compassionate professional. Moving forward, future research could explore the effectiveness of and impact of apps and other interactive components of mobile learning in residency teaching and assessment.

## Development and evaluation of a simulation-based competency curriculum for ultrasound-guided central venous catheterization

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### Objective

To develop a simulation-based competency curriculum to teach novices ultrasound-guided (USG) central venous catheter (CVC) insertion, and to study the volume and type of practice that leads to technical proficiency.

### Methods

Ten residents attended 4 sessions during which they engaged in high-volume deliberate practice to learn USG CVC insertion. Using hand motion analysis (HMA) baseline proficiency measures for time to procedure completion and number of left and right hand motions were recorded for a femoral CVC insertion. Benchmarks were set by HMA of local experts. Progress during training was monitored using direct observation and regular HMA. Blinded assessment of video recordings was done at the end of training to assess technical proficiency using a global rating scale (GRS).

### Results

At baseline mean time required for trainees to complete a femoral CVC insertion (331 seconds, range 192–700) and number of left (75, range 34–194) and right hand motions (86, range 51–180) were significantly higher than expert benchmarks ( $P < .01$ ). On the final day of training, the mean time for residents (86 seconds, range 57–112) and number of left (27, range 21–37) and right hand motions (29, range 24–43) were similar to or better than the expert benchmarks; 90% of residents achieved mean GRS scores indicating competence to perform independently on a simulator.

### Conclusions

We have developed a simulation-based competency curriculum for USG CVC insertion based on high-volume deliberate practice of the component skills of the procedure. Residents demonstrated steady improvement with practice and eventual achievement of expert benchmark standards.

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