# 2016

# The International Conference on Residency Education

## La Conférence internationale sur la formation des résidents

**Advancing Quality:** Aligning Residency Education and Patient Care

**La qualité avant tout :** residence en phase avec les soins aux patients

**CONFERENCE RESEARCH ABSTRACTS** | **RÉSUMÉS DE RECHERCHE DE LA CONFÉRENCE**

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# 2016 International Conference on Residency Education (ICRE) 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 3 Research in Residency Education papers from abstracts submitted to the annual International Conference on Residency Education (ICRE).

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

Each year, more than 200 abstracts are submitted and undergo peer review. Three winning abstracts are announced prior to ICRE, and are presented at a juried session during the conference. A Top Research in Medical Education Award and 2 runner-up certificates are given out. Commencing with ICRE 2014, the selection of the Top 5 Resident Papers was included in the award process.

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

# Table of Abstracts

*Author names are underlined to indicate presenters.*

**001**

**Medical specialty choice-related factors in Mexican residents**

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**Introduction:** Medical specialty choice is related to numerous factors. There are few investigations based on a single time point or retrospective information about how residents chose their specialty. In this study, we explored various factors related to Mexican residents' career choice in 4 specialties: surgery, gynecology, pediatrics, and internal medicine.

**Methods:** Mixed methods design. The qualitative phase entailed 4 focus groups with 32 first-year residents to obtain information on how the specialty choice was made. This identified several factors for specialty choice, which were identified and incorporated into the survey. With this information a web-based cross-sectional questionnaire was developed and fielded to 951 residents in the first year of the Postgraduate Studies Division of the UNAM Faculty of Medicine in Mexico City. The survey had 5 sections (157 items): positive factors and specialty choice (21); negative factors (21); personality (2 sections, 100 items); and demographic factors (15).

**Results:** The survey was completed by 35 surgery, 28 gynecology, 61 internal medicine, and 62 pediatrics residents for an overall response rate of 19.5% (186 of 951). Mean age: 26 years, 55.4% (103): women and the majority were single 87.7% (163). The specialty choice decision: during the medical career in 30% (55). The majority of the residents want to enter a subspecialty after completing a core specialty residency (67%). Personality and other demographic factors are relevant.

**Conclusions:** Specialty choice is important for both students and the health care system. For the general specialties, the choice is made during undergraduate training, with the intention of doing a subspecialty.

**002**

**Applying best practices in resident selection: A quality improvement project for the Dalhousie Internal Medicine Program**

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**Background:** Applicant selection for postgraduate residency programs is important and challenging, and significant variation exists between programs. As a way to address the need for a standardized, fair, and transparent process, a quality improvement project was completed to review the selection practices of the Dalhousie University Internal Medicine Program. The best practice recommendations outlined in the Best Practices in Application and Selection (BPAS; Bandiera et al, 2013) were used as a framework to evaluate the current selection process.

**Methods:** Two senior residents evaluated the program's current selection process through review of relevant documents, and discussions with program administrative staff and the program director.

**Results:** The program's selection process fulfilled, at least partially, many of the BPAS best practices, in particular those of fairness, process, and assessment. Transparency and knowledge translation were the main areas of weakness identified.

**Conclusions:** This review identified areas of the current internal medicine selection process that should be altered to comply with recently published best practices in postgraduate applicant selection. It also led to the development of program-specific documents and protocols for the applicant selection process. The results of this review can be useful to other postgraduate programs undergoing evaluation of their selection practices.

**003**

**The value of multiple mini-interview (MMI) in a general surgery residency training program selection process**

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**Background and Objectives:** The multiple mini-interview (MMI) is well established as a selection tool for undergraduate students applying to medicine, but little data exist on its use in postgraduate selection. This study aims to evaluate the utility of MMI as an assessment tool for a general surgery residency program.

**Methods:** Medical graduates applying to McGill General Surgery program between the years 2014 and 2015 underwent a traditional interview (TI) and 2 to 5 scenario-based MMI stations. The MMI stations were constructed to evaluate the noncognitive skills based on the CanMEDS framework of the Canadian Royal College. Pearson correlation was used to compare the scores obtained from the TI and MMI. Interclass correlation coefficient was used to compare reliability of CanMEDS constructs' scores across stations. Additionally, the MMI acceptability was measured by distributing online questionnaires to both the applicants and the interviewers.

**Results:** There were 113 applicants to the McGill General Surgery Program who underwent both a TI followed by MMI stations. The correlation between TI and MMI scores was weak (r = 0.315, *P* = .001). The CanMEDS constructs had fair to good interclass correlation between stations. The MMI process was found to be acceptable to both applicants and interviewers.

**Conclusions:** The multiple mini-interview produced different, nonredundant results when compared to the traditional interview. Our preliminary experience encourages its incorporation in the selection process as a reliable and acceptable method to select candidates for postgraduate residency programs.

**Reflections on the role of continuous quality improvement in accreditation for the 21st century**

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**Background:** Accreditation systems are based on a number of principles and purposes that vary across different jurisdictions. This paper explores the role of continuous quality improvement (CQI) in a system that has been historically based on episodic evaluation.

**Methods:** The Dutch Scientific Council for Government Policy concisely described generally applicable patterns (core tasks) for government oversight. The 7 core tasks are public interest, benefit for society, governance structure, reflective function, impartial in attitude and independently positioned, public accountability, and balance between expectations and capacity. The perspective of these 7 core tasks is used to look at the role of CQI in 3 accreditation systems across the continuum of medical education.

**Results:** CQI is most valuable for the "reflective function" based on early warning systems because in all 3 medical accreditation systems the accreditors lack the ability to immediately react to either local events or societal developments. The governance structure may benefit from decentralized empowerment of teaching sites working for the same cause. Consequently, there is a potential role for CQI in public interest and benefit for society. CQI has weaknesses in the core tasks of impartiality, independence, public accountability, and the balance between expectations and capacity.

**Conclusions:** The exploration of the accreditation systems through the perspective of the 7 core tasks framework showed that CQI is a valuable addition to external evaluations.

**005**

**Better culture, better physicians: Empowering fellows to measure and improve training program culture**

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**Introduction:** The vital importance of organizational culture has been recognized by the business community for several decades. Organizational culture affects hospital mortality rates for myocardial infarction, and calls for culture change in academic medicine are well documented. Educators know the importance of learning climate, and culture is a central theme of CanMEDS. Yet, little data exist regarding measurement of the culture of academic medicine or graduate medical education (GME). We propose that the culture of GME can be measured, that empowered trainees can change the culture and that these changes can be linked to performance metrics.

**Methods:** We applied a validated business model (Denison model) of culture assessment to 25 cardiology fellows at a large US academic medical center. This 60-item survey is designed to assess an organization's strengths and weaknesses in each of the 4 traits: mission, adaptability, consistency, and involvement. Fellows were tasked with "creating the ideal training environment" and empowered to develop trainee-led quality improvement projects. Over an 18-month period, ACGME program survey, in-training examination scores, trainee publications, grants and awards, and repeat culture assessment all improved.

**Conclusions/Implications:** GME program culture can be measured and improved, and is associated with better trainee performance. Although this is a single center experience, we believe the model is broadly applicable, and we plan to disseminate across the spectrum of GME. We believe that being intentional about improving organizational culture is imperative to improving patient care.

**006**

**International accreditation—Strategies for implementation of the CanMEDS framework in PUC-Chile residency programs: What works for us**

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**Introduction:** To certify compliance with the highest international standards in residency education, the School of Medicine of the Pontificia Universidad de Chile (PUC) has decided to incorporate the Royal College of Physicians and Surgeons of Canada (RCPSC) CanMEDS framework in our programs. We have 65 programs and 600 residents.

**Methods:** A progressive, multilayer strategy was planned for the incorporation of the CanMEDS framework and RCPSC International Standards at PUC residency programs. Our goal is to ultimately reach a cultural change in residency education among PUC faculty members and residents. This is to be achieved by demonstrating the benefits of the model, not by imposing it.

**Results:** We started with a diagnostic review of a sample of residency programs, by Royal College members, to identify programs' strengths and weakness. Workshops for faculty development in CanMEDS and teaching activities for residents were implemented: workshops and blended learning CanMEDS courses. Next steps: administrative and financial management changes (assigned for new program administrator, accreditation coordinator). Co-organization of the Latin American Conference on Residency Education (2013, 2015). Preparing institutional review: discuss/update main policies, such as residents assessment, promotion, dismissal and appeal, resident safety; review of resident counseling and wellness program and educational environment assessment. At the same time, we disseminated the CanMEDS framework to all other levels: PA, clinician educators, department chiefs, and the dean, and coordination with the institution's medical education office for faculty development.

**Conclusions:** The multilayer strategy for implementation of the CanMEDS framework in our residency programs presented a challenge, but the changes are well accepted and valued by faculty members and residents. The CanMEDS framework seems to work for our culture.

**007**

**Conjoint residency accreditation reform**

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**Introduction:** The current Canadian residency education accreditation system has evolved into a system with many manual processes and process-oriented standards. In 2013, the 3 Canadian accrediting colleges (Royal College, College of Family Physicians of Canada, Collège des médecins du Québec) came together to develop a new conjoint residency accreditation system that is aligned with the principles of competency-based medical education.

**Methods:** We created the Canadian Residency Accreditation Consortium (CanRAC) to develop a new national system of residency education accreditation.

**Results:** CanRAC has created a blueprint for a 21st century accreditation system that balances both continuous and episodic elements, comprising 10 components: a new framework of standards for residency programs, with an emphasis on high-yield markers and program outcomes; a new institutional review process, standard system, and status category; a renewed emphasis on the quality and safety of learning environments; a digital accreditation management system that makes the accreditation process more efficient; a new 8-year cycle of regular accreditation visits, supported by ongoing program data monitoring; increased emphasis on continuous quality improvement and program self-evaluation; enhanced onsite review processes, such as tracer methods; new decision categories, with thresholds to improve consistency of decision making; a new category of "exemplary" ratings to identify programs that have developed outstanding innovations; and a systematic approach to evaluation, research, and continuous improvement of the system.

**Conclusions:** CanRAC has developed a roadmap to transform Canadian residency education accreditation, promising an enhanced system for programs, institutions, residents, surveyors, and ultimately, patient care.

**008**

**What are the strengths and weaknesses found in family medicine residency programs in Canada during accreditation visits?**

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**Introduction:** Canada has a strong system of accreditation of postgraduate medical training in family medicine (FM) administered by the College of Family Physicians of Canada (CFPC). Through external reviews of FM programs every 6 years, accreditation contributes significantly to aligning residency education with quality patient care through the implementation of nationally agreed standards for FM training. After any review, the accreditation report is only ever shared with the school and the CFPC Accreditation Committee. This is potentially an important missed opportunity to share common areas of challenge, and also examples of excellence, identified during accreditation visits. This purpose of this study is to describe, for the first time, the demographics of FM accreditation over the last 40 years, the common strengths and weaknesses found in programs, and how these have changed over time.

**Methods:** External program review reports between 1975 and 2015 are available for analysis. Strengths and weaknesses are categorized under a set of themes based on the current Canadian conjoint postgraduate accreditation standards. Demographic information on the survey teams and programs under review is also available.

**Results:** Strengths and weaknesses, organized under a set of common themes, in each 6-year cycle over the last 40 years, will be presented and compared for changes over time. Demographic data on survey teams and programs will also be presented.

**Conclusions:** This analysis of strengths and weaknesses found during accreditation will help FM residency programs consider their own quality improvement processes. The work involved in the accreditation process itself is also highlighted.

**009**

**Organizational change: Another competency to consider?**

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**Introduction:** The introduction of competency-based medical education (CBME) across Canada has resulted in a fundamental shift away from time-based training to outcomes-based training. Not only is there a need for a change in the structure and framework of medical education, but there is also a demand to change attitudes and beliefs about how our institutions approach education. Readiness for change and organizational change management strategies are well recognized among business managers as many change initiatives fail. Within medical education, organizational change competency has not been discussed when evaluating how to best facilitate and implement CBME. As more and more programs begin to embrace CBME, the dynamics of organizational change will become crucial to the success or failure of these new training platforms.

**Methods:** Using a retrospective case analysis of the implementation of CBME within 1 Canadian institution, this narrative review focuses on 3 themes: (1) developing a definition of organizational change competency as applied to medical education; (2) summarizing key organizational change management theories to help effectively manage, lead, and implement CBME; and (3) discussing how we may assess for organizational change competency within our teaching institutions.

**Conclusions:** New initiatives have a high failure rate across all professional domains. In order to ensure the successful implementation of CBME, institutions should consider whether or not there is organizational change competency.

**010**

**Accreditation Council for Graduate Medical Education case logs as an indication of operative competency for vascular anastomoses: A pilot study**

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**Introduction:** The Accreditation Council for Graduate Medical Education (ACGME) continues to play an integral role in accreditation of surgical programs. The institution of case logs to demonstrate competency of graduating residents is a key educational component of evaluation. This study compared the number of vascular cases a surgical resident has completed with their operative proficiency, quality of anastomosis, and confidence in a simulation setting.

**Methods:** General surgery residents participated in a simulation lab in which they completed an end-to-side anastomosis. Residents ranging from postgraduate year 1 to 5 performed a timed task and were evaluated according to technical proficiency using a previously validated global rating scale and quality of the anastomosis (Duran et al, 2014). Participants completed a survey regarding their confidence with the procedure and future fellowship plans. Univariate and multivariate analysis were performed.

**Results:** A total of 18 general surgery residents were available for evaluation; 2 were excluded due to deficient case logs. The residents were evenly distributed throughout clinical years. Groups of residents were divided into quartiles according to vascular cases recorded in the ACGME database. The second and third quartiles were identified as having the highest confidence ($P = .048$) and best quality of final product ($P = .014$). No correlation was found between number of cases and the proficiency score or time to complete.

**Conclusions:** ACGME case logs, which are a requirement for completion of general surgery residency, may not be indicative of resident competency and technical proficiency. Careful examination of resident operative technique is likely the best measure of competency.

**011**

**Evaluating the implementation of entrustable professional activities: Practical lessons learned and faculty perceptions of needs and barriers**

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**Introduction:** Despite substantial uptake of entrustrable professional activities (EPAs) as a competency-based medical education assessment strategy, few reports have addressed program evaluation data for the EPA implementation experience. The next step for a validated set of palliative medicine EPAs that address all CanMEDS roles was to rigorously transition descriptions into implementable assessment processes. The purpose of this study was to comprehensively evaluate the experience with implementing EPAs and to explore more broadly the perceived needs and barriers among faculty related to direct observation and feedback provision.

**Methods:** Within 1 postgraduate training program, EPAs were transitioned into assessment processes and implementation was piloted for each using a small number of highly motivated faculty. Despite quantitative and qualitative data confirming a strongly positive experience among both faculty and learners, variation among faculty in navigating the practical elements of EPAs warranted further exploration. To examine this, 44 of 48 teaching faculty within the program were surveyed. 86% agreed that planned and structured direct observation is important for learner assessment, and 58% either always or usually use this assessment method. 74% identified clinical workload as the greatest time barrier to direct observation and among barriers other than time, logistical barriers were identified as the most impactful.

**Conclusions:** The experience with piloting 3 EPAs highlighted the importance of adequate faculty engagement during implementation. Through a survey of the broader faculty this was confirmed as teachers communicated the importance of maximal involvement in the design of EPA-related processes. This may be critical to successful integration of EPAs into clinical supervisory practice.

**013**

**Developing entrustable professional activities for the ambulatory internist**

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**Introduction:** The development of ambulatory competencies for specialists in general internal medicine (GIM) is a priority given the evolution toward outpatient health care delivery for chronic diseases. This is reflected in the Royal College of Physicians and Surgeons of Canada (RCPSC) specialty training standards for GIM residency programs. Within the CanMEDS 2015 competence by design (CBD) framework, learning goals are articulated as entrustable professional activities (EPAs) to explicitly describe activities performed by a specialty. However, defining EPAs for ambulatory training is still evolving and will require an iterative approach. This work describes the process of developing CanMEDS-anchored EPAs for University of Toronto (UofT) GIM residents specific to ambulatory care in preparation toward transition to CBD.

**Methods:** To develop EPAs, accreditation, and curriculum documents from the RCPSC and the UofT GIM residency were reviewed. Subsequently, a literature search assessing learning objectives in ambulatory GIM on MEDLINE was completed. Experts in ambulatory GIM and medical education from UofT were consulted to ensure agreement on the final list.

**Results:** Six EPAs were generated, with detailed subpoints, broadly encompassing the complexities of diseases and coordinated care managed in the outpatient setting. Each EPA was mapped to the CanMEDS framework highlighting competencies that must be integrated to fulfill the respective EPA.

**Conclusions:** Local consensus EPAs for ambulatory GIM were generated and mapped onto the CanMEDS framework. This work serves as an example of an evidence informed process for developing EPAs, and highlights changes required to successfully translate current objectives of training into clearly defined EPAs pertinent to CBD.

**014**

**An institutional approach to implementing CBME: Capturing the experience**

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**Background:** The Royal College of Physicians and Surgeons of Canada has mandated that all specialty residency programs transition to Competence by Design (CBD) by 2021. Queen's University is accelerating this process, aiming to have competency-based medical education (CBME) implemented in all specialty programs for the residents entering in July 2017. As part of this process, we have initiated a formal program evaluation using Hall and Hord's Concerns-Based Adoption Model (CBAM). This session highlights CBAM's Levels of Use interviews within the context of our overall program evaluation.

**Methods:** We take a phenomenological approach as we are interested in the lived experiences of those who are responsible for, and those who are experiencing, the transition to CBME. In Phase 1 of our project, we interviewed 10 CBME leaders and 29 specialty residency program directors using CBAM's Levels of Use protocols. We used Atlas.ti for content and thematic analysis based on CBAM protocols.

**Results:** Many CBME leaders and program directors believe that transitioning to CBME is a positive step for medical education, which will result in better trained physicians and better patient care. There is concern, however, about the time and resources needed for CBME implementation. While these findings indicate buy-in from many of the program directors, and a commitment to this transition, understanding their concerns can assist CBME leaders to develop supports to facilitate the process.

**Conclusions:** CBME leaders and program directors perceive a clear benefit in implementing CBME. Their concerns regarding the need for time and resources to support implementation will form the focus for future program evaluation.

**015**

**Leading from behind: Is faculty ready for the competency-based medical education movement?**

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**Background/Purpose:** The implementation of competency-based medical education (CBME) necessitates changes to the assessment of trainee performance. While the literature supports the use of CBME frameworks (eg, CanMEDS 2015), less is known about faculty members' perception of and preparedness for CBME. The present study examined both to inform faculty development opportunities within the Department of Psychiatry at McMaster University.

**Methods:** A 10-question survey was developed to examine faculty members' perceptions of and preparedness for CBME, including supervision and teaching of CanMEDS roles.

**Results:** 41 (40%) faculty members responded to the survey. When asked how much training would be required to develop supervisory skills within CBME, the majority of respondents (68%) endorsed a moderate amount of training, while fewer respondents requested a lot (10%) or a little/none (17% and 5%, respectively). The most common benefits included documenting student progression using behavioral anchors (31%); actively engaging students in the learning processes (20%); helping students identify their own learning needs (19%); and providing meaningful feedback (15%). The most common challenges included demands on time (26%); lack of training in evaluation/feedback (16%); lack of understanding of CBME (15%); busy clinical settings (14%); and lack of clear objectives/expectations (11%). Faculty identified efficient, succinct assessment tools (36%); more training (31%); information about CBME (23%); and sharing of educational responsibilities (10%) as most helpful in transitioning to CBME practices.

**Conclusions:** The present study identified areas for focused CBME faculty development at McMaster University.

**016**

**Resident perceptions of CBME: Preliminary findings**

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**Introduction:** As the Royal College prepares to implement competency-based medical education (CBME) across all residency programs, surprisingly little is known about how residents perceive this method of training. Despite an abundance of expert opinion describing the merits of CBME, there are no published reports detailing residents' experiences in CBME, nor regarding how Canadian residents view the impending transition. The purpose of this study is to determine how residents at our institution understand CBME, what they anticipate to be its advantages and disadvantages, and what barriers they see to its successful implementation.

**Methods:** This qualitative study involved 13 residents from a variety of residency programs at Queen's University participating in semistructured interviews. Transcripts were coded using Atlas.ti, with responses gathered under broad headings such as Advantage, Barrier, Concern, and Recommendation.

**Results:** Commonly expressed advantages of CBME included "more supervision," "feedback on more specific aspects of training," and "opportunity to develop skills for self-refection earlier in training." Concerns such as "administrative problems," "hiccups that come with implementing the program," and an "overwhelming" amount of assessment making "busy services even busier" were expressed across participants.

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

**017**

**Royal College specialty committee assessment of residency training in practice—The Canadian Neurology Graduate Survey**

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**Introduction:** Planning for resident training in the competence by design era required an assessment of graduate experience. We catalogued entrustable behaviors in practice, assessed training adequacy based on clinical needs, and identified perceived gaps in CanMEDS instruction by surveying recent graduates.

**Methods:** Graduates in neurology from 2010–2014 completed a cross-sectional survey that was distributed by program directors; automated response tabulation at a coordinating site promoted openness. We used a fillable PDF tool, which allowed time for reflection. Outcomes included a description of current clinical work, observable practice habits, and adequacy of CanMEDS role preparation. Descriptive statistics summarized practice, and qualitative responses were thematically categorized.

**Results:** 37% of 211 invited participants responded. Numerous professional activities were identified. Most conditions encountered in practice were underobserved during training. Many respondents noted a need for more general neurology in longitudinal outpatient/community settings. CanMEDS preparation was very good to excellent; however, poor or fair ratings were seen for 17% of respondents in the advocacy domain.

**Conclusions:** A collection of entrustable activities were identified and could serve as a template for implementation. Further training in independent community practice development is needed. Training was very good at addressing CanMEDS roles, with room for improvement in advocacy. Our study was limited by response rate, but was comparable to other physician surveys. The survey will be repeated to assess competence by design impact. Our administrative committee worked together to facilitate educational scholarship. So far, 2 specialties have approached us to build on our experience.

**018**

**Competency-based medical education implementation: How are we shifting assessment culture?**

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**Introduction:** Competency-based medical education (CBME), the curricular approach utilized by Queen's University Department of Family Medicine (DFM), represents a paradigm shift from the traditional time- and process-based education training approach to 1 that requires postgraduate medical trainees to demonstrate their evolving abilities. To meet the requirements of CBME, the DFM implemented the Portfolio Assessment and Support System (PASS), an electronic portfolio platform that includes field notes, learning plans, case reflections, procedure logs, and other assessment data, reviewed with academic advisors (AAs) quarterly. The purpose of this study was to determine how the implementation of CBME changed the culture of assessment in the department.

**Methods:** This is a qualitative study, based in phenomenology, that included interviews with 9 AAs and 2 focus groups with residents (n = 12) to understand their perspectives and experiences in a CBME environment.

**Results:** Data analysis included an emergent design that identified 3 main themes: recognition of the importance of a robust assessment system; use of criterion-referenced performance standards; and early identification of residents in difficulty leading to better support of individual needs.

**Conclusions:** The study findings indicate that the culture of assessment has changed. AAs recognize PASS as valuable for informing competency decisions. They now focus on criterion-referenced performance standards that include entrustable professional activities. This assessment process allows for early identification of residents in difficulty, and subsequently, better support of individual needs. The findings will have broad implications for DFM faculty development needs and specialty programs implementing CBME.

**019**

**Hematology residents' skills and perceptions around discussing resource stewardship in the setting of thrombophilia testing**

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**Introduction:** Resource stewardship is an essential skill for physicians. Few studies have examined residents' skills in discussing resource stewardship with patients.

**Methods:** Fifty-two hematology residents participated in a communication scenario with a standardized patient (SP) portraying a patient requesting unnecessary thrombophilia testing for early pregnancy loss. Residents were provided with the specific Choosing Wisely Canada (CWC) recommendations in advance. Both SPs and faculty examiners (FEs) scored performance using a communication rating scale, with checklist items across 5 domains (clear recommendations, eliciting concerns, conveying empathy, confirming agreement, and general communication; 1 = not performed, 2 = incomplete/ineffective, 3 = complete and effective) and an overall global score (5-point scale, 5 = high). Residents also completed a post-encounter questionnaire.

**Results:** Overall performance was rated 3.99/5 by FEs and 4.36 by SPs. Residents scored highest on making clear recommendations (FE = 2.69/3, SP = 2.75) and empathy (FE = 2.64, SP = 2.79), while scoring lowest on confirming agreement (FE = 1.99, SP = 2.27). Interrater reliability was fair (ICC = 0.64). Residents' knowledge of CWC recommendations correlated moderately with their performance ratings by SPs ($r = 0.47$, $P = .04$), and showed a non-significant trend with FE ratings ($r = 0.40$, $P = .07$). Although 86.1% of residents reported significant clinical experience with resource stewardship discussions, the majority (56.8%) reported receiving little or no faculty feedback in this. Time constraints and practices of attending physicians were identified as barriers to implementing CWC recommendations.

**Conclusions:** Hematology residents generally performed well in discussions about resource stewardship, but could improve in confirming agreement between physician and patient. Improvements in faculty development regarding providing resident feedback and stewardship may facilitate the implementation of CWC recommendations.

**020**

**Improving patient safety through a quality improvement program—evaluation of the Irish diploma in leadership and quality in health care**

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**Objectives:** A key element of the Irish health system's strategy to improve health care quality was to develop staff proficiency in quality improvement (QI) through a novel program established between the main health service provider and the largest postgraduate training body. The QI program's 2-pronged approach combines QI training with continuous development of senior hospital management. Its main component—Diploma in Leadership and Quality in Healthcare—integrates QI projects with its learning phases. Undertaken by multidisciplinary teams, the projects consider local priorities in addressing the domains of quality care (Institute of Medicine). This study was evaluated the projects completed from 2012 to 2014.

**Methods:** The project progress was assessed by both project teams and the faculty at 3 time points using a modified Institute for Healthcare Improvement project progress scale. Estimated impact of 5 completed QI projects on health care recipients and expenditure was extracted from report submitted 12 months after completion.

**Results:** The 66 QI projects primarily addressed efficiency (33%), safety (32%), timely care (17%), effective care (11%), and patient-centered care (6%). 86% of the projects achieved modest to sustainable improvements. The 5 completed projects estimated impacting ≥ 550 patients and cost savings of €724,500.

**Discussion:** The improvement projects performed within the diploma predominantly aimed to improve efficiency and had tangible impact within the system. Aside from the structure and multifaceted approach of the diploma, the key determinants of success were sponsorship and endorsement by both the service delivery arm and the medical postgraduate training body, which ensured multidisciplinary endorsement, credibility, and buy-in.

**021**

**Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS): Promoting a culture of safety**

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**Introduction:** Adverse events due to medical error are a source of preventable morbidity and mortality in Canada's emergency departments (EDs). TeamSTEPPS is a method to minimize these errors. Although widely implemented, the optimal method of education has not been standardized. This study objectively measured use of TeamSTEPPS strategies pre- and post-implementation of a novel TeamSTEPPS program.

**Methods:** A 12-month longitudinal TeamSTEPPS program was introduced to physicians, nurses, and allied health care professionals in a tertiary care ED. An academic approach consisting of group huddles, educational props, and social media, including Facebook, Twitter, and YouTube, were employed. Trained observers utilized a performance observation tool to record and quantify the use of strategies by staff. Main study endpoints were improvement in behavior metrics and sustained use of TeamSTEPPS methodology.

**Results:** Using a logistic regression model and chi square test for data analysis, 2 modules, Call Out/Check Back and Shared Mental Model, were demonstrated to have a statistically significant increase in utilization through our observation period ($P$ = .003 and $P$ = .048, respectively). Behavior metrics for Leadership & Team Structure were non-significant ($P$ = .29). Additionally, other modules including Briefs/Debriefs/Huddles, Challenge & CUS Rule, DESC Script, and Situation Monitoring showed perfect performance rates pre- and post-TeamSTEPPS implementation in this group of already high-performing providers.

**Conclusions:** TeamSTEPPS was successfully implemented in a busy tertiary ED and sustained use of the implemented strategies was identified. Initial high level staff performance resulted in non-critical differences in many endpoints; improvement in 2 critical behavior metrics was ultimately achieved.

**022**

**Specialty Training's Organizational Readiness for curriculum Change (STORC): Development of an instrument**

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**Introduction:** The field of postgraduate medical education is continuously changing as a result of social demands and advancing educational insights. Change experts contend that organizational readiness for change (ORC) is a critical precursor for successful implementation of change initiatives. However, assessing ORC is rarely considered in medical education, although it could be of great value. Therefore, our aim was to develop an instrument to assess ORC in postgraduate medical education: Specialty Training's Organizational Readiness for curriculum Change (STORC). In this study, we will further explore the psychometric properties and validity of the instrument that we previously developed in a Delphi study.

**Methods:** STORC was administered among multiple educational teams in the Netherlands. We conducted a confirmatory factor analysis on the internal factor structure of STORC. To estimate the reliability of the measurements, we calculated the Cronbach alpha for all subscales. Additionally, to define correlations with change related behavior, a behavioral support for change measurement was administered as well.

**Results:** A total of 864 physicians (from 39 educational teams) completed the questionnaire. Factor analysis led to the removal of 1 new item but supported the expected factor structure with very good fit for the other 43 items. Supportive behavior was positively correlated to a higher level of ORC.

**Conclusions:** In this study, additional steps to validate STORC were taken successfully. STORC could help to optimize implementation processes by exploring the different components of ORC in order to enable educational leaders to diagnose possible hurdles and perform specifically targeted interventions when needed.

**023**

**Modeling the learning trajectory of mid-training resident performance: The McMAP experience**

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**Background:** Many editorials have championed learning curves to track resident performance, yet few studies have demonstrated the necessary longitudinal data to track resident progression. In 2012, our program implemented a system (McMaster Modular Assessment Program) that captures maps recurring assessments of resident performance (globally and around specific tasks).

**Question:** Is it possible to generate a model that can describe a resident's progression along a global rating scale?

**Methods:** *Population:* We assessed emergency medicine residents' global performance during each shift in their second year of training. *Data Collection:* During each shift, the supervising physician electronically rates the resident's performance using a behaviorally anchored scale that hinges on endorsements for progression (1, needs attention; 4, in development; 7, ready to be a senior resident). *Analysis:* A multilevel regression model was developed to examine the relationship between our global rating score and shift assessment over time, adjusting for data clustering by resident and faculty rater.

**Results:** We analyzed data from 23 second-year residents over a 2-year period (July 2013–June 2015), yielding 1498 unique ratings (65 ± 18.5 per resident) from 82 raters. The model estimated an average score of 5.7 ± 0.6 for the first shift, with an increase of 0.005 ± 0.01 for each additional assessment. There was significant variation among residents with respect to their starting score (ie, Y-intercept) and trajectory (ie, slope; $P <$ .05). There was a negative interaction between average starting score and trajectory, suggesting a ceiling effect.

**Conclusions:** We describe a trajectory resident progression. This model can inform education and service/resource planning.

**024**

**The meta-epidemiology of competence—factors, issues, and implications**

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**Introduction:** This study identifies, describes, and examines the risks and supports to competence discussed in the literature related to occupational therapists, pharmacists, physical therapists, and physicians using epidemiology as an analytical model.

**Methods:** A scoping literature review of articles from 1975 to 2014 were included if they were (1) 1 of 4 health groups; (2) professional or clinical competence; and (3) a risk or support to the competence of clinicians. Descriptive and regression analyses identified potential associations between risks and supports to competence and location of study, health care professional, competence life cycle, and the CanMEDS framework.

**Results:** A total of 3568 abstracts were reviewed and 939 articles were analyzed. Most focused on physicians (n = 806, 86%) and "practice" (n = 642, 68%). Fewer articles discussed risks to competence (n = 418, 45%) than supports (n = 746, 79%). The top 4 risks, each discussed in more than 15% of articles were: transitions to, or in, practice, being an international graduate, lack of experience, and age. Top 2 supports (over 25%) were continuing education participation and educational information/program features. Almost 60% discussed Medical Expert and about 25% applied to all roles.

**Conclusions:** Epidemiology is an effective approach to exploring and explaining the risks and supports to the competence of health professionals. Risks are less studied than supports to competence. Articles focusing on residents had a greater probability of reporting on risks, while articles about the other 3 professions or about the Communicator Role focused on supports. Comparison between the literature and other data sources about risks and supports would be prudent.

**025**

**Development and validation of a questionnaire appraising the factors influencing clinical supervisors to report residents in difficulty**

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**Introduction:** Residents who perform poorly are often identified relatively late in training. Previous studies identified factors influencing clinical supervisors (CS) to report residents in difficulty (RID), but we could find no valid questionnaire measuring this outcome. This study aimed at developing and validating a questionnaire appraising the factors influencing CS to report RID.

**Methods:** A 12-item questionnaire was developed based on previous studies. Four constructs were assessed: (1) documentation; (2) knowledge of what to document; (3) remediation options; and (4) personal consequences for the evaluator. The questionnaire was administered on a web-based platform to 94 CS. Item analysis was performed along with exploratory factor analysis on the 12 items and the 4 constructs. Convergent validity was explored through correlation with another scale measuring appreciation of in-training evaluation reports.

**Results:** Internal consistency was very good for the global scale ($\alpha = 0.86$), but mitigated for the 4 constructs ($\alpha$s = 0.62–0.82), and discrimination of items was good for the global scale (ITC = 0.34–0.67). Exploratory factor analysis suggests a unidimensional structure for the questionnaire, but the presence of a second factor might be considered (eigenvalue > 1). Convergent validity is supported with the appreciation of the assessment system ($r = 0.68$).

**Conclusions:** This questionnaire showed good psychometric properties to measure the factors influencing CS to identify RID, but confirmatory factor analyses and further analyses of validity will be required with larger samples. However, the questionnaire seems promising to help programs assess the factors influencing CS to report RID and subsequently develop educational interventions aimed at improving resident assessment.

**026**

**Resident experiences as participants in medical education research during residency: A phenomenographic study**

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**Introduction:** As the medical education research field expands, residents are increasingly being recruited to participate in education-related research studies. Limited research has been conducted examining how residents perceive these experiences. The purpose of our study was to explore the experiences of residents as participants in medical education research.

**Methods:** Seventeen residents in internal medicine, general surgery, and pediatrics at the University of Toronto were recruited to participate in semistructured interviews. Potential participants were identified using a maximum variation strategy to identify residents with varied experiences as research participants. Interview transcripts were analyzed using a phenomenographic approach. Phenomenography is a method used to describe the qualitatively different ways in which people experience and understand a given phenomenon and how these are related to one another.

**Results:** Residents have different experiences of participating in education research. Positive aspects identified included the opportunity to participate in otherwise unavailable educational opportunities, and to become more integrated in the research enterprise for networking and future career opportunities. Factors modifying the decision to participate include an altruistic desire to contribute to medical education and incentives being offered for participation. Resident concerns were expressed about the recruitment and consent processes not being fully free of coercion and that poor performance in a study setting may reflect negatively on future official assessments.

**Conclusions:** Participating in medical education research is perceived in qualitatively different ways. Understanding the view of resident participants is important to optimize the potential benefits, while minimizing risks and negative consequences for all parties involved.

**027**

**Establishing absolute standards for technical performance**

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**Introduction:** Standard setting methodologies have been used in medicine primarily for written examinations at the undergraduate and postgraduate levels. Currently, standard setting has not been used to determine competency for trainees in surgical skill assessment. The objective of this systematic review is to identify studies that systematically establish cutoff values, focusing on procedural skill assessment.

**Methods:** A systematic review describing the use of absolute standard-setting methodologies to assess procedural performance was conducted by searching MEDLINE, Embase, PsychINFO, and the Cochrane database of systematic reviews. Abstracts of retrieved studies were reviewed and those meeting the inclusion criteria were selected for full-text review. Data were retrieved in a systematic manner, and validity and quality of evidence presented in the included studies was assessed using the Medical Education Research Study Quality Instrument (MERSQI).

**Results:** Of the 1762 studies identified, 38 used standard-setting methodology for assessment of procedural skill. Of these, 25 used participant-centered methods, and 13 used item-centered methods. The included studies assessed residents (26), fellows (7), and staff physicians (17). 18 articles were MERSQI graded as 14/18 or higher, while 20 did not meet this mark.

**Conclusions:** The 38 studies included in this analysis demonstrate that absolute standard-setting methodologies can be used to establish cutoffs for procedural skill assessments, including those taking place in the clinical setting. Establishing benchmarks in technical skill is particularly important prior to the implementation of new assessments into surgical training, such as the "competence by design" curriculum being introduced in many residency programs.

**028**

**Communication crises in the in-patient setting: A study of health care provider perspectives**

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**Introduction:** The Communicator role is a core CanMEDs competency yet little is known about communication interactions of an extreme nature hereafter referred to as communication crises (CC). We define CC as interactions between patients/families and the health care team that result in delays or obstructions in patient care and negatively impact the therapeutic relationship. The purpose of this needs assessment study was to characterize and describe CC that pediatric health care providers encounter.

**Methods:** Data were collected via 6 focus groups (FGs). Key informants were individuals who experience CC firsthand or are called on to support conflict resolution. FGs proceeded through open-ended questions to explore experiences and perceptions about CC. FG were audio taped and transcribed. Data were analyzed using grounded theory and constant comparison methods.

**Results:** Participants included pediatricians (10), nurses (6), social workers (4), and hospital administrators (5). Three major themes and associated subthemes emerged: (1) health care team factors: communication style and system issues related to inpatient setting; (2) family factors: language/cultural barriers, mental health conditions, poor coping skills, and refusal of medical care; and (3) patient factors: acuity of illness, unstable medical situation, and unclear diagnosis. The presence of a trusting relationship between the family and team is the core variable identified as critical to the communication process.

**Conclusions:** These results provide a rich description of CC in the inpatient setting. Next steps include development of a CC curriculum including workshop and actor-based simulation to further develop skills in this area.

**029**

**Leadership education: A model for personal continuous improvement**

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**Introduction:** The CanMEDS Leader Role establishes the expectation that physicians contribute to the delivery of health care that is continuously improving. According to the world-wide discussion of the topic, there are some challenges in meeting this expectation. From our perspective, 1 of the most important steps to quality improvement (QI) is the adoption of the continuous improvement (CI) philosophy and the formation of personal CI skills. We attempted to develop a training model for both residents and faculty, which can be used to serve as an introduction to personal CI and to engage individuals in personal CI practices.

**Methods:** The model was developed in 2 phases. The first phase entailed a nonsystematic review, critical synthesis, and deduction. During the second phase, the model was empirically tested.

**Results:** The outcome-based model for personal CI was created based on Deming's philosophy, different approaches to QI, and the principles of coaching and project management. It is comprised of 2 parts. The first part consists of 3 components: the current state, the desired outcome, and a list of actions. The second part involves the outcome-based Plan-Do-Study-Act (PDSA) cycle, which is closely related to the components of the first part.

**Conclusions:** We believe that the adoption of the proposed model by both faculty and residents will improve leadership and QI education. The presented model became the framework for a personal CI training course.

**030**

**Intrinsically intuitive: "CanMEDS Natives" may assess the intrinsic roles more frequently their predecessors**

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**Background:** Since 2014, our emergency medicine program has used an electronic workplace-based assessment system for off-service postgraduate (PGY) 1 residents. PGY-1s are rated on medical expertise, and 1 additional intrinsic role. We conducted a data-driven needs analysis to determine faculty development needs for various cohorts to determine if training in the CanMEDS era results in a wider range of intrinsic roles assessed.

**Methods:** We examined shift encounter records from March 13, 2014 to February 26, 2016. We split the faculty members by their training era (pre-/post-CanMEDS or CanMEDS-FM). We also examined the various CanMEDS eras for the Royal College fellows (before 1996 and those after 1996). We examined the distribution of CanMEDS intrinsic roles completed by each cohort. A Pearson chi-squared test was used to determine if there was a difference in distributions of roles assessed.

**Results:** We analyzed a total of 2947 shift encounter records. There was significantly different distribution in the frequency of intrinsic roles assessed by those who trained in post-CanMEDS era ($P < .001$) in both training streams. Pre-CanMEDS faculty members tended to emphasize Communicator and Professional roles. Post-CanMEDS faculty still emphasized Communicator, but rated other roles more frequently. The Scholar role was particularly infrequently assessed in all groups.

**Conclusions:** Familiarity with CanMEDS may yield differences in intrinsic roles assessed at the bedside. There is an inherent bias for all faculty members, regardless of training era, to assess the Communicator role. Differential training around the less often assessed roles may be of benefit to faculty of different training eras.

**031**

**Evaluating the quality of postgraduate medical education: Does it improve the quality of teaching? Results of a longitudinal study**

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**Background:** There is mixed evidence whether evaluations of clinical supervisors lead to more effective teaching and higher ratings. We assessed changes in resident ratings of their supervisors using a validated questionnaire (EFFECT). We interviewed supervisors to understand what changes they plan to make, and how they realize them.

**Methods:** Supervisors from 9 medical specialties were evaluated using EFFECT. Mean overall scores (MOS) and mean scale scores were calculated and compared using paired $t$ tests. Semistructured interviews were conducted based on predefined topic lists. Interviews were transcribed and analyzed by thematic analysis.

**Results:** 89 supervisors were evaluated at 2 subsequent years. 12 out of 18 supervisors (67%) with a MOS < 4.0 at year 1 demonstrated a relevant increase of their MOS (mean increase 0.4). 15 out of 71 supervisors (21%) with an MOS higher than 4.0 demonstrated an increase > 0.2 in their MOS. We interviewed 12 supervisors. The qualitative analyses show that supervisors experience a high job autonomy concerning teaching, improve their teaching but are not aware of their strategies, and don't expect support from the head of the department. Supervisors rarely learn from their colleagues. Feedback from residents is useful.

**Conclusions:** Evaluating teachers with EFFECT is associated with a positive change in residents' ratings, predominantly in supervisors with low initial scores. Supervisors formulate intentions but do always not have clear strategies on how to realize them.

**Take Home Message:** Evaluating supervisors helps to further improve teaching. Supervisors could be supported in realizing their intentions after an evaluation.

**032**

**Resident evaluations of faculty: Resident versus faculty perspectives**

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**Introduction:** Resident assessments of faculty are integral to postgraduate education. We previously surveyed residents on their perspectives of the written assessments they complete of faculty physicians. We now sought to determine how faculty perspectives compare to residents' perspectives.

**Methods:** We designed an anonymous online survey for internal medicine faculty at McMaster University. The questions mirrored those of the 2015 resident survey.

**Results:** 42/65 (65%) of faculty completed our survey. Faculty identified resident assessments as being most important for personal satisfaction and development as teachers, consistent with previous studies. Faculty identified major barriers to residents providing honest assessments as: inadequate time with preceptors, concerns that assessments will not effect change, and inadequate time to complete assessments. In contrast, residents reported that their main barrier to being honest was concern about anonymity of the assessments. Nonetheless, only 16% of faculty report ever being able to identify the resident who completed their assessment. Assessments are equally effective in identifying faculty's strengths and areas for improvement, but much less effective in identifying strategies for improvement. Residents reported being honest on faculty assessments 58% of the time, but faculty think residents are honest only 12% of the time. Faculty report modifying their behaviors based on resident feedback 37% of the time, though residents thought they do so only 9% of the time. Main areas where faculty modify their teaching behaviors are resident autonomy, bedside teaching, and availability in clinical settings.

**Conclusions:** There is a large disconnect between resident and faculty perspectives on resident assessments of faculty.

**034**

**Resident career development and mentorship: Results of the national PGY-4 to PGY-6 hematology career and mentorship survey**

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**Background/Objective:** As physician subspecialty positions become increasingly competitive, it is clear that residents require greater career planning and mentorship. Limited data exist to evaluate the factors influencing fellowship and career selection, and their impact on resident stress and satisfaction.

**Methods:** A national needs assessment sent to postgraduate year (PGY) 4 to PGY-6 hematology trainees across Canada specific to career planning (47 of 65 respondents; 72% response rate) was e-mailed to all trainees in July 2015 for completion. Data were collected focusing on the interventions available for career planning, barriers to effective hematology career planning, and their impact on resident satisfaction and job selection.

**Results:** Residents across Canada from the PGY-4 to the PGY-6 level were represented in this survey. Up to 50% of trainees had no formal career counseling or structured career planning curriculum in their respective hematology programs. This is despite most trainees planning to pursue academia or additional fellowship training. Career mentorship opportunities were limited and heterogeneous, with only 33% of trainees having any ongoing contact with mentors specific to career planning. Results also indicate that many competing factors influence job selection outside of clinical work, including location of practice and family obligation.

**Conclusions:** The results indicate that greater career mentorship and curriculum development are required in hematology training programs across Canada. Such programs should focus on changing resident need and demands, and prospective job opportunities. Interventions for a structured career curriculum require greater study and can be applied to additional training programs.

**035**

**Scope of practice of family medicine graduates who completed rural versus urban residency program by practice location**

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**Introduction/Objective:** Do site of residency training (rural versus urban program) and practice location influence scope of family practice? This study compared the practice patterns of Alberta family medicine graduates who completed the urban versus rural residency program by practice location.

**Methods:** In 2014, we surveyed 655 graduates who completed family medicine residency training at the University of Calgary or University of Alberta during 2006–2011. They rated 19 domains of care in 4 categories (types of care, clinical procedures, practice settings, specific populations) on a 5-point scale, ranging from 1, not part of practice, to 5, element of core practice. Mean rating scores were compared between rural and urban program graduates by practice location.

**Results:** 307 (46.9%) graduates responded, of whom 173 obtained a residency position via the urban and 59 via the rural program. Mean scores for rural program graduates were higher ($P < .05$) than for urban program graduates for postnatal care, intrapartum care/deliveries, palliative care, office-based procedures, in-hospital procedures, providing emergency department care, in-hospital care, home care, long-term care facilities, and caring for rural/Aboriginal populations. Mean scores for rural program graduates in rural practice were significantly higher than for urban program graduates in rural locations for 5 domains of care. Rural program graduates in urban practice had higher mean scores for intrapartum care/deliveries than urban program graduates in urban practice locations.

**Conclusions:** Alberta family medicine graduates who completed a rural residency program tend to have a broader scope of practice than urban program graduates, regardless of practice location.

**037**

**Exploring the training experiences of a direct entry vascular surgery resident cohort using focus groups**

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**Objectives:** Vascular surgery training is undergoing a paradigm shift from a 5 2 fellowship to a 0 5 direct-entry pathway following medical school. Very few studies have explored or evaluated resident satisfaction and experiences during surgical training, and none have specifically looked at the 0 5 Canadian vascular surgery training programs. The aim of this study is to qualitatively explore the experiences of postgraduate year (PGY) 1 to 4 residents enrolled in the new 0 5 training pathway nationwide.

**Methods:** We explored the experiences of current PGY-1 to PGY-4 residents in vascular surgery training programs across Canada by way of online focus groups of 3–5 residents. Focus group discussions were recorded, transcribed, anonymized, and then analyzed for recurrent themes and patterns, culminating into a codebook. Various qualitative methods were employed to ensure methodological rigor, including triangulation and member checks.

**Results:** A total of 6 focus groups were completed, involving 6 first-year residents, 1 second-year resident, and 3 senior residents. Themes generated from discussions include increasing levels of responsibility, time constraints in the operating room, collegiality among staff and residents, lack of academic structure, open communication routes, and increasing acceptance.

**Conclusions:** The results illustrate a wealth of insights regarding resident perspectives, including satisfaction, program performance, and experiences within the new 0 5 direct entry training pathway for vascular surgery. Furthermore, themes generated serve to inform a framework for future residency program development, both within vascular surgery as well as other surgical specialties, toward optimizing resident experience.

**038**

**Leadership education. A longitudinal, integrated approach to leadership development: changing thinking and practice**

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**Background:** While leadership is recognized as a vital to the delivery of high-quality care, it has been downplayed in training; as a consequence, residents often see leadership as being synonymous with seniority. In the United Kingdom, there is increasing emphasis on leadership development. Our study evaluates the impact of an innovative competency-based program extending over 6 years of psychiatry training. As well as formal teaching, residents access facilitated leadership development groups where they explore experiences of learning to lead. A new leadership assessment tool is being piloted, placing leadership activity firmly within clinical training.

**Methods:** This is a qualitative study. Residents and faculty complete a bespoke "conceptions of leadership" tool (CoLT) and are invited to take part in semistructured interviews. These explore how each element of the program supports residents' development as leaders, capturing shifts in the ways they think and talk about leadership, leading, and their identities as clinical leaders. A thematic analysis of year 1 data is presented (for 101 residents and 33 faculty).

**Results and Conclusions:** Residents initially have fairly narrow conceptions of leadership, focused on personal qualities and interpersonal behaviors. Six months into the program, trainees are rethinking leadership, seeing it as something that is integral to their work with patients and the multi-disciplinary team. The work-based aspects of the program appear to have particular value. Our paper concludes with suggested ways to integrate leadership development into everyday training practices.

**039**

**Perspectives from residents on learning and teaching leader competencies: Barriers, challenges, and best practices**

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**Introduction:** Inherently, physicians take on leadership responsibilities when delivering care, and evidence suggests that effective clinical leadership results in superior outcomes. The purpose of this project was to obtain resident perceptions on barriers/challenges and best practices for teaching/learning the Leader role.

**Methods:** An online survey was distributed to 443 residents inquiring about the barriers/challenges and best practices for teaching/learning the CanMEDS Leader role. Qualitative responses from 322 residents—84 from family medicine (FM) and 238 from specialty programs (SP)—were assessed by content analysis. Subsequently, frequency of responses across thematic categories between FM and SP were explored with 2-sample z tests for proportions.

**Results:** Major themes identified on the barriers/challenges included: no barriers/challenges (33%), curriculum (21%; eg, no formalized programs); time constraints (10%); limited opportunities (15%); hierarchy of authority (6%); and lack of confidence/knowledge (6%). Suggestions on the best way to teach/learn the Leader role included: increasing educational sessions (35%); experience (16%); mentoring (11%); assigned leader/coordinator (7%); and increased responsibility (5%). Significant differences ($P < .05$) between groups were observed: more SP residents (9%) did not have any suggestions for effective teaching (2% FM), FM (13%) residents would like to see an assigned leader coordinator (5% SP), and more SP residents (4%) suggested an increase in allocated time for teaching/learning (0% FM).

**Conclusions:** The perceptions and views of resident stakeholders are considered invaluable in the continued ongoing efforts of the implementation of competency-based medical education. Results from this project will aid in focused leadership curriculum development and targeted leadership training throughout residency.

**Unravelling medical leadership**

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**Introduction:** Medical leadership is *trending topic.* However, consensus is lacking on what the concept entails. Leadership itself is an ambiguous concept and how it gets shape varies among different professional groups. It reflects the aspirations, norms, values, and complexity of the sector in which it is used. This ambiguity is reflected in the discussions on *medical* leadership. This study aims to unravel the different perspectives on medical leadership.

**Methods:** A discourse analysis was performed using Dutch (health care) magazine articles on medical leadership. Thirteen popular scientific articles and interviews about medical leadership, from 2011 (the start of "Platform Medical Leadership" in the Netherlands) onward, were coded and themed by hand. The results were discussed among the research group.

**Results:** Three perspectives on medical leadership were revealed: institutional leadership, organizational level leadership, and leadership within daily practice. The first 2 perspectives refer to medical leadership mainly in a defensive manner: by demonstrating medical leadership doctors could "take the lead" once again. Interestingly, the word "patient" is hardly mentioned in these articles.

**Conclusions:** In the Netherlands there has been a focus on medical leadership as (defensive) administrative action and hierarchic leadership, which emphasizes on getting physicians back in leadership positions again. These perspectives are not free of consequences; they will determine how the medical profession is constructed. However, by bringing more attention to medical leadership for *all* doctors, the profession can take a proactive approach in which physicians are committed to continually improving patient care, society, and themselves.

**041**

**Understanding medical students' response to stress in the clinical setting**

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**Introduction:** Transitions in medical training are associated with significant stress for medical trainees, and this stress is generally perceived to negatively influence learning. However, in other fields stress can enhance performance and the optimal stress level has not been elucidated for medical students. The purpose of this study was to deepen our understanding of the experience and role of stress in the clinical learning environment for senior medical students.

**Methods:** A mixed methods approach was used to analyze the impact of stress on learning for third-year medical students after their transition to the clinical workplace. Students were invited to participate in surveys and focus groups sessions. Twenty-six students completed the questionnaire, and 30 attended the focus groups out of 100 invited. The narrative responses were analyzed using the constant comparative method. Likert scale questions were used to triangulate responses.

**Results:** Students described a range of reactions to stress with equal numbers perceiving stress as having a positive rather than negative influence on learning. Positive experiences with stress were characterized by high clinical expectations set in a supportive workplace with clearly defined roles and responsibilities. Learner-focused interventions such as early clinical experiences elicited variable responses and were felt to be less impactful on stress than addressing workplace-related factors.

**Conclusions:** Our work suggests medical students experience stress in both positive and negative ways as they enter their clinical training. Furthermore, the nature of the impact of stress on learning is predominately influenced by the working environment rather than learner attributes.

**Enhancing resident resiliency**

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**Introduction:** Resiliency is recognized as key quality to responding to stress in a healthy manner in both professional and personal life. Indeed, evidence suggests that including resiliency training in residency contributes to improved outcomes. The purpose of this project was to obtain an understanding of various stakeholders' views of how to enhance resiliency for our residents in order to inform a workshop for new residents.

**Methods:** Past and current chief residents (CRs), program administrators (PAs), program directors (PDs), and faculty were surveyed for their views with 2 open-ended questions: (1) physician health issues and factors associated with stress and burnout in residents, and (2) steps that can be taken to enhance resiliency in our residents. Thematic analysis was conducted based on responses from 184 individuals and themes for each subgroup were ranked and compared.

**Results:** Data were categorized into 31 themes for question 1 and 32 themes for question 2. Similarly, the most frequent question 1 factor for faculty (22%) and CRs (44%) was workload/time management, differing from PDs (26%: unrealistic expectations/perfectionism) and PAs (27%: each for anxiety and depression). The top 5 factors for question 1 were the same for faculty and CRs with almost identical ranking. For question 2, the top-ranked factor was wellness, which was rated as the top factor by all 4 subgroups. Of the remaining 4 top-ranked themes, 2 other themes were shared by all: peer support and learning environment.

**Conclusions:** Implementation of resiliency training will be discussed, with implications of similarities and differences in stakeholders' views.

**043**

**Burnout and contributing factors among Dalhousie residents**

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**Background:** Residents experience high rates of burnout, ranging from 25% to 75%. A Canadian study of family medicine residents identified factors that contribute to (eg, high workload and burned-out colleagues) and mitigate burnout (eg, strong role models and feeling valued). Our study aimed to determine the prevalence of burnout among Dalhousie residents in all specialties and further explore protective and contributing factors.

**Methods:** Residents (N = 195, 35% response rate) completed an online survey, including questions about demographics, behaviors, perceptions of contributing and protective factors to burnout, and the Maslach Burnout Inventory (MBI), a validated measure of work-related burnout in 3 domains: emotional exhaustion, depersonalization, and personal accomplishment. Relationships among burnout, demographic variables, and self-reported work, sleep, and exercise hours were tested using chi-square and Pearson's correlation.

**Results:** Of the residents studied, 65% met the criteria for burnout. Burnout varied by specialty (33% in anesthesiology to 75% in pathology) and year of training (77% in PGY-2). Higher burnout rates were associated with greater self-reported work hours (2 (3) = 11.48; $P < .01$) and higher emotional exhaustion was associated with lower self-reported hours of sleep (r = –0.15, $P < .05$). Being married or in a partnership was a protective factor (2 (1) = 4.94; $P < .05$). Gender, parental status, and self-reported exercise were not significantly associated with burnout. Respondents identified several other protective (eg, specialty choice) and contributing factors (eg, lack of support).

**Conclusions:** Recognizing the high prevalence of burnout and the identification of potential modifiable factors is an important step in the prevention of burnout during residency.

**044**

**Designing non-academic support services: An exploration of resident wellness**

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**Introduction:** The future of medicine in Canada pivots on physician wellness and sustainability. There is a plethora of literature with emphasis on dealing with physician burnout and stress, but it is sparse on examining proactive strategies to enhance physician health and wellness. The purpose of this project was to examine the resident wellness needs important to non-academic support services and educational programming during residency training.

**Methods:** In 2015, 379 residents completed an online survey to rate and rank their wellness as operationalized on 8 domains: physical, emotional, intellectual, financial, spiritual, occupational, social, and environmental. Residents were asked to rate their wellness on a 10-point scale (ie, 1, very poor; 5, at risk in some aspects; and 10, 100% well). In addition, they were asked to indicate the *1* domain they would like more support in. ANOVA analysis was conducted on mean comparison by gender and by specialty (SP)/family medicine (FM).

**Results:** On average, the residents rated their physical wellness the lowest at 6.1 and their occupational wellness the highest at 7.1. The mean ratings of resident wellness status were similar by program except in occupational (FM 7.5 and SP 6.9; $P < .05$). Top domain ranking for desired support was financial for FM residents and male residents, occupational for SP residents, and emotional for female residents.

**Conclusions:** Our findings suggest needs can vary by program and gender and as such will help to inform when designing support services, workshops, and non-academic educational materials that in turn will promote lifelong benefits to physician wellness.

**045**

**Withdrawal (resignation) from surgical training in Australia and New Zealand**

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**Introduction:** The new program Surgical Education and Training was introduced in 2007–2008 and formally evaluated in 2014–2015. The review noted substantial attrition (13%) from the program. Women were more likely to be lost overall (20%) compared to men (10%). Women were even more likely to resign (OR = 2.5). As a result, the Royal Australasian College of Surgeons (RACS) engaged 2 medical education researchers to survey and interview these previous surgical trainees. This previously planned project overlapped in time to the external advisory group work leading to the Building Respect, Improving Patient Safety action plan.

**Methods:** Those resigning were invited to participate, initially by an e-mail letter from the dean of education, with a follow-up questionnaire and opportunity for interview. 80 respondents (almost one-half of the resignation group) completed the questionnaire and 22 underwent interview, usually taking about 1 hour. Questionnaire themes were developed in the interviews. Data saturation occurred.

**Results:** There were 3 major themes: dissatisfaction with the surgical life demands seen in supervisor role models as well as the working week; personal stress related to technical challenges, patient outcomes, and family life; and discrimination, bullying, and sexual harassment. The last of these 3 is a serious issue in our system (as noted in introduction).

**Conclusions:** RACS is committed to addressing the serious issues, but the first 2 themes must also be sorted. The emergent approach to surgery, its raison d'etre and lifestyle, as well as well-being is outlined.

**046**

**The impact of high performance physician training on resident wellness and clinical performance**

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**Introduction:** The High Performance Physician (HPP) program is a performance enhancement based curriculum. It is designed to equip physicians with skills to help optimize focus, arousal control, stress management, communication, and teamwork. The purpose of this prospective cohort study was to test the effectiveness of the HPP program among general surgery residents at the University of Manitoba with regard to burnout and clinical performance.

**Methods:** This program was delivered over a 9-week period. All 26 residents were asked to complete the Maslach Burnout Inventory–Human Services Survey (MBI-HSS). Each resident then participated as the team leader for a 15-minute trauma resuscitation simulation. Three attending physicians from Surgery & Emergency Medicine assessed resident performance and ability to manage work-based stressors using a validated measurement tool. Following the simulation, each resident received a debrief interview. Once the HPP curriculum had been completed, residents took part in a second high-fidelity simulation session and again completed the MBI-HSS.

**Results:** The emotional exhaustion domain of the MBI-HSS demonstrated a statistically significant decrease. The other domain scores were not statistically significant. Simulation domain scores did not demonstrate a statistically significant difference in performance between the pre- and post-HPP curriculum simulation sessions. A summative content analysis of the interview data demonstrated that residents believed internal barriers to situational awareness were the most significant impact on performance.

**Conclusions:** This study demonstrated a statistically significant decrease in the emotional exhaustion domain on the MBI-HSS. Further study is required to determine if differences are seen in long-term follow-up.

**047**

**"Rising to the level of your incompetence": Revealing the impact of imposterism in medical education**

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**Introduction:** Clinicians require insight to develop competency, to navigate failure, and to solidify professional identity. Clinicians who overestimate their skills are dangerous; those who underestimate their knowledge may feel like imposters and experience anxiety, burnout, or career paralysis. To unravel how trainees and expert clinicians develop insight, we conducted 2 studies that (1) explored residents' learning experiences during training, and (2) consultants' experiences with underperformance and failure.

**Methods:** Participants representing a variety of disciplines and career stages were interviewed about direct observation during residency (n = 22 trainees) or career "turning points" (n = 28 consultants). Iterative constant comparative analysis was used to identify themes. In both studies, "imposter syndrome" was a prominent theme that warranted further analysis.

**Results:** Trainees and consultants described feeling like imposters. Success, positive feedback, and accolades did not buffer participants' feelings of inadequacy in clinical situations, in academic endeavors, or as communicators and leaders. Instead, participants—including those at advanced career stages—questioned the validity of their achievements. Imposterism created psychological distress and impacted perceptions about performance and professional identity; participants remarked that they did not commonly share these feelings with colleagues.

**Conclusions:** Progressive independence and career advancement were variably experienced as "rising to the level of your incompetence." Imposter syndrome prevented trainees from seeking direct observation of their performance, and prevented consultants from seeking new career challenges. While common among high achieving individuals, imposter syndrome is not well-understood in medicine; to prevent burnout and enhance physician wellness, medical culture needs to create space for honest discussions about this phenomenon.

**048**

**Fieldnotes: Experience and lessons from the anesthesia training program in Ireland**

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**Introduction:** Competency-based medical education requires assessment that supports learning and provides evidence of competence. Striking a balance between these purposes can be challenging. To address this, Fieldnotes were piloted in the national training program in anesthesiology in Ireland, informed by practice in family medicine in Alberta. A Fieldnote is a brief record of an event involving a trainee in a clinical setting, and of the feedback provided.

**Objective**: This study examined the feasibility of Fieldnotes and their acceptability as evidence for progression decisions in postgraduate training.

**Methods:** A mixed-methods study involved anesthesiology consultants and trainees in 4 hospital sites. Training was provided in the Advocacy Inquiry method of feedback. Questionnaires and semistructured interviews were used to explore participants' experience, challenges to implementation, and impact on training. Data analysis was by content analysis and a constant comparison approach.

**Results:** Fieldnotes led to more constructive feedback, techniques for improving practice, and enhanced reflection. The level of engagement was reflected in the range of completed Fieldnotes, in terms of domains of practice and competencies. A number of issues were identified before Fieldnotes could be embedded in the national training program. Ambivalence about the potential use of Fieldnotes to support progression decisions could be discerned.

**Conclusions:** This study highlighted cultural, organizational, and logistical issues, which need to be addressed before mainstreaming Fieldnotes in the clinical environment. While this study confirms the importance of effective feedback and the feasibility of Fieldnotes, enabling conditions will be required if Fieldnotes are to contribute to high-stakes decisions.

**049**

**Test-enhanced learning: Does repeated testing enhance knowledge retention in continuing medical education?**

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**Introduction:** There has been growing interest in evidence-based research evaluating the effectiveness of continuing medical education (CME) activities. While theories of knowledge acquisition, such as test-enhanced learning (TEL) are believed to be applicable to CME, it is unclear if this is supported by evidence. This study examined whether TEL effects can be observed in practicing physicians.

**Methods:** 49 physicians were recruited during a local CME activity. Following a cardiology lecture series, physicians were randomized to either (1) the test condition (n = 26), where learners completed 20 multiple choice questions (MCQs), or (2) the study condition (n = 23), where learners studied the same information. Testing and studying occurred during the CME activity and then once more 4 weeks later. Finally, 8 weeks later, physicians completed a final 20 MCQ test. A between-subjects $t$ test compared performance on the final quiz as a function of the initial activity (test condition versus study condition). The dependent variable was percentage correct answers on the final test.

**Results:** Performance on the final MCQ test was equivalent for both test (75%) and study-only (77%) conditions ($t(47) = 0.94$, $P = .35$).

**Conclusions:** The null findings in the present study are inconsistent with previous research showing performance benefits of repeated testing relative to studying. It is possible that TEL effects may not be transferable to practicing physicians with developed mechanisms for knowledge retrieval. Before implementing TEL as a form of CME, it is essential to identify if it would be of benefit to the intended population.

**050**

**Seeing things differently: Better performance in resuscitation-based simulation OSCEs is associated with specific gaze patterns**

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**Introduction:** Providing effective patient care during a medical emergency is a critical skill that develops with training and experience. Although a critical competency for many medical specialties, it is a difficult process to study. The purpose of this experiment was to evaluate gaze pattern differences between team leaders with varying objective performance scores in a simulated medical crisis.

**Methods:** Emergency medicine residents in different stages of training wore gaze-tracking glasses during 2 simulated resuscitation examinations (31 and 13 residents in each examination, respectively). A blinded outside expert assessed video-recorded performances using a validated simulation-specific tool. Gaze patterns captured with the glasses were correlated with objective performance scores to determine if relationships existed.

**Results:** Specific gaze patterns were correlated with objective performance. These patterns varied between examinations based on scenario-specific content. For example, the number of times a resident checked the vital signs during the beta-blocker overdose case was strongly positively correlated with performance ($r = 0.74$, $P = .02$). In contrast, the total time spent looking at the ECG in the ruptured abdominal aortic aneurysm case was strongly negatively correlated with performance ($r = -0.51$, $P < .01$).

**Conclusions:** There are significant differences between the visual patterns of high- and low-performing residents. High performers tend to focus their visual attention on task-relevant stimuli and appropriately ignore task-redundant stimuli. Poor performers do not exhibit these gaze patterns. These findings may allow for better characterization of expertise development in emergency medicine and may identify new potential focus points for competency assessments.

**051**

**Cracking the code: Residents' interpretations of written assessment comments**

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**Purpose:** Written comments on residents' in-training evaluation reports (ITERs) can be reliably interpreted by faculty. Yet if residents don't interpret comments in the same way, their educational value may be lost. We explored residents' interpretations of written assessment comments using mixed methods.

**Methods:** Twelve postgraduate (PGY) 2 residents in internal medicine rank-ordered a set of unknown PGY-1s based solely on ITER comments. Each PGY-1 was ranked by 4 PGY-2s, and generalizability theory was used to assess interrater reliability. PGY-2s were interviewed about their rank-ordering process, how they made sense of the comments, and opinions on ITERs in general. Interviews were analyzed using constructivist grounded theory.

**Results:** Across 4 resident judges, $G = 0.84$. Single-judge $G = 0.56$. Resident rankings correlated extremely well with faculty rankings ($r = 0.90$). Residents were equally adept at reading between the lines to construct meaning from the comments, using language cues similarly reported for faculty. In the interviews they discussed their struggles to interpret vague language and provided thoughts on why they think it occurs (time, discomfort, memorability, and the permanency of written records). They emphasized the importance of face-to-face discussions, the relative value of comments over scores, staff-dependent variability, and perceived purposes and value of ITERs. Residents saw value in the opportunity to review comments in aggregate.

**Discussion/Conclusions:** Residents understood the hidden code in assessment language. Their ability to rank-order residents based on comments alone matched that of faculty. Residents perceived value in seeing aggregated comments, and accepted staff-dependent variability as a reality. This supports the current trend toward accepting narrative comments and subjectivity in assessment.

**052**

**The hidden value in written assessment comments: A quantitative reliability analysis of qualitative data**

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**Purpose:** In-training evaluation reports (ITERs) are the predominant methods of assessment in internal medicine (IM) residency. Most of the focus is on their numeric scores, yet the written comments can provide a rich source of data. Our main goal was to determine the reliability of using full year versus early year commentary to distinguish between residents in 2 cohorts.

**Methods:** ITER comments were collected on 2 cohorts of postgraduate year (PGY) 1s in IM at the University of Toronto (n = 48 and 46). Packages of comments from 15–16 PGYs from both 1 full year and from the first 3 months were collated and were rank-ordered by 24 faculty internists external to our institution. Each resident was ranked by 4 faculty. Generalizability analyses were conducted using G_string.

**Results:** For the full year of comments, reliability coefficients averaged across 4 raters were G = 0.85 and G = 0.91 for cohorts 1 and 2, respectively. For a single rater, values were G = 0.60 and G = 0.73. When only the first 3 months of comments were used single-rater reliabilities remained high at G = 0.66 and G = 0.60. Comparable G coefficients for the numeric scores were between 0.08 and 0.19. A decision study for 2 raters and 3 months of comments showed reliability coefficients of G = 0.80 and G = 0.75.

**Conclusions:** Using narrative comments alone to discriminate between residents can be extremely reliable even after just the first 3 months. This can provide a way to assist residents in difficulty early on, with the advantage (as compared to numeric scores) of offering insight into what needs to be improved.

**053**

**Revising the in-training evaluation report (ITER) to improve its utility**

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**Introduction:** The ITER is used in residency programs globally for both formative and summative purposes. Despite much research on ITERs, the relationship between number of rating scales and ITER quality is unclear. The purpose of this study was to evaluate reducing ITER length on quality of feedback and internal consistency.

**Methods:** The University of Alberta Internal Medicine Residency program uses a 35-item ITER in each of its rotations. Using a consensus approach with members of the Division of General Internal Medicine (GIM), we reduced the ITER to 14 items capturing broader competencies. The shortened ITERs were used at 2 GIM sites with the longer version used at 2 other sites. Data from the first 8 months were deidentified for analysis. Three faculty members rated each ITER using the 5-point Completed Clinical Evaluation Report Rating (CCERR) scale, a published tool for evaluating the quality of completed ITERs. For the CCERR ratings, intraclass correlation was used for interrater reliability, and $t$ tests were used for differences in mean scores. Cronbach's alpha was used to assess internal consistency of the long and short ITER.

**Results:** The interrater reliability was good at 0.76. The mean CCERR scores were 3.1 and 3.8 for the long and short ITERs, respectively ($t$ test $P < .001$). The internal consistencies of the long and short ITERs were 0.98 and 0.97, respectively.

**Conclusions:** A substantially shortened ITER improved quality of feedback, without decreasing in reliability. The high reliability suggests rater issues, form/scale issues, and/or that the ITER could be further shortened.

**054**

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

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**Purpose:** Much of the literature investigating the challenges associated with completing high-quality work-based assessments (WBAs) have raised concerns over the appropriate documentation of assessments for underperforming trainees. The purpose of this study was to examine the relationship between resident performance and the quality of assessments documented on Daily Encounter Cards (DECs), a form of WBA commonly used in shift-work settings. The effect of trainee proximity (ie, on-service versus off-service status) on this relationship was also examined.

**Methods:** A series of DECs from the Department of Emergency Medicine at the University of Ottawa were scored by 2 raters using the Completed Clinical Evaluation Report Rating (CCERR), a previously validated 9-item measure of DEC quality. A proxy measure of resident performance was calculated by averaging scores across items on each DEC to produce a "mean DEC rating." Linear regression analysis was conducted to determine the relationship between "mean DEC rating" and CCERR score. Separate linear regressions were conducted for DECs completed for on-service and off-service residents.

**Results:** Linear regression analysis demonstrated a significant inverse relationship between mean DEC rating and CCERR score ($P < .001$, r = –0.18). This inverse relationship was observed in the on-service group ($P < .001$, r = –0.24) but not in the off-service group ($P = .62$, r = –0.05).

**Conclusions:** Resident performance and trainee proximity are important factors impacting the quality of documented clinical performance assessments. Greater attention should be given to determining ways of improving the quality of assessments reported for off-service residents as well as for residents who are appropriately progressing in their clinical competence.

**Contextualizing work-based assessments of faculty and residents: Does the environment have an impact?**

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**Introduction:** Competence is bound to context, yet the environment is seldom explicitly considered in assessments. We explored (1) faculty and residents' perspectives of the environment during internal medicine clinical teaching unit (CTU) rotations; (2) the extent that faculty and residents accounted for environmental factors in their assessments; and (3) the relationship between factors and assessments.

**Methods:** From July 2014 to June 2015 residents (n = 174) and faculty (n =54) across 6 teaching hospitals at 1 university rated their CTU environment using a novel Practice Environment Rating Scale (PERS) matched by rotation block and hospital site over 12 rotations. PERS data were paired to faculty in-training evaluation reports (ITERs) of residents supervised during the block, and to residents' Resident Assessment of Teaching Effectiveness (RATE) scores of the same faculty. Differences between perception and impact on assessment were tested using ANOVAs and correlations, respectively.

**Results:** Residents rated the CTU environment more positively than faculty (3.91/5 versus 3.29; $P < .001$; $d = 0.5$). Residents were less likely to take environmental factors into account when assessing faculty (2.70/5) than vice-versa (3.40; $P < .0001$; $d = 1.2$). On subscales of the PERS, residents' ratings of Busyness correlated negatively with RATE scores of faculty ($r = –0.23$, $P = .0001$); conversely, faculty's ratings of Busyness did not correlate with ITER scores of residents. Faculty overall PERS scores correlated with ITER scores for intrinsic CanMEDS roles ($r = 0.23$, $P < .01$).

**Conclusions:** Residents and faculty perceived the same environment differently; these perceptions had small but significant effects on assessment. Understanding the interplay between context and assessment is essential to developing valid judgements about competence.

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

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**Purpose:** Barriers to completing high-quality work-based assessments include relational factors such as the episodic and fragmented interaction that often exists between clinical supervisors and trainees. In an effort to increase supervisor-trainee continuity in the Department of Emergency Medicine at the University of Ottawa, Clinical Teaching Teams (CTT) were created in which a resident and clinical supervisor work matched shifts together throughout the year. The aim of this study was to determine the impact of increased supervisor-trainee continuity on the quality of assessments documented on Daily Encounter Cards (DECs).

**Methods:** DECs completed by 20 clinical supervisors were sorted into 3 groups representing differing degrees of supervisor-trainee continuity (ie, supervisor with CTT emergency resident, non-CTT emergency resident, or off-service resident). DECs were scored using the Completed Clinical Evaluation Report Rating (CCERR), a previously validated 9-item quantitative measure of DEC quality. Mean scores between the continuity groups were analyzed using a univariate ANOVA.

**Results:** Mean CCERR scores for the CTT (21.0, SD = 5.8), non-CTT (21.9, SD = 4.2), and off-service (20.7, SD = 4.0) groups differed ($P = .019$). A statistically significant difference in means between the non-CTT and off-service groups was observed ($P = .04$); however, the magnitude of this difference was small (partial eta-squared = 0.03) and not educationally significant. The number of encounters between supervisor and trainee did not have a significant effect on CCERR scores ($P = .43$).

**Conclusions:** Increasing supervisor-trainee continuity alone did not result in higher quality assessments of clinical performance. Additional research focusing on the educational alliance between supervisor and trainee may hold greater promise.

**Feedback credibility in a formative postgraduate OSCE: Effects of examiner type**

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**Introduction:** Studies indicate that learners' perspectives are key determinants of feedback effectiveness. Previous data from our objective structured clinical examination (OSCE) suggested that residents perceived feedback by faculty as more credible than from standardized patients (SPs), and indicated generalist faculty feedback was more credible compared to subspecialists. The present study was designed to systematically examine how residents perceive credibility of feedback from SPs compared to faculty examiners, and whether feedback credibility is higher for faculty examiners' whose subspecialty is congruent with station content compared to faculty who are generalists or subspecialty incongruent.

**Methods:** During a formative, 5-station internal medicine OSCE, residents received immediate feedback from faculty examiners or from SPs. For clinical scenarios, each resident received feedback from at least 1 specialty congruent and 1 specialty incongruent faculty. Residents were randomized to receive feedback from SPs or faculty for communication stations, with feedback controlled for content. After the OSCE residents rated perceived credibility of feedback providers. Results were analyzed through multivariable linear regression.

**Results:** A total of 197 residents, 36 faculty, and 12 SPs participated. For communication stations, credibility of faculty feedback was significantly higher than SP-provided feedback (6.3 versus 5.4/7, $P < .0001$). For scenario stations, feedback credibility was higher for congruent subspecialists compared to non-congruent subspecialists (6.6 versus 6.0/7, $P < .001$) and generalists (6.6 versus 6.4/7; $P < .001$).

**Conclusions:** Faculty specialty congruency with station content led to higher feedback credibility. Communication skills feedback from faculty was perceived as more credible by residents than feedback from SPs. These results support a significant effect of perceived expertise on credibility of feedback, which warrants further study.

**058**

Exploring the evolving concept of "patient ownership" in the era of resident duty hour regulations

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**Introduction:** While the concept of "patient ownership" is a central aspect of medical professionalism, especially in the discourse on duty hour reform, it has never been well defined in the literature. The goal of this study is to understand how stakeholders define the concept of patient ownership and what factors are perceived to influence it.

**Methods:** We conducted a secondary thematic analysis of interview transcripts collected as part of a previous study more broadly concerned with the impact of duty hour reform on professionalism. Eighteen residents and 12 faculty internists at 1 university center participated in the original study.

**Results:** Having patient ownership is generally viewed as showing personal concern about patient's well-being and outcome beyond the boundaries of duty hours. A number of factors facilitate formation of patient ownership, including having both the right and the competence to make patient care decisions, and having adequate knowledge about patients, which in turn depends on effective information transfer across shifts. On the other hand, limited contact with patient and family, mental or/and physical exhaustion, and unclear assignment of responsibilities are thought to be barriers to development of patient ownership. Variability in expectations of what residents are responsible for can lead to divergent performance standards for patient ownership.

**Conclusions:** To maintain patient ownership across shift boundaries, one must provide residents with training on effective sign-over, learning and working environments that minimize mental and physical exhaustion, support and empowerment in making patient care decisions, as well as frequent clarification of responsibilities and expectations.

**059**

**Time is of the essence: What do internal medicine residents do while on duty?**

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**Background:** Resident duty hours and workload are a major focus in junior physician training. With new duty hour systems being proposed, it is important to first determine what residents do while on duty to see how we can optimize workflow.

**Objectives:** To determine how internal medicine residents allocate their time while on duty on an inpatient clinical teaching unit.

**Methods:** Internal medicine residents from 2 tertiary care sites were shadowed on the inpatient unit during 6-hour blocks of time during the day, on call, and weekend shifts. All resident activities were tracked using an iPad application that recorded the type of task and duration of each task.

**Results:** From June through August in both 2013 and 2014, residents were shadowed and timed on all tasks completed. Distribution of time spent in each category is as follows: direct patient care (18.7%), communication (23.2%), personal tasks (15.4%), documentation (13.9%), education (11.0%), transit (6.1%), indirect care (10.5%), administration (0.67%), and non-physician tasks (0.47%). Residents overall spent 9.3% of time in presence of patients.

**Conclusions:** This study demonstrated the feasibility of a time motion software application to facilitate workflow analysis as well as to determine the impact of new restrictions on resident duty hours. Our study demonstrated the additional as value of observer insights about serious or recurrent issues around resident confidence or patient safety. This data will be used to optimize resident education, physician-patient relationships, and reduce the risk of adverse events related to extraneous duty hours.

**060**

**Duty hour restrictions negatively impact motivators for surgical resident learning**

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**Introduction:** Motivation is vital for learning and intrinsic motivation has been linked to many educational benefits, such as enhanced knowledge retention and increased perseverance. Recently, duty hour restrictions (DHRs) have drastically altered the resident training experience. Neither quality of motivation nor the impact of DHRs on training motivation have been studied in surgical residents. We sought to clarify these issues.

**Methods:** Semistructured interviews were conducted with 10 university-affiliated general surgery residents at all levels of training. Participants were selected by stratified sampling and were recruited until response exhaustion was achieved. Open-ended questions were developed by committee to maximize exploration of the target topics and minimize redundancy. The responses were analyzed using grounded theory.

**Results:** Residents largely endorsed intrinsic motivators as reasons they sought mastery and persevered despite hardship, such as interest in their chosen specialty, enjoyment from working in a team, and satisfaction from making independent decisions. Achieving operative competence and providing patient care were most often cited as the greatest sources of motivation for surgical training. Feeling underappreciated and perceiving a lack of progression in technical skills were most often cited as demotivating. When asked specifically about DHRs, these were overwhelmingly viewed negatively by residents. DHRs were most frequently described as leading to fragmentation of teamwork, decreased operative exposure, and decreased patient ownership.

**Conclusions:** Surgical residents are largely driven by intrinsic motivators, and DHRs have negatively impacted several key elements that enhance motivation. These findings may inform resident scheduling decisions to improve motivation among surgical trainees.

**The unintended consequences of duty hour restrictions: Effect on residents' education**

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**Introduction:** In 2011, additional restrictions limiting continuous duty hours were imposed over the 80-hour weekly limit that governs residents training in Quebec. These restrictions raised concerns over the delivery of surgical education, including resident participation in mandatory academic activities. This study aims to describe the effect of the new restrictions on residents' participation in mandatory academic activities in 2 major academic general surgery programs in Montréal.

**Methodology:** A retrospective review comparing residents' attendance at 4 key surgical academic activities before and after the implementation of the new duty hour restrictions. Attendance records were collected systematically by program administrators for the academic years of 2009–2010 (before) and 2013–2014 (after). Comparative analyses were performed using independent sample *t* tests. A supplementary online survey was sent to all general surgery residents affected by the new rules in both institutions.

**Results:** 254 teaching sessions were included from both institutions. Attendance significantly decreased in all 4 key surgical academic activity by 5.7%–23.4% ($P < .02$) in 2013 compared to 2009. Out of 66 residents, 59 residents (90%) responded to the online survey. Survey results identified duty hour restrictions as the main reason for missing teaching activities, followed by the presence of other more relevant educational opportunities and the perceived suboptimal quality of the teaching activity.

**Conclusions:** The noted decline in residents' participation in educational activities is partly attributable to the loss of flexibility in duty hour rules. Surgical teaching schedules and methods need to be reevaluated in light of the current restrictions.

**062**

**What are the sleep patterns of residents?**

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**Introduction:** Decisions regarding resident work hours and fatigue management should be based on accurate information. Most data on resident sleep are from retrospective sleep logs, an inaccurate method. This study's purpose was to objectively define sleep patterns of residents through a method known as actigraphy. We hypothesize that residents are getting less sleep than other Canadians and sleep is further decreased when on call.

**Methods:** This was a cross-sectional cohort study. Sleep patterns of the participants were recorded for 2 weeks using sleep logs and actigraphy monitors, devices which determine sleep patterns through measuring movement and light. Statistical analysis included $t$ tests and linear regression.

**Results:** Participants from the University of Calgary orthopaedic (21) and pediatrics (5) residency programs were recruited. Residents had decreased average sleep (M = 4.9 hours, SD = 3.1 hours) compared to the national age and sex matched norms (M = 8.1 hours, $P$ = .00001). Residents total sleep on call was 0.89 hour less ($P$ = .02) than their baseline sleep duration. Orthopaedic residents get 2.3 hours less sleep than pediatrics residents ($P$ = .00001). Regression demonstrated that medical programs and increased postgraduate year were both correlated with increased sleep.

**Conclusions:** Residents get less sleep than the general population and sleep is decreased almost another hour when residents are on call. Orthopaedic residents get 2.3 hours less sleep per night on average than their pediatrics colleagues. Factors that influence sleep include the type of program and postgraduate year. This study gives accurate information on residents' sleep patterns and demonstrates a reliable way to measure it.

**Just-in-time simulation training to improve clinical, procedural, and non-technical skills: A randomized controlled study**

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**Introduction:** Just-in-time simulation training, or training conducted proximal to clinical events within the clinical environment, has been shown to improve performance for some procedural skills. We aimed to determine whether a simulation-based just-in-time training session targeting cardiopulmonary resuscitation (CPR) quality and medication administration improves learners' performance during in situ interprofessional mock code blue simulations, with regard to (1) the pretrained tasks and (2) team-based non-technical skills.

**Methods:** Forty teams of nurses and pediatrics residents participating in interprofessional mock codes were randomized to (1) a 25-minute simulation-based just-in-time training session, occurring within 3 hours of the code, targeting CPR quality and medication administration; or (2) no pre-training. Participants then performed as members of a pediatric resuscitation team during an in situ mock code blue simulation on an inpatient ward. During each code team-based non-technical skills were measured by blinded observers using the Team Emergency Assessment Measure scale. Secondary outcomes included CPR quality and medication errors.

**Results:** Twenty-one of 40 planned simulations have occurred to date. Teams randomized to just-in-time training (10 teams, 70 participants) had significantly better team-based non-technical skills during the mock codes ($P < .05$) as compared to no training (11 teams, 80 participants). Additionally, they displayed fewer medication administration errors and superior CPR chest compression depth ($P < .05$).

**Conclusions:** Just-in-time training targeting core clinical skills can be used to enhance in situ simulation-based learning of teamwork skills, thus potentially leading to improved quality and safety of care. Pretraining may reduce cognitive load, permitting learners to devote more cognitive capacity to teamwork.

**064**

**Teaching end-of-life communication in the emergency department through high-fidelity simulation scenarios**

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**Background:** End-of-life (EOL) care is challenged in the emergency department because of compressed timelines and necessity to care for the patient while simultaneously communicating with the family. Existing literature describes EOL training delivered in didactic sessions, workshops, or simulated encounters with standardized patients divorced from acute care. EOL communication is not addressed in the emergency medicine (EM) curriculum at the University of Toronto.

**Methods:** We implemented high-fidelity simulation training for residents on the EM rotation that required participants to manage the acute presentation while communicating with the patient's family. We developed 2 scenarios: (1) speaking to a family member by telephone while attempting resuscitation of a cardiac arrest patient, and (2) assessment and management of a lung cancer patient with severe dyspnea, including establishing goals of care with the substitute decision maker. We evaluated scenario feasibility, participants' satisfaction, and self-perceived effect on practical skills in EOL communication (measured on a 5-point Likert scale).

**Results:** Over 25 months (January 2014–February 2016), 69 postgraduate year 1 and 2 trainees participated. Most had limited previous exposure to EOL training. The overall level of satisfaction was high and the sessions positively contributed to the trainees' self-perceived knowledge on the topic (mean ± SD scores: 4.44 ± 0.62 [scenario 1]; 4.22 ± 0.68 [scenario 2]).

**Implications:** We conclude that high-fidelity simulation can be used to teach EOL communication in the acute care environment. Our novel simulations were feasible and well-received. Effects on actual resident performance and family satisfaction should be evaluated.

**065**

**To sim or not to sim: Choosing Wisely for procedural skills training**

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**Background:** The Royal College of Physicians and Surgeons of Canada (RCPSC) Pediatric Objectives of Training (OTR) include 30 procedures in which residents must become competent. Due to reduced training hours and variable clinical exposure, simulation is increasingly used to provide training opportunities. Given the resources required for effective simulation training, selecting the skills taught via this modality requires careful consideration. Using survey methodology, we explored which skills are best suited to simulation teaching.

**Methods:** A questionnaire was administered to the Community and Hospitalist sections of the Canadian Pediatric Society requesting them to rate the importance of maintaining competence in each procedure and the frequency with which they performed each one. Mean importance and frequency of each procedure was calculated.

**Results:** Response rate was 61% (257/417), including respondents from 9 of 10 provinces and a variety of practice settings. Skills rated as high importance and high frequency were bag mask ventilation, lumbar puncture, neonatal CPR, neonatal intubation, ID specimen procurement, immunization, and ear curettage. Skills rated as high importance but low frequency were pediatric CPR, intraosseous needle insertion, defibrillation, gathering child maltreatment evidence specimens, pediatric intubation, C-spine immobilization, oral/nasogastric tube placement, tuberculin skin testing, umbilical artery/vein catheterization, and bladder catheterization.

**Conclusions:** Many skills in the RCPSC Pediatric OTR are not commonly used by practicing pediatricians, who rate them as variably important. With limited resources, training programs may focus their clinical skills training on skills that are rated both highly important and frequently performed. Those skills that are rated as highly important but infrequently performed may be ideal targets for simulation training.

**Bridging the gap: Defining objectives for a high-stakes general pediatric simulation curriculum**

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**Introduction:** Graduating pediatricians must obtain critical skills to manage acutely ill children. Training programs are building simulation into their curriculum to ensure safe and adequate exposure to these skills. Determining which objectives are best taught using simulation and will impact clinical learning the most is crucial to optimize this educational strategy and improve residents' skills in challenging cases they will encounter in practice. We engaged educators in a 2-phase study to identify objectives to include in a general pediatric residency simulation curriculum.

**Methods:** Phase 1 used the Delphi Method to survey 25 simulation experts. They rated all pediatric training objectives for their suitability in a simulation curriculum. Retained objectives were used in Phase 2 to survey pediatrics content experts who rated clinical frequency, management impact, and confidence for each of the objectives retained after Delphi consensus, in order to understand their relative clinical importance.

**Results:** Eighty percent of participants reached consensus after 3 rounds of the Phase 1 Delphi, with 134 of 240 objectives being kept. Phase 2 had a 49% response rate, including representation of every Canadian center. Interclass correlations, cluster, and subgroup analyses combined results from the 2 phases, identifying 24 medical expert, 11 skills, and 5 crisis resource management objectives to be included in the final curriculum.

**Conclusions:** This multi-modal research design applies to other programs who wish to combine simulation, content, and stakeholder expertise to address critical, clinically relevant knowledge gaps with simulation curriculum.

**067**

**3D printed pediatric difficult airways—a novel method for teaching anesthesia residents**

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**Introduction:** The management of congenital difficult airways in children poses unique challenges to anesthesiologists and their trainees. These cases are often by very experienced anesthesiologists who use advanced technics including flexible fiber optic intubation, and are still presented with challenging clinical scenarios. A small proportion of these patients have required "crash" tracheotomies due to failed mask ventilation or even failed fiber optic intubation. We sought to use a case to create a 3D print of a difficult airway to evaluate for education. The creation of virtual 3D models is feasible and needs more work to identify processes that can efficiently replicate the process to yield good models for both virtual 3D and 3D printing.

**Methods and Outcomes:** After obtaining patient and parental consent we used old images previously obtained from a 3D helical CT at 2.5 mm of the pediatric airway from apex of skull to C5. Segmentation was done with Amira Visualization RT using Thresholding and Gaussian techniques for the initial 3D model creation. Smoothing done both manually and with embedded Smoothing algorithms. Isolation of the upper airway and hyoid was accomplished resulting in a printable model of a difficult airway.

**Conclusions:** Our work creates a library of 3D airways for use in future prospective studies assessing teaching/clinical outcomes from the use of these models. We discuss the challenges faced during the use of such technologies.

**068**

**Preparing for examinations and beyond: Utilizing collaborative eLearning for senior psychiatry residents**

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**Introduction:** Final-year residents contend with competing priorities of preparing for licensing examinations, honing the non-Medical Expert CanMEDS skills needed for independent practice, and developing the habits of lifelong learning, all while working busy clinical rotations. E-learning may provide a platform in which these priorities may be attained in a time-efficient manner. Utilizing a learning management system (LMS), we developed an online course for final-year residents to work collaboratively on clinical cases and develop these skills.

**Methods:** We piloted an online course with the primary objective of increasing residents' sense of preparedness prior to licensing examinations, also hoping the course would enhance residents' non-Medical Expert skills and reinforce habits of lifelong learning. Using a LMS, 3 cases were revealed to final-year residents on a monthly basis. Residents identified personal knowledge gaps related to the case; over the next week, they would study this area and post what they had learned, with resources, to an online discussion forum, where the content was read and commented on by a case facilitator and their resident colleagues. After this feedback, residents would refine or further explore their study area and post again to the forum. Each case concluded with a face-to-face debriefing session of the residents and case facilitator. Analysis used questionnaires, interviews, and coding of forum content according to CanMEDS roles.

**Conclusions:** Participants felt the course was helpful preparation for examinations and future practice, and review of forum content indicates non-Medical Expert roles, including Communicator and Advocate, were demonstrated by participants.

**#CGS2015: Enhancing the conference experience through social media. An evaluation of Twitter use at the annual scientific meeting of the Canadian Geriatrics Society**

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**Introduction:** Twitter is a microblogging application utilized for medical education and communication. Tweeting at scientific conferences enables international networking, resource sharing, and critical appraisal. This study evaluates and describes participation, content, and impact of the live Twitter stream at the 2015 Canadian Geriatrics Society annual scientific meeting (CGS2015). This is the first analysis of Twitter applications for geriatric medicine conferences.

**Methods:** Twitter transcripts of #CGS2015 were obtained from Symplur and analyzed for content, impressions, and participant demographics. The analysis period extended from 1 week prior to 3 days after the conference. Qualitative data on participants' opinions were obtained by questionnaire. TweetReach provided transcripts of #CGS2014 for growth analysis.

**Results:** There were 1491 total #CGS2015 Tweets. Tweet content was categorized as follows: conference sessions (38.8%), networking (29.2%), resource sharing (17.6%), and conference promotion (14.3%). Of the 279 participants, 60% were non-Canadian. The study authors and CGS accounts were responsible for 18% of Tweets. Through questionnaire data, participants emphasized the value of Twitter in facilitating collegial interactions and providing insight into sessions not attended live. The most cited drawback was divided attention. Analysis from #CGS2014 to #CGS2015 revealed increases in total participants, Tweets, and impressions.

**Conclusions:** Twitter engagement at CGS2015 enabled international participation in online discussions of conference-specific sessions, resource sharing, and networking. The efficacy of Twitter in complementing geriatric medicine conferences is supported by the growth of Tweeting between #CGS2014 and #CGS2015. Future conferences may benefit from workshops teaching Twitter basics and implementing strategies to minimize stigmas when participants use handheld technology.

**070**

**Video monitoring and feedback in laparoscopic simulation**

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**Background:** Awareness of posture and ergonomics is lacking in many surgeons performing laparoscopy. No randomized study has shown the usefulness of videography feedback. This is a randomized prospective study of videography feedback in a laparoscopic simulation laboratory.

**Methods:** Medical students were provided an introductory laparoscopic teaching session. They returned after 3 weeks to assess their skills in peg transfer and randomized into videography and non-videography groups. The videography group reviewed their individual video before performing the timed task at the interval assessment. The time difference was calculated between interval and initial times. Univariate and multivariate analyses were performed.

**Results:** Each of 47 participants had initial and interval assessment times recorded. Age and gender were similar. Gender did not influence time difference ($P$ = .66). The mean time improvement for the videography and non-videography group trended toward significance (mean = 32.13 /- 3.8, and 22.79 /- 3.8 seconds respectively; $P$ = .09). There was a significant correlation between participating in more than 2 laparoscopic cases and time improvement ($P$ = .008) and a strong association between initial time and improvement ($P$ < .001). There was significant correlation between being in the videography group and time improvement ($P$ = .04) in a model that included initial time and number of laparoscopic cases. The model predicted better improvement by 7.92 seconds for the video group.

**Conclusions:** The group receiving video postural feedback was able to perform the timed task faster. Video feedback increases the efficiency of laparoscopic teaching and is a useful tool in laparoscopic training.

**071**

**Using smartphone voice memos to scaffold residents' self-reflection in the workplace**

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**Introduction:** Research suggests that residents require feedback on the content and processes of their reflective thinking in order to develop this skill over time. Yet residents often have very little time to practice systematic and critical self-reflection given the constancy of patients and related workplace responsibilities. Consequently, valuable opportunities to consider past actions and consequences may be lost. Built-in voice memo applications on smartphones can provide residents with an accessible and timely means of recording details about residents' important learning moments for later in-depth reflection.

**Methods:** Over a 1-month period, 11 family medicine residents (5 PGY-1s, 6 PGY-2s) each recorded a series of 10 voice memos describing (1) patient care situations that made them feel uncertain in practice; (2) the resources they consulted to manage their uncertainty; and (3) reflections on the quality of their learning. Upon completion of each voice memo, residents e-mailed the audio file directly to a research assistant who provided timely feedback on the quality of residents' reflections about their learning moments. Depending on the depth of their reflection, residents were asked to respond to brief follow-up questions or to apply the feedback they received to subsequent reflections.

**Conclusions:** Voice memos appear to provide a convenient and valuable method for residents to record self-identified gaps in knowledge, skills, and competence along with directions for future learning. Electronically sharing voice memos with knowledgeable others (eg, preceptors) presents opportunities for residents to receive timely feedback on the quality of their self-reflection and guidance to direct future learning opportunities.

**Teaching intubation? The scope on airway apps—a critical analysis**

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**Background/Purpose:** Airway management is a core skill in anesthesia ensuring adequate oxygenation and delivery of inhalational agent for the patient. The purpose of this study was to critically evaluate the quality of airway management apps and targeted revised Blooms Taxonomy cognitive levels.

**Methods:** An electronic search using the keyword "airway" was conducted in May 2015 across the App Store, Android, Windows Phone Store) and Blackberry (Blackberry App World). Apps were included in the study if their content was related to airway management. App content/characteristics were extracted into a standard form and evaluated.

**Results/Observations:** A total of 65 apps met the inclusion criteria. 73% of apps were developed by companies/industry. Anesthesiology trainees were the target audience in only 20% of apps. Bag mask ventilation/laryngeal mask airways were covered in only 20% of apps. Only 2 apps were supported in the scientific literature. For Bloom's taxonomy, 37% (24) of apps targeted knowledge, 5% (3) comprehension, 22% (14) application, 28% (18) analysis, 9% (6) evaluation, and 0 synthesis. Multivariate analysis identified cost of apps, size of apps (MB), and apps targeting trainees and paramedics to be associated with higher levels of cognitive processing of revised Bloom's Taxonomy.

**Conclusions:** Apps developed for teaching intubation target lower levels of cognitive processing and are largely not validated by research. Cost, app size, and targeted user are associated with higher cognitive levels. Trainees and all users should be aware of the paucity of the published evidence behind the efficacy of some of these apps.

**074**

**"Why don't you look that up?" versus "collaborative self-directed learning": the impact of residency context on self-directed learning**

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**Introduction:** Attaining competence during residency training requires self-directed learning (SDL). Previous research has focused on SDL process and personal characteristics. However, there is a growing need to understand the SDL context. We explored SDL context during residency to characterize the role of faculty and programs in supporting resident SDL.

**Methods:** Sensitized by previous SDL concepts, we used constructivist grounded theory to explore SDL concepts in residency. We conducted 7 focus groups (FG) with 46 internal medicine residents. FG guides were developed from literature and expert review. A trained facilitator moderated the FGs, which were transcribed verbatim. Transcripts were reviewed using open coding and analytic memos to guide subsequent FGs. Constant comparison and axial codes revealed themes related to SDL context.

**Results:** Residents elaborated on the roles of faculty and the program in guiding their SDL. Most of their learning was self-directed, but the lines between SDL and other directed learning (ODL) were blurred, and ODL was often a launching point for SDL. Residents preferred the use of "collaborative SDL" where faculty members model SDL versus the "Why don't you look that up?" approach. Residents suggested how faculty and residency programs could provide guidance to the process of and personal characteristics affecting SDL.

**Conclusions:** SDL is viewed as an internal orientation to learning that incorporates process and personal characteristics, like motivation. Understanding the learning context demonstrates the importance of external guidance for SDL. This study defines the borders of context and process to assist residency programs in creating a culture of SDL.

**075**

**Learn to ask: Using a flipped classroom model with group versus individual objective generation to teach residents goals of care discussions**

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**Introduction:** A flipped classroom model, which provides content for learners to review in advance, enables higher-level engagement and application of material. However, it is unclear whether individual versus group objective generation results in improved performance and retention of skills. Accordingly, we tested if individualized versus group objective generation would produce greater change in internal medicine (IM) residents' subsequent performance in a simulation-based academic half-day (AHD) on goals of care (GOC) communication.

**Methods:** A flipped classroom model was used to develop a simulation-based AHD for first-year IM residents. Residents (n = 23) were provided written and video-based resources prior the session and randomized to 2 groups: (1) individual objective generation, or (2) group objective generation. Objectives were submitted prior to the session. Residents rotated in small groups through 5 different GOC communication stations involving role play with standardized patients and expert feedback. Performance was evaluated using a standardized 9-point OSCE scale. Qualitative assessment of resident preparation and satisfaction were obtained.

**Results and Conclusions:** There were 12 participating residents allocated to group objective generation and 11 to individual objective generation. There was a trend toward higher OSCE scores in the group objective generation arm (6.83 ± 1.26 versus 5.9 ± 1.86, $P$ = .19). In their qualitative feedback, residents in both groups reported increased self-confidence in conducting GOC discussions. This study suggests that group objective generation may be an effective technique to maximize the educational value of a flipped classroom model in a time-constrained residency environment; however, further research is required to confirm our findings.

**Should learners reason 1 step at a time? A randomized trial of 2 diagnostic scheme designs**

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**Introduction:** Making a diagnosis can be difficult for learners as they must integrate multiple clinical variables. Diagnostic schemes can help learners with this complex task. The current literature does not identify whether scheme layouts should guide learners to reason 1 step at a time in a branching layout or weigh multiple variables at a time in a chart layout. We compared diagnostic accuracy, errors, and cognitive load using 2 scheme layouts.

**Methods:** Focused on the task of identifying murmurs on Harvey, a cardiopulmonary simulator, 86 internal medicine residents used 2 scheme layouts. The terminally branching scheme organized the information into single variable decisions. The hybrid scheme combined single variable decisions with a chart integrating multiple distinguishing features. Using a crossover design, participants completed 1 set of murmurs (diastolic or systolic) with either the terminally branching or the hybrid scheme. The second set of murmurs was completed with the other scheme. A repeated measures MANOVA was performed to compare diagnostic accuracy, errors, and cognitive load.

**Results:** There was a main effect of the scheme layout (Wilks' $\Lambda$ = 0.841; F3, 80 = 5.1; $P$ = .003). Use of a terminally branching scheme was associated with increased diagnostic accuracy (65% versus 53%, $P$ = .02), less errors (0.61 versus 0.98 errors, $P$ = .001), and lower cognitive load (3.1 versus 3.5/7, $P$ = .023).

**Conclusions:** The terminally branching scheme was associated with improved diagnostic accuracy, less errors, and lower cognitive load, suggest that this layout is effective for teaching complex tasks and improving diagnostic accuracy. These findings inform the design of schemes and other clinical decision aids.

**077**

**Video coaching as an efficient teaching method for surgical residents: A randomized controlled trial**

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**Background:** As surgical training is evolving and operative exposure is decreasing, new effective experiential learning methods are needed to ensure surgical competency and patient safety. The aim of this trial was to evaluate the effectiveness of video coaching in enhancing surgical technical skills in surgical residents.

**Methods:** In this randomized controlled trial conducted at a single teaching hospital, participating residents were filmed making a side-to-side intestinal anastomosis on cadaveric dog bowel for baseline assessment. The Surgical Video Coaching (SVC) group then participated in a 1-on-1 video playback coaching and debriefing session with a surgeon, where constructive feedback was given. The control group went on with their normal clinical duties without any coaching session. All participants were then filmed making a second intestinal anastomosis, which could be compared to their first using a 7-category validated technical skill global rating scale (OSATS) going from 7 to 35. A single independent surgeon who did not participate to the SVC reviewed all videos. A satisfaction survey was then sent to the residents in the coaching group.

**Results:** 28 residents were randomized and completed the study. After intervention, the SVC group (n = 14) significantly increased their OSATS score on a global rating scale (mean of differences = 3.36; [1.09–5.63]; $P$ = .007) compared to the control group (n = 14; mean of differences = 0.29; $P$ = .76). All residents agreed or strongly agreed with the fact that video coaching was a time-efficient teaching method.

**Conclusions:** Video coaching is an effective and efficient teaching intervention in improving the technical skills of surgical residents.

**078**

**What are residents paying attention to? An exploratory study of attention and engagement during academic half-day**

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**Background/Purpose:** Academic half-days (AHDs) are regular teaching events that occur outside of bedside care. As focus shifts toward competency-based education and restricted duty hours, AHDs are an increasingly important avenue for delivery of the formal curriculum. However, pedagogical barriers to trainee engagement exist, including session length (3 to 5 hours), the lack of formal training for presenters, and a singular approach to content delivery (didactic). The purpose of this exploratory study was to examine resident attention and engagement during AHDs as a first step toward optimizing AHD design and delivery.

**Methods:** Independent observers were sent to record events during weekly AHDs in obstetrics-gynecology. Presenter content, presentation style, and perceived attentiveness of trainees were recorded at 5-minute time intervals.

**Results/Observations:** On average, residents were either somewhat or completely inattentive at about a quarter (26%) of the time. Inattention during sessions ranged from 18% up to as high as 37%. Individual differences in attention between residents also displayed a substantial range, with some residents completely attentive during sessions and some residents displaying signs of inattention up to 78% of the time. There appeared to be a relationship between participants' level of engagement and the lecturer's teaching approach.

**Conclusions:** Even among a group of learners expected to be self-motivated, inattention and disengagement from the lecture is relatively common. Sacrificing the rigid structure of the presentation to allow for a greater discussion on the topic can produce more attentive participants.

**079**

**Feedback and the oral case presentation in internal medicine: Are we doing enough?**

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**Introduction:** The Oral Case Presentation (OCP) is a fundamental activity in routine medical practice, used in patient care and medical education in part due to feedback from supervisor to trainee. This study explores the existing gap in the literature regarding internal medicine clinicians' perceptions of feedback as it relates specifically to the OCP, and the factors influencing feedback delivery to learners during the encounter.

**Methods:** Eight semistructured interviews with internal medicine physicians, varying in age, gender, and experience, were conducted. Purposive and snowball sampling was used. Interviews were conducted and coded iteratively within an exploratory constructivist framework until saturation was reached.

**Results:** Interviewees recognized feedback as an important part of the OCP, identifying that feedback can be both (1) explicit labeled feedback, and (2) informal unlabeled feedback. Many interviewees were hesitant to label feedback during the OCP encounter, labeling it as an interruption or explanation instead. Interviewees generally agreed on the components of feedback delivered directed to both content and style, in addition to noting barriers such as time constraints.

**Conclusions:** Our interviews demonstrate that feedback is occurring much more frequently than previously described, particularly in an informal unlabeled format. This is particularly reassuring in the age of competency-based medical education, where feedback holds an essential role in workplace-based assessment and promotion. Future research is needed to identify the perceptions of the OCP and feedback from the resident and medical student perspective in order to further optimize the OCP as an educational opportunity.

**080**

**Prepared to practice? An evaluation of PGME training at Oman Medical Specialty Board: graduates' perspectives**

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**Introduction:** Graduate medical education programs at Oman Medical Specialty Board have focused on improving the quality of residency training, yet little is known about how well graduates are prepared for practice. In this study, we solicited graduates' perceptions of preparedness for practice (PP), professional confidence (PC), and institutional support (IS) received.

**Methods:** This was a cross-sectional study. The Institutional Alumni Survey was distributed to 295 graduates across 18 residency programs. This was part of an outcomes evaluation study to measure impact of our programs. Constructs measured were PP (14 items), PC (4 items), and IS (2 items). Reliability scores were calculated. Calculated average scores for each item and construct were compared across specialty programs.

**Results:** Fifty-nine percent (174/295) of graduates responded. The overall survey reliability by Cronbach's alpha is 0.94. Constructs' average scores (SD) were 46.56 (7.26), 12.72 (2.29), and 5.63 (1.54) for PP, PC, and IS, respectively. The highest items of reported disagreement were relating to ability to critically evaluate research (36.2%), influence of a mentor on career choice (35.6%), and institutional support during training (31%). Average score of PP were higher among surgical residents compared to non-surgical residents ($P = .052$). There was no statistical significant difference between residency programs in PC domain ($P = 0.53$).

**Conclusions:** This first study in Oman demonstrated that despite feeling prepared for medical practice, graduates lack confidence in critically appraising literature, and lack of mentoring on their career choices. The findings should direct efforts to ensure a strong scholarly focus and career guidance.

**081**

**Perceptions of educational climate among residents at Oman Medical Specialty Board Residency Programs: A survey-based study**

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**Introduction:** Educational climate (EC) in residency is a well-recognized contributor to high-quality graduate medical education (GME). A positive EC is essential in promoting residents' learning, preventing burnout, career satisfaction, and professional development. Evaluation and improvement of the EC is key to educational institution success.

**Methods:** A validated multi-factorial questionnaire is used to measure EC at training sites of 2 Oman Medical Specialty Board training programs, internal medicine and pediatrics. The questionnaire was distributed to 165 residents at different residency levels of both programs. The survey tested 9 EC domains with 35 items in total. The mean and the standard deviation of all domains were calculated and compared using $t$ test. The analysis was carried out using SPSS 21.0.

**Results:** 110 residents responded with a response rate of 66.7%. Of the surveyed residents, 59.1% and 40.9% were from internal medicine and pediatrics programs, respectively. The majority were female residents (57.7%) and first-year residents (32.1%). The overall reliability Cronbach's alpha score was 0.92. The most positively perceived domain was resident peer collaboration (mean score of 3.72). The domain with the least positive perception was coaching and assessment (mean score of 2.68). There was no statistically significant difference in the perception of EC between both programs across all domains ($P = .50$).

**Conclusions:** This is the first reported study of the educational climate in GME in Oman. A positive perception of EC across all domains is reported. However, the coaching and assessment domain needs to be carefully studied. The results can be utilized to offer better EC for residents.

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**Chronometric pressure to bend the learning curve in surgical procedures**

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**Introduction:** Desirable difficulties improve learning transfer and retention by increasing the cognitive work of learning. We hypothesized that "chronometric pressure," in the form of a verbal prompt to increase speed, would alter the speed-quality tradeoff and thus create a desirable difficulty.

**Methods:** We conducted a single intervention interrupted time-series study enrolling surgery residents and medical students from 2 institutions. Participants completed 10 repetitions of a simulated blood vessel ligation. Placement of 2 ligatures 1 cm apart constituted 1 repetition. Between repetitions 5 and 6 we verbally encouraged participants to complete the next (sixth) repetition 20% faster than their previous (fifth) time. We timed all repetitions and measured ligature placement accuracy and tightness. We analyzed the resultant learning curves using random coefficients spline models.

**Results:** 77 participants completed the study: 16 first-year residents, 36 senior residents, and 25 medical students. Time per repetition decreased from the first (mean [SD], 39.8 [18.4]) to the last (29.6 [12.5]) repetition. Time decreased between repetitions 5 and 6 by an adjusted 8.6 seconds (95% CI 6.1–11.1) with a corresponding decrease in ligature placement accuracy and tightness. No other adjacent repetitions had statistically significant differences in any outcome. Senior residents demonstrated relatively larger decrements in accuracy and tightness when speeding up than did junior residents and medical students (more pronounced speed-accuracy tradeoff).

**Conclusions:** Chronometric pressure pushes trainees out of their comfort zone and thereby exposes areas for improvement. This effect seems particularly salient for senior residents. Impact on retention and transfer requires further investigation.

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