Research Day Abstract

Abstract Title: National Cluster-Randomized Trial of Duty-Hour Flexibility in Surgical Training


BACKGROUND
Concerns persist regarding the effect of current surgical resident duty-hour policies on patient outcomes, resident education, and resident well-being.

METHODS
We conducted a national, cluster-randomized, pragmatic, noninferiority trial involving 117 general surgery residency programs in the United States (2014–2015 academic year). Programs were randomly assigned to current Accreditation Council for Graduate Medical Education (ACGME) duty-hour policies (standard-policy group) or more flexible policies that waived rules on maximum shift lengths and time off between shifts (flexible-policy group). Outcomes included the 30-day rate of postoperative death or serious complications (primary outcome), other postoperative complications, and resident perceptions and satisfaction regarding their well-being, education, and patient care.

RESULTS
In an analysis of data from 138,691 patients, flexible, less-restrictive duty-hour policies were not associated with an increased rate of death or serious complications (9.1% in the flexible-policy group and 9.0% in the standard-policy group, P = 0.92; unadjusted odds ratio for the flexible-policy group, 0.96; 92% confidence interval, 0.87 to 1.06; P = 0.44; noninferiority criteria satisfied) or of any secondary postoperative outcomes studied. Among 4330 residents, those in programs assigned to flexible policies did not report significantly greater dissatisfaction with overall education quality (11.0% in the flexible-policy group and 10.7% in the standard-policy group, P = 0.86) or well-being (14.9% and 12.0%, respectively; P = 0.10). Residents under flexible policies were less likely than those under standard policies to perceive negative effects of duty-hour policies on multiple aspects of patient safety, continuity of care, professionalism, and resident education but were more likely to perceive negative effects on personal activities. There were no significant differences between study groups in resident-reported perception of the effect of fatigue on personal or patient safety. Residents in the flexible-policy group were less likely than those in the standard-policy group to report leaving during an operation (7.0% vs. 13.2%, P<0.001) or handing off active patient issues (32.0% vs. 46.3%, P<0.001).

CONCLUSIONS
As compared with standard duty-hour policies, flexible, less-restrictive duty-hour policies for surgical residents were associated with noninferior patient outcomes and no significant difference in residents’ satisfaction with overall well-being and education quality. (FIRST ClinicalTrials.gov number, NCT02050789.)
Abstracts longer than one page will not be accepted.

Research Day Abstract

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Principal Investigator: * Dave Lu MD, MBE
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Does this research involve women’s health? * No

Abstract Title: * Emergency Medicine Trainee Wellness is Associated with Higher In-Training Examination Scores

Background:
Resident physicians experience low levels of wellness during training. Emergency medicine (EM) trainees report some of the highest levels of burnout among all specialties. EM trainee distress is associated with higher self-reported rates of negative patient care. It remains unclear if low levels of EM trainee wellness are also associated with poorer academic performance.

Objective:
We examined the relationship between EM trainees’ levels of wellness and their American Board of Emergency Medicine (ABEM) in-training examination percentile scores. We hypothesized that lower levels of trainee wellness would be associated with lower scores.

Design/Methods:
In this cross-sectional survey study conducted in October 2015 we assessed levels of wellness among all post-graduate year 1-4 EM trainees at a single university-based residency program. Our primary measure of burnout was determined and dichotomized using the Maslach Burnout Inventory. Secondary measures of work engagement, quality of life, depression, career satisfaction and daytime sleepiness were evaluated using standard instruments. These results were compared to trainees’ 2015 ABEM in-training percentile scores via independent samples t-test and linear regression.

Results:
Thirty-six out of 54 (66.7%) eligible trainees responded to the survey, with 27 (75.0%) reporting burnout. Excluding interns without available 2015 in-training exam scores, the mean percentile score for the remaining 23 out of 54 participants was 74.6% (SD ±24.7). Burnout was significantly associated with lower exam percentile scores [66.9% vs 88.9%, 95% CI (1.20, 42.67), p=0.04]. Increased levels of work engagement [β=0.43, CI (0.78, 30.24), p=0.04] and quality of life [β=0.53, CI (0.16, 1.11), p=0.01] were positively associated with higher exam scores. Depression, career satisfaction and daytime sleepiness were not significantly associated with exam scores.

Conclusion:
Absence of burnout and higher levels of EM trainee work engagement and quality of life were associated with higher in-training exam percentile scores. We did not find significant associations between depression, career satisfaction and daytime sleepiness with in-training exam scores, but these results may have been limited by the study’s small sample size.

| Engagement, and Quality of Life |
Teaching the Teachers of Point-Of-Care Ultrasound (POCUS): Creating a checklist for an Objective Structured Teaching Examination (OSTE) for Instructors of the Focused Assessment with Sonography for Trauma (FAST) Exam

Introduction/Background: Competency in POCUS is required by the Residency Review Committee for multiple medical specialties not just limited to Emergency Medicine. As ultrasound use increases there is a need to ensure that senior residents and faculty are adept at instructing novice learners in POCUS. OSTEs focus on the teaching skills of residents and faculty and have been utilized to evaluate and enhance clinical teaching. There is a lack of literature detailing OSTE use in teaching procedures like POCUS.

Objective: We sought to create an OSTE checklist that could be used to evaluate an instructor teaching a FAST exam to a novice ultrasound learner. This OSTE is the basis for creating a curriculum for the instructor and evaluating the effectiveness of teaching the teachers of POCUS.

Methods: A panel of faculty from our institution with both POCUS and medical education expertise created a preliminary OSTE checklist after reviewing the literature. The checklist was organized into three parts: short didactics, hands-on scanning, and overall learning climate. We conducted a cross-sectional survey which was IRB exempt. We sent the draft checklist to a convenience sample of ultrasound directors for review. We asked specifically, “Is each particular point/item important for a FAST teacher to perform when instructing a novice ultrasound learner?” and the results were recorded in a binary fashion.

Results: The checklist was reviewed by 13 US directors nationally. A cutoff of 75% of respondents scoring the item as YES/KEEP was used to determine whether individual items should be kept or dropped. The final OSTE checklist reflects a total of 29 items out of the original 33 draft items (Table 1). Creation of a FAST OSTE will facilitate the development and evaluation of curriculum specifically designed for the instructors of POCUS starting with the core application of the FAST exam.
Preliminary evaluation of a laparoscopic common bile duct simulator for the training of pediatric surgery fellows

Purpose: Mirroring the overall trend in childhood obesity, the incidence of biliary disease has been increasing in the pediatric population. Laparoscopic common bile duct exploration (LCBDE) has demonstrated its value at decreasing costs and hospital length of stay when used as primary treatment for choledocolithiasis in the adult patient. Despite this, overall utilization of the LCBDE procedure remains low. Successful use of the technique requires a high-level of cognitive and technical skills. Most institutions lack adequate training opportunities outside of the operating room for pediatric surgery fellows. In order to address this gap in training, we employed an existing LCBDE simulator previously validated for use in training general surgery residents the necessary skills to perform LCBDE in the adult patient. In this study, we evaluated the simulator’s training value for pediatric surgery fellows.

Methods: During a recent pediatric surgery fellows training course, thirty-one participants were asked to perform a transcystic LCBDE using a validated simulator. At the conclusion of the course, the participants completed a self-reported 26-item instrument consisting of 25 4-point rating scales (from 1 = not realistic to 4 = highly realistic) and a one 4-point Global Rating Scale. Participants also self-reported their LCBDE self-efficacy, scored from 1 (Not comfortable) to 3 (Very comfortable). Validity evidence relevant to test content and response processes was evaluated using the many-facet Rasch model, while evidence of internal structure (inter-item consistency) was estimated using Cronbach’s alpha and inter-rater agreement estimated using ICC.

Results: Expert participants rated the simulator overall slightly lower [observed average (OA) = 3.2] than novice participants (OA = 3.3, p = 0.02). The highest combined observed averages were for the domain Value (3.8) whereas the lowest ratings were for the domain Visual Attributes (3.2). Lowest rated items were Performing intraoperative cholangiogram and Realism of balloon dilation (both 3.0). The averaged global rating was 3.1, consistent with “this simulator can be considered for use in pediatric LCBDE training, but could be improved slightly.” Inter-item consistency for the 19 items used to evaluate the simulator’s quality was high (α=0.94). Less experienced participants rated the simulator significantly higher in value as a training tool (OA = 4.0) than experts (OA = 3.3), p = 0.03.

Conclusions: Overall, course participants rated the LCBDE simulator highly in regard to value as a training tool for pediatric surgery fellows. Novice surgeons rated the simulator higher than expert surgeons in the overall global rating scale and in the simulator’s value as a training tool. Participants felt that the LCBDE simulator could be used as a training tool after making minor modifications, most predominantly in the visual attributes of the simulator.
Research Day Abstract

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Does this research involve women’s health?* No

Abstract Title:* An Esophageal Manometry Training and Competency Assessment System Identifies Significant Variation in Learning Curves

Introduction: Heartburn and dysphagia account for over two million annual outpatient ambulatory visits and evaluation often requires esophageal high-resolution manometry (HRM). A competent interpreter is integral to a quality esophageal HRM study. Currently, an understanding of learning curves, training requirements and measure of competency for HRM does not exist. This study aimed to 1) develop a training and competency assessment system, and 2) utilize this system to assess learning curves for HRM interpretation. Methods: We conducted a prospective multicenter trial evaluating HRM naïve gastroenterology trainees over an eight-month period (5/2015-12/2015). The study team designed a web-based HRM training and competency assessment system. After reviewing the training module, participants interpreted 50 HRM studies and received answer keys at the fifth and then every second interpretation. A cumulative sum (CUSUM) procedure produced individual learning curves with preset acceptable failure rates of 10% and classified competency status as ‘Competency Not Achieved’, ‘Competency Achieved’, and ‘Competency Likely Achieved’. Results: Twenty trainees from eight centers interpreted 50 HRM studies each. Five (25%) participants achieved competence, four (20%) likely achieved competence, and 11 (55%) failed to achieve competence. A minimum case volume to achieve competency was not identified. There was no significant agreement between diagnostic accuracy and accuracy for individual HRM skills. Conclusions: We developed a training and competency assessment system for HRM interpretation and, utilizing this system, we found significant variation in learning curves for HRM diagnosis and individual skills. In addition, our system effectively distinguished trainee competency levels for HRM interpretation and contrary to current recommendations, found that competency for HRM is not case-volume specific.
Critical Care Rotation Impact on Pediatric Resident Mental Health and Burnout

**Background:** Resident physicians are at high risk of experiencing burnout. Research of primarily internal medicine and emergency medicine trainees suggests that 50-75% of residents will experience significant burnout during their training. Depressive symptoms and burnout are frequently coincident (in 50-90% of those residents meeting criteria for burnout). Workload and duty hours have not been found to consistently correlate with incidence of burnout or depression among trainees. In addition to the personal impact burnout and depression has on residents, evidence suggests that burnout can negatively impact patient care.

The Pediatric Intensive Care Unit (PICU) rotation is an important, yet challenging, educational experience during a pediatric resident’s training. The high patient volume and acuity, ethical dilemmas, long hours, and other demands inherent to the rotation can result in a significant amount of stress placed on trainees. Attending physicians in the ICU experience high rates of burnout and depression which is likely to impact those trainees whom they are teaching.

**Hypothesis:** Residents experience increased frequency of depression and burnout at the end of their critical care rotation compared to the beginning.

- Residents with higher scores on depression and burnout scales will have a more negative view of the rotation as a whole and perceive decreased autonomy and education compared to those with lower depression and burnout scores.
- Factors associated with these negative outcomes will vary between residents but may include high patient volume, patient acuity and perceived large numbers of ethical issues as well as perceived lack of teaching, lack of opportunities to perform procedures, perceived lack of autonomy and political concerns including patient distribution between ICU teams (resident compared to APN/hospitalist services).

**Methods:** IRB-approved, prospective study and includes all second-year pediatric residents at Ann & Robert H. Lurie Children’s Hospital of Chicago who consented to participate over a 12 month period starting December 2014 and ending December 2015. Residents were surveyed just prior to and immediately following one of their PICU rotations.

Surveys included the Center for Epidemiologic Studies Depression Scale (CES-D, maximum score of 60, score of 15-20 indicating risk of mild to moderate depression and >20 indicating risk for major depression) and the Maslach Burnout Inventory (scored in 3 domains); both previously researched and validated. Additionally, a short Lurie PICU specific survey is completed. This survey aims to identify aspects which the residents anticipate (in the pre-rotation survey) or found (in the post-rotation survey) to be negative and positive aspects of the rotation. The residents use a unique anonymous identifier in order to compare pre- and post-rotation survey data.

**Results/Conclusions:** Complete data analysis is ongoing. 24 pre-rotation assessments and 17 post-rotation assessments were completed. Prior to the rotation only one resident had a CES-D score >20, indicating risk for major depression. At the end of the rotation 4 residents had CES-D scores 15-20 (risk of mild to moderate depression) and 3 had scores >20. Prevalence of at least mild depression increased from 4% to 43.7% over the 4 week period. Analysis of 17 paired surveys indicate an average increase in depression scale scores by 6.3 points over the course of the rotation. Score are higher on the post-rotation burnout surveys in the emotional exhaustion domain (by average of 5.7 points) and unchanged in the depersonalization domain. Scores are also slightly increased in the personal accomplishment domain (by 1.4 points) at the end of the PICU rotation. Residents overall rate the PICU rotation as a positive experience (82.3% in the post-rotation survey) and almost universally identify patient acuity, education and nursing-integrated rounding as positive aspects of the ICU rotation. Residents most commonly cite a lack of autonomy and lack of opportunity to do procedures as negative aspects. Further analysis comparing pre- and post-rotation surveys has not been completed and conclusions cannot be drawn at this time.
Research Day Abstract

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Does this research involve women’s health? * No

Abstract Title: * Use of a Simulation-Based Capstone Course to Teach and Assess Entrustable Professional Activities to Graduating Medical Students

Summary:
We developed and pilot tested a 3-day simulation-based capstone course for a cohort of graduating medical students to assess their readiness for residency. The intervention taught and assessed individual performance on specific components of the 13 core Entrustable Professional Activities (EPAs) that all medical school graduates should perform independently. We developed two, 6-station clinical skills examinations (CSE) to assess performance before and after a simulation-based educational intervention. Graduating medical students could not reliably perform selected EPAs at baseline. However, a focused three day simulation-based capstone experience produced significant improvement in core clinical skills.

Background:
One of the biggest challenges in medical education is the transition from completion of undergraduate education to the start of graduate medical education. During this transition, recent graduates change from a fully supervised role as a medical student to a role with more independence, greater responsibility, and an impact on patient safety. Ensuring that graduating students are prepared for these responsibilities upon entering residency is critical. Recently, the American Association of Medical Colleges published a set of thirteen core Entrustable Professional Activities (EPAs) defining expectations for all activities US and Canadian medical school graduates should be competent to perform independently. Although the EPAs are directed at graduating students, with few exceptions, it is not known if graduating medical students can reliably perform each of the specific EPAs because rigorous medical school outcome evaluations are rare. Therefore, the current study had two aims. First, to assess baseline performance of EPAs in a cohort of graduating medical students. Second, to study the impact of a 3-day simulation-based capstone course on student knowledge and skills.

Methods:
We developed and piloted a simulation-based capstone course to assess graduating fourth year medical students’ readiness for residency. The educational intervention was designed to teach and assess individual performance on specific components of the EPAs. In the final curriculum, graduating medical students were assessed individually on their ability to perform the following skills linked to EPAs: (a) insert peripheral intravenous line (IV), (b) obtain informed consent, (c) respond to pages from a nurse, (d) identify normal and abnormal heart sounds, (e) develop a differential diagnosis and write admission orders, and (f) write discharge prescriptions. We developed equivalent pretests and posttests for the six station clinical skills examinations (CSE)s to assess student performance. Each station used standardized clinical scenarios and a skills checklist.

Capstone participants rotated through the six CSE stations. At each station, participants completed a baseline standardized assessment. After the assessment, students received specific feedback regarding their performance. Students then engaged in four hours of deliberate practice for all skills with feedback under supervision of the instructor followed by a post-test CSE.

Results:
Performance on all six clinical skills significantly improved (P<0.01) from pretest to posttest with high inter-rater reliability between CSE instructors as shown by a mean kappa of 0.96 on a subset of pilot examinations. Greater than 90% of the participants agreed or strongly agreed that the capstone course improved their clinical skills, provided useful educational feedback, was a good use of their time, and that they were given sufficient time to practice. Participants’ perception of the effectiveness of the sessions was highest for IV insertion, discharge prescription writing, and replying to pages from a nurse.

In this pilot study, we demonstrate that graduating medical students could not reliably perform clinical skills related to selected EPAs. However, a 3 day simulation-based capstone experience resulted in significant improvement in performance.

Conclusion:
In summary, this pilot study is a first step toward addressing the more ambitious goal of certifying medical school graduates as competent to perform core EPAs. Our next steps will involve expansion to all EPAs and setting rigorous minimum passing standards for all students to achieve prior to medical school graduation.
Objective: Our goal was to design and launch an “e-support” website that provided curricular support for physicians teaching about PRMSK disease, particularly in the context of residency programs.

Methods: OuchMyLeg! was designed by Northwestern University Information Technology’s Department of Academic & Research Technology using a Drupal platform and has security measures to protect confidentiality of member data. OuchMyLeg! serves two private communities. The PRIME community (Pediatric Rheumatologists Interested in Medical Education) is for pediatric rheumatologists to easily share and access teaching materials. OuchMyLeg! also houses a community for pediatric chief residents (CRs), designed to help residency programs increase their quality and quantity of PRMSK education. Researchers verify each user account to ensure that prospective members belong to the medical community. Members of either community can upload educational resources they have created and download materials posted by others directly to tablets/smartphones for on-the-fly teaching. Copyright infringement warnings are posted. The research staff curates a collection of links to PRMSK instructional materials already available on the internet; the list is searchable by medium, keyword, and/or diagnosis. We use Google analytics to track website traffic. After launching the CR community in 2013 to a small pilot group of pediatric CRs, the community was opened in 2014 to all 2014-2015 chief residents. To recruit CRs, we asked all pediatric residency program directors to forward our contact information to their chief residents. Those who registered for an account were required to take an entry survey about their program’s PRMSK teaching and received a $5 gift card for doing so. They were then granted access to links to existing websites and a subset of PRIME’s private materials shared with author permission.

Results: As of February 2016, there are 218 PRIME members. Most are attending physicians recruited through PRMSK listservs (185), but fellows, nurses, and research associates also contribute. 37 public materials are available to both the PRIME and chief resident communities; CRs can also access some of the 19 private teaching resources currently posted to PRIME. 205 residency program directors were emailed, and 74 responded with contact information for 136 total chief residents. 61 of these chief residents created an OuchMyLeg! account but only 31 took the entrance survey and gained full access to the site. The data from the entrance survey gave us insight into the current state of PRMSK resident education. 68% of chief residents surveyed were unsatisfied with their program’s rheumatology teaching. The CRs revealed that an average of only 4.35 hours is spent on rheumatology topics in their programs’ didactics each year, but they could spend 9.10 hours if given prepared teaching materials such as case-based discussion questions and short handouts broken down by topic. 33% of CRs viewed written case studies as a useful teaching tool, but only 20% of CRs said their programs provided independent access to these materials. Similarly, 76% viewed videos of musculoskeletal exams as a useful teaching tool, but only 16% had independent access.

Several chief residents completed an exit survey and reported that they liked the website and wished we had sent periodic email updates throughout the year.

Conclusions: Almost half of interested CRs were deterred by the survey requirement, which will be eliminated moving forward. CRs estimated they could add approximately 5 hours per year of PRMSK teaching if provided prepared materials, which demonstrates interest in the service OuchMyLeg! provides and would make a huge difference in PRMSK resident education. The CRs’ desire for access to written case studies and musculoskeletal exam videos show that many educational materials that already exist are not reaching their target audience, a problem that OuchMyLeg! hopes to correct. The positive response to OuchMyLeg! suggests that teaching material sharing networks are good tools for orphan subspecialties with limited educator pools. Using lessons learned from the website’s roll-out, we plan to improve CR recruitment and welcome users to an optimized website with more teaching resources, direct support, and improved communication, thereby increasing residents’ access to PRMSK education.
Abstract Title: Strengthening Pre-Clinical Medical Education While Improving Community Cardiovascular Health: An Evaluation of the Keep Your Heart Healthy Program

Introduction: Keep Your Heart Healthy is a community-based service-learning program that trains medical students to improve cardiovascular health in underserved Chicago communities through motivational interviewing. Medical education programs often assess medical student outcomes, but not those of community participants. The objective of this evaluation is to concurrently assess longitudinal changes in medical student confidence in cardiovascular health counseling and participant cardiovascular health.

Methods: A cohort study of 53 medical students enrolled in Keep Your Heart Healthy and 98 of their non-enrolled peers assessed confidence in eight domains related to cardiovascular health and motivational interviewing. Follow-up of a convenience sample of community participants assessed cardiovascular health lifestyle changes through a telephone survey four to six weeks after initial screening.

Results: After training, Keep Your Heart Healthy students had significantly higher confidence in the cultural competency ($P=.002$), motivational interviewing ($P<.001$), nutrition ($P<.001$), and physical activity ($P=.008$) domains compared to their non-enrolled peers. Six months later, Keep Your Heart Healthy students had significantly higher confidence in the motivational interviewing ($P=.006$), nutrition ($P<.001$), physical activity ($P=.02$), smoking cessation ($P=.005$), and self-efficacy ($P<.001$) domains compared to their non-enrolled peers. Community participant participation in physical activity significantly increased ($P=.01$) and high sodium food consumption significantly decreased ($P<.001$).

Conclusion: This community-based service-learning program benefited both medical students and the community participants they counseled. To further improve medical education and community cardiovascular health, programs such as Keep Your Heart Healthy should continue to expand and undergo evaluation to measure their effectiveness and identify opportunities for improvement.
Research Day Abstract

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Department:* Emergency Medicine
Does this research involve women's health?* No

Abstract Title: * Supplemental Milestones for 48-Month Emergency Medicine Residency Programs: A Validation Study

Background: Emergency Medicine (EM) residency programs may be either 36 months or 48 months in length. The Residency Review Committee for EM requires that 48-month programs provide educational justification for the incremental 12 months. We developed additional milestones that 48-month programs might use to define and assess outcomes in domains that meet this accreditation requirement. This study aims to validate these proposed supplemental milestones using a similar methodology to that established by the original EM Milestones validation study.

Methods: A panel of EM program directors and content experts at two institutions identified content domains for additional training offered by many 48-month EM programs. This led to the development of 6 novel subcompetencies: Operations and Administration, Critical Care, Leadership and Management, Research, Teaching and Learning, and Career Development. Subject-matter experts at other 48-month EM residency programs refined the milestones for these subcompetencies. Program directors of all 48-month EM programs were then asked to order the proposed milestones using the Dreyfus model of skill acquisition for each subcompetency. Data analysis mirrored that used in the original EM milestone validation study, leading to the final version of our supplemental milestones.

Results: Sixteen of 33 subjects (48.5%) completed the study. No subcompetency or individual milestone met deletion criteria. Of the 97 proposed milestones, 61 (62.9%) required no further editing and remained at the same level as proposed by the study authors. Thirty-five milestones underwent level changes: 15 (15.5%) were moved one level up and 18 (18.6%) were moved one level down. One milestone (1.0%) in ‘Leadership and Management’ was moved two levels up, and one milestone in ‘Operations and Administration’ was moved two levels down. One milestone in ‘Research’ was ranked by the survey respondents at one level higher than that proposed by the authors, however this milestone was kept at its original level assignment.

Conclusions: Six additional subcompetencies were generated and validated among a cohort of 48-month program directors using the same methodology as was used to validate the current EM Milestones. These optional milestones may serve as an additional set of assessment tools that will allow 48-month programs to report educational outcomes using a familiar milestone rubric.

*Abstracts longer than one page will not be accepted.
Research Day Abstract

Abstract Title: Creation, Implementation, and Assessment of a Near-Peer Taught, EM-Focused Electrocardiogram Curriculum for EM PGY-1s

Summary
Electrocardiogram (ECG) interpretation is fundamental to the practice of emergency medicine (EM). Expert training needs to be provided during EM residency because only the basics can be assumed to be covered in medical school. Currently there is no nationally recognized or endorsed ECG curriculum for EM residents. We describe the implementation of an innovative near-peer standardized curriculum for first year residents in ECG interpretation.

Objective
Our primary objective was to develop a curriculum encompassing ECG diagnoses critical to the practice of EM, minimize the effect of varied medical school exposure, and provide enrichment via exposure to rare ECGs.

Methods
Material from a cardiology elective as well as free open access medical education (FOAMed) resources were used to create 34 EM-focused cases which have been taught by near-peer (PGY-3/4) volunteers during established weekly PGY-1 educational sessions since July 2014. Cases with an ECG, FOAMed links, and challenge questions were emailed to PGY-1s in advance of a short (10-15 minute) small group. After each session an answer document is sent for further review and future use as a resource.

Results
The Northwestern EM classes of 2018 & 2019 were surveyed on their medical school ECG education and the effectiveness of this innovation. 22 of 30 surveys were completed and 1 was partially completed. Participants believed that medical school prepared them to interpret ECGs in the ED either very poorly or poorly in 13/23 (57%) of responses. Participants believed that instruction while working in the ED was ineffective or very ineffective in 17/22 (77%) of responses and split between 7/11 (64%) PGY1s and 10/11 (91%) of PGY2s. Participants believed that instruction provided via this innovation was effective or very effective in 22/22 (100%) of responses. Participants believed near-peers (PGY2-4) are the most effective teachers in 16/22 (73%) of responses, split between 10/11 (91%) PGY1s and 6/11 (55%) of PGY2s, with EM attending at 4/22 (18%) and EM fellow 2/22 (9%) as the remaining responses. Overall, comparing the frequency of effective/very effective responses for on-shift instruction with near-peer instruction we found a significant difference (5/22 vs 22/22, p<0.001). Also, comparing the frequency of effective/very effective responses for on-shift instruction between the PGY1 and PGY2 class we found a non-significant difference (7/11 vs 10/11, p=0.31). Also, comparing the frequency of effective/very effective responses for near-peer instruction between the PGY1 and PGY2 class we found a non-significant difference (10/11 vs 6/11, p=0.31).

Conclusion
This curriculum could easily be expanded to additional residency programs and since July 2015 is also being implemented at another program by a recent graduate. In summary, the effectiveness of this curriculum is perceived significantly more favorably than bedside instruction at this institution.

*Abstracts longer than one page will not be accepted.
Research Day Abstract

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Abstract Category:* Education research
Principal Investigator:* Zeina Ibrahim MD
Department:* Cardiology

Does this research involve women’s health?* No

Abstract Title:* Usefulness of Transesophageal Simulator during a Continued Medical Education event to assess competency of Transesophageal performance among cardiologists

**Background:** Simulator technology has proven to be an effective educational and testing tool in the training and assessment of clinical skills. There is little experience using simulated transesophageal echocardiography (TEE) in a continuing medical education (CME) setting. Testing a heterogeneous group of cardiologists, we hoped to identify baseline skill level for performing a comprehensive TEE, in both the academic and non-academic setting.

**Methods:** A realist TEE simulator (Simbionix TM) with realtime imaging and haptic feedback was used to evaluate community and academic cardiologists during a CME event. A total of 27 physicians participated; Group A (n=14) consisted of cardiologists from an academic setting, which included attendings (n=5), and senior cardiology fellows (n=9). Group B (n=13) included non-academic, community-based cardiologists. Each participant performed what they considered to be a complete TEE study; their examinations were then evaluated for comprehensiveness by means of a total score on a standardized 35 item checklist based on the ASE guidelines, and total study time.

**Results:** The mean score of all the participants was 25 (out of 35), with an average completion time of 19 minutes. There was a trend towards better performance for the academic physicians in regards to comprehensiveness of the exam (29 versus 21 p=0.086), irrespective of years of practice. In addition, group A was more efficient (12 versus 26 minutes, p=0.002). Interestingly, the only variable that correlated with the completion score in the entire group was the number of TEEs/yr (R=0.5, P=0.002).

**Conclusion:** TEE simulators are a useful teaching tool for cardiology trainees as well as for maintaining procedural competence post-graduation. Providing access to the simulator during a CME event for hands-on experience has a role in identifying gaps in learning, particularly in the community setting. Simulation training may be one way to positively improve clinical practice, especially in centers where TEE volume may be low.

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**Group A (academic) VS Group B (non academic)**

<table>
<thead>
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<th>Practice year</th>
<th>Group A</th>
<th>Group B</th>
<th>p-value</th>
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*Abstracts longer than one page will not be accepted.*
Abstract Title: Checklist Assessment of Teamwork in Pediatric Cardiac Critical Care

Background: Teamwork and communication are important aspects of patient care that are difficult to teach and assess in traditional ways. Simulation provides a unique medium for this education and assessment.

Objective: A novel checklist assessment for teamwork is developed in this study to further advance this educational mission. A rigorous psychometric analysis is employed to determine reliability and validity of scores obtained from this checklist.

Methods: A novel checklist assessment for teamwork was developed and studied in a pediatric cardiac critical care setting. Two raters scored team’s performances on this new checklist as well as the Mayo High Performance Teamwork Scale and a subjective global score. Descriptive statistics, G study, D study and correlation coefficients were calculated to analyze the data.

Results: Twenty-nine teams were assessed by two raters. Teams scored highly on most items. Items associated with closed-loop communication were scored most poorly. Neither tool demonstrated strong reliability with the coefficients of 0.42 and 0.08 for the novel tool and Mayo tool, respectively. Global scores correlated well with scores of both tools. Inter-rater reliability was strong.

Conclusion: The novel tool had low reliability but was more reliable than the Mayo Teamwork Tool. The novel tool could be used in formative assessments and clinical team discussion. Summative assessments likely need analysis by a more reliable and precise tool. Teamwork is a difficult construct for study, given its subjective nature and varying applications and settings. Further work is needed in evaluating the assessment of subjective aspects of team performance.
Promoting Responsible Electronic Documentation: Validity Evidence for a Checklist to Assess Progress Notes in the Electronic Health Record

Background: Notes written in electronic health records (EHRs) have generated criticism for being unnecessarily long and redundant, perpetuating inaccuracy and hiding providers’ clinical reasoning.

Objective: We aimed to develop an instrument to measure the quality of EHR-generated progress notes as a precursor to a curriculum to improve trainee documentation.

Methods: We used medical student survey and attending focus groups to develop and refine a 22-item assessment instrument to evaluate inpatient progress notes. We measured inter-rater reliability and scored a sample of one hundred progress notes written by PGY-1 medicine trainees for inpatients on the general medical service.

Results: Mean intraclass correlation demonstrated good agreement at 0.70. The mean note score was 67% of maximum possible points (range 34-93%, SD 11).

Conclusions: We present evidence for content validity and reliability of assessment tool to evaluate inpatient progress note quality. Trainee notes show substantial room for improvement, supporting use of this tool to assess outcomes of a curriculum to improve EHR documentation.
Abstract Title: Utilization of a Validated, Low-Cost Suprapubic Tube Model in Urology Resident Training Improves Knowledge and Performance of Suprapubic Tube Placement

Introduction: Suprapubic tube (SPT) insertion for the relief of urinary obstruction is encountered in an urgent setting by on-call urology residents, but is relatively uncommon in day-to-day practice. We assessed the utilization of a low-cost, validated SPT simulation model in a urology resident skills-lab curriculum and evaluated knowledge and skills acquisition. Learner feedback on anxiety with the procedure and potential impact on patient outcomes was presented.

Methods: Using our previously validated SPT model, fourteen residents underwent pre-test assessments, didactic teaching sessions, skills-task assessments (graded as poor, satisfactory or excellent by faculty), and post-test evaluations. Learners also completed a post-session global evaluation of educational value, impact on learner comfort, and potential effect on future patient outcomes on a 5-point scale (1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree). Subjective feedback was also solicited.

Results: Percentage correct on knowledge-based testing increased from 67% pre-test assessment to 83% post-test assessment following the session. Surgical task completion was rated as "excellent" for thirteen residents and "satisfactory" for one resident. Learner self-evaluations of the skills sessions were as follows: global rating 4.5, appropriateness of level 4.3, sufficient practice and feedback 4.5, overall quality 4.5, educational value 4.9, and improvement in future patient outcomes 4.7. Subjectively, residents noted that the session improved familiarity with different types of SPTs. They appreciated the hands-on training, reporting improved confidence in performing the procedure.

Conclusions: Utilization of this SPT model for simulation-based training and evaluation resulted in improved knowledge and excellent skills-task accomplishments for the overwhelming majority of resident learners.
**Research Day Abstract**

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**Does this research involve women’s health?** No

**Abstract Title:** Using Ultrasonography as a Novel Method for Teaching the Musculoskeletal Physical Examination

**Purpose:** To investigate the accuracy of acromioclavicular (AC) and lateral knee joint line palpation in first-year medical students using ultrasound (US) verification, and to determine the effectiveness of a MSK physical examination class integrated with direct US feedback on the accuracy of joint line palpation.

**Method:** Ninety first-year medical students participated in a 2-hour MSK physical examination class with direct feedback using US from 2014 to 2015. Pre-class joint palpation accuracy testing was done 1 week after traditional MSK physical examination instruction that did not use US. Students were asked to palpate AC and lateral knee joint lines on a partner and tape a blunt-tip needle on the skin parallel to the joint line. US was used to determine needle placement accuracy. Post-class testing was done 1 week after the MSK physical examination class. McNemar’s test was performed to compare pre-class and post-class results.

**Results:** Twenty-six students completed palpation accuracy testing in 2014, and 57 students completed testing in 2015. In 2014, AC joint palpation accuracy improved significantly from 30.8% (pre-class) to 65.4% (post-class) (p=.02). Lateral knee joint line palpation accuracy improved from 50.0% (pre-class) to 65.4% (post-class) (p=.34). Participants in the class had higher overall median scores for knee and shoulder OSCE stations than non-participants. In 2015, AC joint palpation accuracy improved from 36.8% (pre-class) to 50.0% (post-class) (p=.18). Lateral knee joint line palpation accuracy improved significantly from 43.9% (pre-class) to 82.5% (post-class) (p=.0001).

**Conclusions:** Palpation accuracy of the AC and lateral knee joint lines in first-year medical students is low after conventional MSK physical examination education. A MSK physical examination class using US to provide direct feedback improved palpation accuracy of the AC and lateral knee joint lines. The utilization of MSK US is a novel and effective method of teaching and assessing MSK physical examination skills in medical trainees.

**Key Words:** Physical examination; joint line palpation; musculoskeletal ultrasound; medical education; acromioclavicular joint; knee joint

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Introduction: Various didactic training modules have been employed over the years to providing preclinical medical students with early patient experiences, given early medical education focus on basic sciences. As part of the new curriculum in 2012, Focused Clinical Experiences (FCE) were developed as a block-based learning module covering entire organ systems with the goal of early exposure to the clinical context, supplementing basic science taught in the early years of medical training. We describe the impact of these evocative experiences.

Methods: Medical school student surveys were recorded after the completion of the FCE. The resulting survey instrument was administered to medical students at Northwestern University in a cohort study. From 2013-2015, responses were collected through a numerical grading format on a 5-point Likert scale, with 5 signifying an extremely positive response and 1 being a very negative response regarding experiences in relevant areas: Ability to apply basic science learning in a clinical context, faculty awareness of learning objective, comprehension of the scope of practice and training requirements and overall satisfaction of the experience. In addition, subjective responses were obtained from 2 open-ended questions about the nature of the experience and suggested improvements/changes.

Results: Six Hundred and thirty medical students (630/700) responded, with a total response rate of (90%). Aggregate scores from the past three years of replies demonstrated an overall favorable and reproducible annual response to the FCE program. Scores revealed the following: Ability to apply basic science learning in a clinical context (4.0 ± 1.00), faculty awareness of learning objective (4.0 ± 1.02), comprehension of the scope of practice and training requirements (4.0 ± 1.04), and overall satisfaction of the experience (4.0 ± 0.97).

Conclusion: The FCE program survey results demonstrated that medical students benefited from the experience and perceived that it was a valuable encounter. The FCE may help students better understand clinical skills and knowledge as an adjunct to their pre-clinical education.
Research Day Abstract

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Does this research involve women’s health?* No

Abstract Title:* "Treating the patient, not the problem:" Diversity in perceptions of patient centered care among early M1 medical students

Summary: The Education-Centered Medical Home (ECMH) is an innovative, four-year longitudinal clerkship that enables medical students to work closely in teams, develop continuity relationships with complex primary care patients, and measure and improve the quality of care they help provide. In academic year 2015-2016, 40% of Feinberg students are embedded in eighteen ECMH clinics. Evaluation of educational impact has thus far been positive. In 2015, incoming Feinberg students were randomized to an ECMH clinic or an Individual Preceptorship (IP) for their primary care curriculum. We plan to assess educational outcomes using a number of tools including student surveys and qualitative methods. In this study, we seek to understand the perceptions of incoming medical students about primary care tenets and practices.

Objective: Few studies have examined how incoming medical students view, or are exposed to, patient-centeredness and patient-centered care. We hope to understand the baseline perceptions of incoming M1 medical students about primary care and patient-centered care and, by doing so, better understand the educational experiences of students to improve primary care education.

Sample: All consenting M1 students (n=164) were placed in a randomly ordered list based on (1) ECMH or IP, (2) college (one of four) and (3) sex. Following this random order, we recruited a total of n=38 students to participate (20 male, 18 female).

Methods: Three interviewers (KAC, BLH, ERR) conducted semi-structured interviews with the participants. Interviews lasted a mean of 24.2 minutes. As part of the interview guide, participants were asked to reflect on their perceptions of primary care by providing their personal definitions of the concepts of “primary care” and “patient-centered care” and by indicating why “patient-centered care” may or may not be an important way for them to frame their interactions with patients. We used grounded methodology to systematically examine de-identified transcribed participant responses to generate a list of themes and subthemes emerging from the data.

Results: Preliminary results show that students defined primary care as being the “first point of contact” or the “first line of defense” and a primary care physician as being a “gatekeeper” who cares for a patient’s overall health longitudinally. Only seldom did students describe active management of chronic disease or specific aspects of preventive care. “Patient-centered care” (PCC) was defined by students in four general ways: (1) by juxtaposition of PCC with “profit-centered care,” paternalism, and a sense that PCC was more “warm and fuzzy” as opposed to “focusing on the hard medical facts;” (2) as recognizing patient values, using empathy, involving patients in decision making, and “treating the patient, not the problem”; (3) as something that is almost implicit or intuitive (“What kind of care would not be counted as patient-centered?”); and (4) infrequently as being “jargon” or a “buzzword.” When asked why PCC may or may not be a good way to frame interactions, students noted that PCC is a goal or an objective to work toward, both as an individual and as a health system, and that it can be seen as a reminder that avoids paternalism.

Conclusions: M1 medical students tended to see a primary care physician as a ‘passive gatekeeper’ as opposed to one who actively manages patients’ chronic illnesses, preventive care and health needs. Patient-centered care was seen as being intuitive and integral to the task of being a physician and, occasionally, at odds with the way M1 students perceive that medicine was ‘traditionally’ practiced. Many students appeared to have an easier time describing what PCC was not as opposed to what it was, which could lead to difficulty in developing a framework with which to evaluate patient-centered attitudes in a curricular innovation. In the future, we will track these perceptions as students travel through medical school and examine differences in changes among students in the ECMH and IP curricula.

*Abstracts longer than one page will not be accepted.
Abstracts longer than one page will not be accepted.

**Research Day Abstract**

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**Abstract Category:** Education Research

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**Does this research involve women's health?** No

**Abstract Title:** Telephone talk: the role of work-related telephone conversations in physicians' clinical training

**BACKGROUND:** ‘Talk’ is a core activity for both learning and patient care that serves information exchange, relationship building and teamwork across disciplinary and professional boundaries. Indeed, ‘learning to talk’, illustrates the shift in modern societies in which talk has become one of the main components of the work, which is particularly relevant in medicine. Talk can potentially amplify less favourable social structures such as authority gradients, power differentials that lead to conflict. We know little about the role of work-related telephone conversations in graduate medical education (GME). Better understanding of this social phenomenon in clinical practice would yield valuable insights to promote practice improvements and clinical education. The purpose of this qualitative interview study is to explore the role of work-related telephone conversations with other health professionals in physicians’ clinical education.

**METHODS:** Using a constructivist grounded theory approach, we conducted individual semi-structured interviews with 11 physicians across a range of training levels (PGY1-PGY8), with residents (n = 6) and fellows (n = 5). All interviews focused on telephone conversations doctors have with doctors, nurses, and other health professionals related to patient care. Data were analyzed iteratively using constant comparison. Key themes were identified and their relationships critically examined to derive a conceptual understanding of how work-related telephone conversations contribute to learning. For this work in progress, we anticipate further data collection and analysis using theoretical sampling to guide additional recruitment.

**RESULTS:** Doctors-in-training speak with a broad spectrum of conversation partners, including other residents/fellows, attendings, nurses, and other allied health professionals. Phone conversations occur within training institutions and across hospitals in instances when patients are being transferred for further care.

We identified key areas of learning for junior level residents/fellows that feature prominently in telephone conversations:

- Communicating concerns and key information succinctly, including: (a) the use of framing statements to preview the conversations by stating clinical questions or concerns explicitly and upfront; (b) using keywords to grab attention as well to synthesize and distill information; (c) incorporating key relevant objective information to make your case; (d) conveying acuity and urgency.
- Perspective-taking of the ‘other’: anticipating and communicating what will be important to conversation partners.
- Managing information needs – for themselves and conversation partners, including learning to enlist the conversation partner as your ‘eyes and ears’ when decision-makers are not in a position to examine patients.
- Managing educational needs – for themselves and conversation partners, including explaining or soliciting thought processes surrounding the ‘why’ of clinical decision-making and management.
- Managing social elements of telephone interactions, including (a) building social capital through effective phone interactions, with both familiar and unfamiliar conversation partners; (b) dealing with emotional reactions (when people raise their voice or dismiss their concerns); (c) establishing / maintaining credibility; (d) assessing the credibility of conversation partners.

Key areas identified for more senior fellows/faculty to promote learning on the phone

- Enhancing communication skills on the phone: (a) being patient and letting juniors tell their story, when feasible; (b) asking clarifying questions to help junior physicians focus their attention when they are ‘rambling’, (b) restating what junior doctors are saying in more succinct terms.
- Promoting clinical learning: (a) explaining rationale for decisions: ‘the why’; (b) helping juniors think through the ‘what-ifs’; (c) promoting autonomy through remotely supervised practice.

**CONCLUSIONS:** Telephone conversations surrounding patient care represent significant learning opportunities for physicians’ clinical education. ‘Learning to talk like a doctor’ is a key part of physician education impacted by telephone conversations. More senior residents, fellows, and faculty supervisors may support learning through simple yet important maneuvers. Future work will provide a more granular understanding of how preparing both doctors-in-training and their clinical supervisors will enhance the educational experience and patient care.
PURPOSE: Emergent retrieval of airway foreign bodies (AFB) in children remains a priority skill set for pediatric surgeons. Unfortunately, the expansion of pediatric otolaryngology at many training programs has diminished learning opportunities for pediatric surgery trainees. In the setting of low-procedural volume and expected surgical competency, deliberate practice in a simulation-based educational environment is essential. The purposes of this study were to (1) create a realistic rigid bronchoscopy for AFB retrieval simulation model and (2) to evaluate the content validity of this novel simulation model during a training course for pediatric surgical trainees.

MATERIALS AND METHODS: After IRB exemption determination, an 18-month old pediatric tracheobronchial airway was 3D printed and connected to a commercially available infant intubation model(Figure 1). Standard pediatric rigid bronchoscopy instrumentation, retrieval baskets, and laryngoscopes were used for the study. Two foreign bodies were placed into the 3D printed airways, peanut fragments and 4 mm plastic beads. Eighteen participants performed AFB retrieval for both objects, and completed a self-report, 30-item instrument consisting of twenty-nine 4-point rating scales (ranging from 1=not realistic to 4=highly realistic) and a 4-point global rating scale. Participants also reported their experience and comfort level (ranging from 1=not comfortable to 3=extremely comfortable) with performing this task and were considered to be experienced if they had performed ≥10 rigid bronchoscopies. Validity evidence relevant to test content and response processes was evaluated using the Many-Facet Rasch model, supported by the Wilcoxon rank sum test, while evidence of internal structure (inter-item consistency) was estimated using Cronbach alpha.

RESULTS: Novice surgeons(n=12) had previously performed a mean of 2.7 (±2.0) rigid bronchoscopies, compared to 15.4 (±7.7) by experienced surgeons(n=6). Overall, participants had no model preference with observed averages (OA) of 3.3 and 3.2 for bead and peanut simulations respectively(p=0.6). Experienced participants rated both models higher than novice participants (3.5 vs. 3.2, p=0.01). For both models, “Value” and “Relevance” domains received the highest ratings(OA=3.8), while “Materials Response” was rated the lowest(OA<3.0). Specifically, “mobility of oropharynx” and “amount of resistance to view vocal cords” received the lowest individual ratings. There were no differences between novice and experienced surgeons relative to “Ability to perform tasks”. The overall global rating for this rigid bronchoscopy model was 2.3, consistent with “requires minor improvements before it can be considered for use in rigid bronchoscopy training.” Experienced participants preferred the bead model more than the peanut model (3.0 vs. 2.0, p=0.009). Inter-item consistency for the 19 items used to evaluate the simulator’s quality was high (α=0.94).

CONCLUSIONS: We successfully designed, assembled, and evaluated a novel rigid bronchoscopy model for airway foreign body. Course participants rated the model as relevant to their educational needs, and valuable as a testing and training tool. Participants recommended a number of improvements for the model, including better attachments for the airway to the intubation model and increased flexibility of the intubation model tissues. With these and other minor modifications, the rigid bronchoscopy for airway foreign body retrieval model will be ready for implementation with a Mastery Learning curriculum.
Research Day Abstract

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Department:*  Medicine

Does this research involve women’s health?*  No

Abstract Title:*  The Scope of Medical Practice Experienced by Students in the Education-Centered Medical Home Clerkship i.e. “What You Could Have Learned in Just One Afternoon in the ECMH Clinic”

Title: The Scope of Medical Practice Experienced by Students in the Education-Centered Medical Home Clerkship i.e. “What You Could Have Learned in Just One Afternoon in the ECMH Clinic”

Background: In response to calls from medical education leaders to improve continuity within medical education,¹ and calls from healthcare experts to prepare graduates for new primary care delivery models – multiple US medical schools have created educational opportunities for their students to have early, authentic roles in the delivery of team-based care for complex patients.² These innovative programs aspire to achieve “value-added medical education,” an ideal where medical students can contribute meaningfully to patient experiences and outcomes.³ There is consensus among medical educators that immersion in a high functioning primary care setting at an early stage may better expose students to positive primary care role models and may generate interest in the pursuit of primary care careers at a time of a significant workforce shortage.⁴ One such “Value-Added Medical Education” model is the Education-Centered Medical Home (ECMH) at Northwestern University’s Feinberg School of Medicine. The ECMH is a novel, team-based, longitudinal primary care clerkship founded on the principle of continuity and focused on teaching the educational principles of the Patient-Centered Medical Home (PCMH). ⁵

Objective: In spite of the growth early clinical immersions and “value-added” curricular models nationally, little is known about the scope of practice that M1 or M2 students actually encounter when they take part in these clinic settings, and less is known about the qualitative impact of these early clinical experiences on student perceptions of patient-centered care and primary care practice.

Methods: Patients with multiple chronic conditions within the preceptor’s patient panel were identified and matched up with students who served as health coaches. These “empaneled” patients were asked to schedule their planned clinic visits on Thursdays (when the students were in clinic) whenever feasible. The last 25 consecutive ECMH clinic sessions during academic year 2016 (the 5th year of the program) were reviewed by both the author (MC) and clinic preceptor (DE). All patient specific data was de-identified. The # of patients per session was recorded, # of hospital visits was ascertained by using EHR admission notifications, and # of medical conditions, symptoms, and medications per patient was determined by reviewing progress notes, problem lists, and ICD-10 codes. The eight M1 and M2 students at this site participated in brief structured interviews to reflect on their clinic experience and qualitatively assess their perceptions of patient-centered care and primary care as a potential career path.

Results: An average of 10.0 patients attended the ECMH clinic each week. 107 of the 250 clinic visits (43%) were considered “continuity encounters” – i.e. visits where the student team was seeing empaneled patients back for return visits. Additionally, 35 patients hospitalized over the study period were seen by students for transition of care visits. M1 and M2 students actively evaluated 3 patients each time they attended clinic, but they also had the opportunity to participate in case discussions pertaining to the other 7 patients seen that day by their peers, as well as patients admitted to the hospital and patients not in attendance but whose care plans were discussed during team huddles. The patients seen on an average ECMH clinic day had approximately 31 unique symptoms (4.0 per patient) for evaluation relating to 13 different organ systems; they had 44 unique active medical conditions (5.9 per patient) for students to manage; and they took 54 unique medications (7.7 per patient) from 35 different pharmaceutical classes for the students to review and reconcile.

Conclusions: Incorporating early students as “health coaches” into an academic general internal medicine practice is feasible, and it exposes these early learners to a tremendous breadth of symptoms, medical conditions, and pharmacology. A single afternoon in clinic provides dozens of opportunities for students to reinforce medical knowledge objectives covered in the classroom. All students interviewed had positive opinions regarding primary care as a potential career, and all students felt the scope of practice they were seeing exceeded their preconceived notions for what general practice would look like. Further study is needed to ascertain weather or not these early positive primary care clinic experiences translate into more students ultimately choosing primary care careers.

References:
2. Curry RH. Authentic Roles for Medical Students in the Provision of Longitudinal Patient Care. JAMA 2014; 312(22):2335-2336.

*Abstracts longer than one page will not be accepted.
Abstract Title: Initial Experience with Accreditation Council of Graduate Medical Education (ACGME) Residency Program Self-Study: Assessment Design and Time Requirements in the First Six Months

Introduction: Under the Next Accreditation System, residency programs are required to compete a self-study every ten years. A report is due after a six-month period, culminating with a site visit after two years. We report our process for formulating the initial report and the time requirements of the program director (PD) and program coordinator (PC).

Methods: Time spent by PD and PC in self-study activities were prospectively recorded. The assembly and conduction of committees, survey target and constructs, survey results, focus group approaches, presentations of findings to stakeholders, and action plan results were rendered.

Results: In the first six months, PD and PC time totaled 56 hours and 40 hours, respectively. PD's time included 6 hours of background instruction, 20 hours meeting with the PC (survey development and analysis, focus group planning and interpretation), 6 hours of literature review, 8 hours in committee meetings, 4 hours preparing focus group leaders, and 12 hours presenting to stakeholders and drafting the initial report.

An anonymous survey was sent to all department faculty and residents to examine attitudes and perceptions about the program. Five focus group topics were identified from survey results: research environment, training sites and rotations, operative experiences, educational experience, and department morale. Focus groups were led by outside PDs to prevent bias. Focus group meetings were recorded and transcribed. Results were condensed into themes for the initial report submitted for ACGME review. The initial report included the program’s aims and environmental context, self-study methodology, and how this process will facilitate program improvement.

Conclusion: The initial PD's and PC's time commitment in the first six months of the self-study substantially exceeds the typical operations of residency program administration. Consequently, protected and regularly scheduled time is needed. Surveys and focus groups provided framework and context for initial data reporting.
INTRODUCTION:
Residency interviews are an essential component of the application process. Topics surrounding relationships, children, ethnicity, and religion violate employment law if asked by the interviewer. The purpose of this study was to determine the rates of such discriminatory questions asked during urology residency interviews and to assess for differences by applicant gender.

METHODS:
A 22 question online anonymous survey was distributed following the Urology Match to every individual who submitted a PGY1 urology application to Northwestern University. Questions were asked in a two-part, stepwise fashion. If a candidate replied “no” to whether they introduced a restricted topic in an interview, they were subsequently asked if their interviewers never, rarely, sometimes, often or most of the time introduced that topic.

RESULTS:
Response rate was 50% (Total=170; females=41, males=129). A statistically significant difference existed between whether females vs. males were asked about current parental status 59% vs. 5% (p=0.030), and intent for future children 42% vs. 13% (p=0.001). Female applicants were also more often asked about marital status, female=67% vs. male=42%, but this did not reach statistical significance (p=0.300). Regarding other restricted topics, 17% of candidates were asked about age, 4% religion and 13% national origin with females questioned more often about age and national origin.

CONCLUSIONS:
An alarming percentage of urology applicants are asked interview questions that violate employment law. Female applicants are disproportionately questioned about relationships, parental status and plans for future children. Education of applicant interviewers regarding legally restricted questions seems warranted.
Research Day Abstract

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Abstract Category: Education Research
Principal Investigator: Dr. Siddhartha Jonalagadda, PhD
Department: Preventive Medicine

Does this research involve women’s health? No

Abstract Title: Towards Automatically Building Information Extraction Gold Standards: An Approach to Expedite Systematic Reviews

Summary: A systematic review identifies and collates various clinical studies and compares data elements and results in order to understand the current state of a particular clinical question. The process is manual and involves a lot of time. In this work, a tool is developed using natural language processing (NLP) and machine learning (ML) to identify data elements in a new primary publication by generating a generalized information framework for systematic reviews. The proposed tool does this by automatically building a gold standard corpus from existing systematic reviews. It has been observed from the empirical studies that the proposed system automatically identifies sentences containing the data element of interest with a high recall (93.75%) and reasonable precision (39.12, which means the reviewers have to read only 2.6 sentences on average).

Introduction: The aim of this work is two-fold. The first objective is to develop a framework to generate gold standard using existing systematic reviews. The other aim is to use these gold standards to train ML classifiers for extracting data elements from a new study. As noted in our review on this topic [1], there is a dearth in gold standards for information extraction from literature for the purpose of systematic reviews and this approach holds promise.

Method: Some Cochrane Database systematic reviews related to congestive heart failure are randomly identified from PubMed. The corresponding full-texts of both the systematic reviews and the included studies are obtained automatically through APIs accessible from Northwestern University’s Galter Library. Different data elements (e.g., the inclusion criteria of a health care study) and their references are extracted from each systematic review and the exact information about the data elements are extracted from the corresponding included studies by using a modified Jaccard similarity measure. The modified Jaccard score finds the similarity between the sentence ($S_x$) that represents a data element say D, in a systematic review and each sentence ($S_y$) in an included study by simply dividing the number of common terms between $S_x$ and $S_y$ by the number of terms in $S_x$. The sentences are sorted according to their similarity values and the top sentence is considered as the positive instance for D. The sentences that have very low similarity values are considered as negative instances for D. Thus, the gold standard for each data element is developed by combining all the positive and negative instances in two different groups. In the second phase, a ML model has been developed, where this gold standard is used to train a classifier to determine whether a sentence contains the data element of interest (in our evaluation case – inclusion criteria) from a new clinical paper. Unigrams, Bigrams and Trigrams generated from sentences are used as features with support vector machine (SVM) classifier in the experiments.

Results: We have tested the performance of the proposed system on a commonly used data element (inclusion criteria of Randomized Control Trials (RCT)). The training set generated from the existing systematic reviews mentioned above contains 69 positive instances and 69 negative instances. The test set contains 24 new RCT publications that are chosen randomly from the Cochrane Database [1] and are not included in the gold standard. Each sentence of a new test reference is categorized to either positive (i.e., inclusion criteria) or negative instance. The aggregate recall of the system is 0.9375 and the precision is 0.3912. The performance shows the effectiveness of the proposed tool.

Discussion and Conclusion: Note that the value of modified Jaccard similarity measure ranges between [0, 1]. The sentences that have similarity values in the range [0, 0.005] are considered as negative instances for the data elements. We have done extensive experiments using several other classifiers like random forest, naive bayes etc. and eventually SVM outperforms the other classifiers in terms of recall. It has been observed from the experiments that the tool is retrieving valuable information from some references, even when it is difficult to identify them manually. Thus, we hope that the tool will be useful for automatic data extraction from literature. The future scope of this work is to generalize this information extraction framework for all topics and validate it for all frequently used data elements.

References

*Abstracts longer than one page will not be accepted.

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Abstract:

Purpose: Students entering health professions must possess adequate teamwork skills to engage with other health professionals and patients. While numerous curricula in teamwork have been described, few formal assessments of pre-clerkship student teamwork skills and attitudes exist. Portfolios may provide one such assessment.

Methods: We performed a qualitative analysis of narrative assessment data from 15 student portfolios using constant comparative techniques. The portfolios were randomly selected from three groups: high-performing, middle-performing, and low-performing students. Narrative assessment data included both peer and faculty feedback from a variety of curricular settings, including clinical skills groups, problem-based learning groups, and longitudinal clinical clerkship groups. All phrases from the narrative assessment data were coded both for theme and valence.

Results: Seventeen themes related to teamwork emerged, including team orientation, presentation and teaching skills, communication, information facilitation, and leadership. Within each theme, phrases received a valence of either “positive observations” or “suggestions for improvement.” The frequency of themes and valence varied by performance group, with students in the low-performing group consistently receiving more suggestions for improvement across themes.

Conclusion: Pre-clerkship student teamwork skills and attitudes can be assessed in portfolio assessment systems that employ narrative assessment data. Identification of students who struggle with teamwork in the pre-clerkship setting may allow earlier remediation of these skills.

Co-authors: Celia Laird O’Brien, PhD, Kenzie A. Cameron, PhD, MPH, and Marianne M. Green, MD
Research Day Abstract

**Abstract Title:** Advances in Pediatric Surgical Education: A Critical Appraisal of Two Consecutive Minimally Invasive Pediatric Surgery Training Courses

**Background:** Public and private mandates for improved patient safety and outcomes, work hour restrictions, and regulations requiring greater oversight of trainees have resulted in significant changes in surgical education. As trainees and practicing surgeons seek to expand surgical skills, hands-on educational courses increasingly must meet those needs. More than 20 years ago, surgical pioneers in minimally invasive surgery (MIS) for infants and children began a hands-on training course for pediatric surgical trainees. The course has evolved into a modern simulation-based educational course.

**Objective:** The purposes of this study were to (1) determine self-reported operative experience and technical skill levels, and (2) determine the impact of a dynamic model of simulation-based education for two separate cohorts of senior pediatric surgery trainees.

**Materials and Methods:** After IRB exempt determination, a retrospective review was performed of all evaluations for an advanced MIS course for pediatric surgery trainees. The courses, occurring in September 2014 and 2015, included a combination of didactic content and hands-on skills training. Hands-on simulation included size-appropriate neonatal/infant models for rigid bronchoscopy-airway foreign body (AFB) retrieval, laparoscopic common bile duct exploration (LCBDE), and real tissue diaphragmatic hernia (DH), duodenal atresia (DA), pulmonary lobectomy, and tracheoesophageal fistula (TEF) models. Data are reported as mean ± SD. Chi-squared analyses were used for categorical data, with t-tests for continuous data. A P-value<0.05 was significant.

**Results:** Complete survey data were available for 27 and 31 trainees in 2014 and 2015, respectively. Participants had limited prior operative MIS experience, with mean case numbers ranging from 0.44±0.62 (laparoscopic DA repair) to 3.8±3.9 (thoracoscopic lobectomy). Trainees reported a mean of 1.95±2.84 and 1.16±1.54 total advanced MIS cases in 2014 and 2015 cohorts, respectively. Notably, the 2015 cohort had significantly less previous experience in lobectomy (p=0.04) and overall advanced MIS than the 2014 group (p=0.007). Prior to both courses, a significant percentage of participants were not comfortable with DH repair (39-42%), DA repair (50-74%), lobectomy (34-43%) or TEF repair (54-81%). In 2015, 34% of participants were not comfortable with AFB bronchoscopy, and 59% were not comfortable with LCBDE. Importantly, 35% of participants were not comfortable with pulmonary anatomy. After course completion, participants noted improvement in tying intracorporeal knots (87.5% and 82.8%), energy selection (63.6% and 69%), instrument selection (82.6% and 89.7%), and port positions for DH repair (89.7% and 96.6%), DA repair (86.2% and 96.4%), lobectomy (86.2% and 93.1%), and TEF repair (89.7% and 96.6%). Participants also reported improvement in retrieval of AFB (93.1%) and LCBDE (96.6%). Course materials and hands-on skills significantly improved participants’ perceived ability to perform each operation more safely, with 100% reporting improvement for DH, 96% for DA, 96% for lobectomy, and 100% for TEF.

**Conclusions:** Pediatric surgery trainees continue to have limited exposure to advanced MIS during clinical training. Simulation based education results in significant improvement in both cognitive knowledge and trainee comfort with safe operative techniques for advanced MIS. Thoughtful revisions to the educational content of the MIS course continue to allow for relevant educational experiences for a large cohort of pediatric surgical trainees.
Purpose
Medical educators struggle to find effective ways to assess essential competencies like communication, professionalism and teamwork. Portfolio-based assessment can provide one method of addressing this problem by allowing for judgment of performance based on a longitudinal record of student behavior. At the Feinberg School of Medicine, the portfolio system measures behavioral competence using multiple assessments collected over time. This study examines whether a pre-clerkship portfolio review is a valid method to identify student behavior that affects later performance.

Method
We divided students into two groups based on a summative pre-clerkship portfolio review in 2014: (a) students who had concerning behavior in one or more competencies and (b) students progressing satisfactorily. We compared how these groups performed on two clerkship performance outcomes as of October 2015: (a) final grades in required clerkships, and (b) performance on a clinical composite score. We omitted knowledge-based NBME shelf scores from the clinical composite score to better isolate the behavioral attributes that are the focus of the portfolio. We used multiple linear regression to examine the relationship between portfolio review results and performance on the clinical composite score. USMLE Step 1 score was used as a control for knowledge acquisition.

Results
Students with pre-clerkship concerning behavior received significantly fewer Honors grades and significantly more Pass and Fail grades in clerkships than students progressing satisfactorily (see Table 1). They also scored significantly lower on the clinical composite score (mean 79.4 SD 3.9 vs. 82.3 SD 3.0, p<.001). Regression analysis indicated that concerning behavior was associated with lower clinical composite scores, even after controlling for knowledge acquisition. The final model accounted for 32% of the variance.

Conclusions
The results suggest that portfolio reviewers were able to identify students in the pre-clerkship phase whose concerning behavior affected future clerkship performance. Our study is the first to demonstrate that a portfolio review can successfully be used as an assessment method to identify behavior associated with lower clerkship grades and clinical performance scores. This is strong evidence that the decisions made from the portfolio review are valid and that a comprehensive portfolio system is an effective tool for use in competency-based medical education.

Table 1: Median number of clerkship grades between students with and without concerning behavior findings in the pre-clerkship portfolio review.

<table>
<thead>
<tr>
<th>Clerkship grade</th>
<th>Progressing satisfactorily</th>
<th>Concerning behavior</th>
<th>P</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Honors (IQR)</td>
<td>3 (4)</td>
<td>1 (4)</td>
<td>.004</td>
<td>.52</td>
</tr>
<tr>
<td>Median High Pass (IQR)</td>
<td>2 (2)</td>
<td>2 (1)</td>
<td>.864</td>
<td>.02</td>
</tr>
<tr>
<td>Median Pass (IQR)</td>
<td>1 (3)</td>
<td>3 (3.75)</td>
<td>.006</td>
<td>.50</td>
</tr>
<tr>
<td>Median Fail or PAR (IQR)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>.002</td>
<td>.54</td>
</tr>
</tbody>
</table>

Abbreviations: PAR= Pass after remediation; IQR=Interquartile range

Four total Fail or PAR grades were given, 3 to students in the “Concerning behavior” group.
Research Day Abstract

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Position:* Assistant Professor
Abstract Category:* Education Research
Principal Investigator:* Abra Fant MD, MS
Department:* Emergency Medicine

Does this research involve women’s health?* no

Abstract Title: * TALKS (Timely Assessment of Learner’s Knowledge and Skills): An Approach to Increase Volume and Quality of Resident Evaluations

Introduction
EM residency programs must complete biannual resident evaluations. Typically, the information for these evaluations is obtained from faculty via written or electronic end-of-shift evaluations. The information obtained is often vague with little formative value and, frequently, evaluations are not completed at all. Additionally, residents may receive the feedback at six-month evaluations, disparate in time from the occurrence. This may hinder their ability to improve in real time.

Educational Objective
Previously, we solicited evaluations via weekly electronic surveys and received a low response rate. Our goal was to increase the number of evaluations per resident. Secondary goals were to: increase the quality of comments and to provide timely feedback to residents who received poor evaluations.

Curricular Design
Three members of residency leadership initiated face-to-face conversations (“TALKS”) with other faculty members about resident performance during or after a clinical shift. During these 15-20 minute TALKS, faculty provided feedback about residents in a single post-graduate year (PGY) class via a structured interview. Comments were transcribed into each resident’s file. Faculty members also ranked residents in categories that are anchored to EM specific milestones (Table). Residency leadership reviewed evaluations weekly. Any resident “not meeting expectations” was discussed and an action plan was developed. Residency leaders met with these residents within one week.

Impact
337 evaluations were received from 16 faculty members in the first 4 months of TALKS compared to 88 evaluations from 12 faculty members over a similar period last year. On average, each PGY4 resident had 7.8 evaluations, PGY3s had 7.7, PGY2s had 6.9 and PGY1s had 2.2, compared to 1.0, 2.9, 1.7 and 1.2 respectively last year. Additionally, 20 discrete evaluations with negative comments or “does not meet expectations” were identified, compared to 3 last year.

The TALKS method resulted in a much higher number of evaluations per resident, and the ability to rapidly identify under-performers and provide timely interventions, when compared to methods used previously. This method could easily be adapted to other programs that also struggle to obtain sufficient evaluations.
Abstract Title: Comprehensive Curriculum Renewal at Northwestern University Feinberg School of Medicine

Background: Northwestern University Feinberg School of Medicine introduced a new undergraduate medical education curriculum in 2012; the stated mission was to “mentor and educate students to become exceptional, compassionate and innovative physicians, educators, and researchers” and “inquiry-driven team leaders.” During curriculum planning, the Carnegie Foundation issued an influential call for reform of medical education with four major recommendations for change. In this abstract we describe how we addressed each recommendation and report preliminary outcomes. To our knowledge, this is the first description of a holistic curriculum reform that responds to all four recommendations.

Methods to Address Carnegie Recommendations:

Recommendation 1: Standardize on learning outcomes and individualize learning processes. To ensure students meet specified outcomes, we adopted a competency-based learning framework with a portfolio evaluation system. Students must demonstrate competency in five domains (beyond medical knowledge) to advance to the next phase of training. To individualize learning, instructors began to diversify teaching methods, and pre-clerkship (phase 1) and core clerkship (phase 2) instructional time was condensed by four months to allow students to explore more electives early in their education.

Recommendation 2: Promote multiple forms of integration. In basic science, normal anatomy and physiology is now taught alongside the study of disease in a unified phase 1 course, a departure from teaching normal function in year 1 and disease in year 2. Alongside basic science, coursework in clinical medicine, health and society, and professional development links to the organ system being studied concurrently. Grades in phase 1 are derived from composites which integrate scores from basic science, health and society, clinical medicine, and professional development.

Recommendation 3: Prepare physicians who are committed to excellence by cultivating habits of inquiry, innovation and improvement. All students participate in the Area of Scholarly Concentration, completing an independent scholarly project by graduation. About 40% of students participate in the Education-Centered Medical Home, embedding in a primary care clinic to improve the quality of care for a panel of patients with chronic illness. Students actively engage in self-improvement by developing mentored learning plans to advance their achievement of particular competencies.

Recommendation 4: Address professional identity formation. All students work in small groups in an expanded 4-year “Personal Transition to the Profession” curriculum to explore challenging topics in physicianship. A teamwork and leadership thread runs through the four years as well. Career development is a major focus in year 3 and 4, with a week-long intersession run in career-focused tracks and two culminating capstone weeks matching students’ career intentions.

Outcomes: Coursework was far more integrated in the new curriculum. In a sample of phase 1 modules, 55% of contact time focused on non-basic science topics compared with 32% in the old curriculum. Despite this change in emphasis, mean USMLE step 1 scores were unchanged (237 in the first new curriculum cohort vs. 238 in the last old curriculum cohort). Beyond medical knowledge, 241/310 (78%) of students whose portfolios were reviewed after phase 1 met all benchmarks for competency, while six students were required to remediate before phase 2. After phase 2, 128/146 (88%) students met all benchmarks, and 4% remediated before phase 3. New curriculum students in phase 2 reported greater confidence in domains including situational awareness, research, epidemiology/biostatistics, ethics, and teamwork, and greater preparedness in communication, physical exam and clinical reasoning skills compared to old curriculum students. Seventy-two percent of new curriculum students authored an extramural publication or abstract and 50% were first authors, compared with 67% and 46% in the old curriculum, a non-significant increase. Ninety percent of new curriculum students graduating in four years pursued electives in their third year, compared with no students in the old curriculum.

Conclusion: Feinberg’s new curriculum attends to each major recommendation in the Carnegie report. Students experience greater integration of content within and across disciplines. They explore careers through early electives at higher rates than before. Medical knowledge outcomes remain consistent as evidenced by USMLE scores, while portfolio review allows students to more clearly demonstrate their achievement of other competencies essential for 21st century physicians.

*Abstracts longer than one page will not be accepted.
Research Day Abstract

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Position:* Resident (PGY-3)
Abstract Category:* Education Research
Principal Investigator:* Dave W Lu, MD, MBE
Department:* Emergency Medicine

Does this research involve women's health?* No

Abstract Title:* Emergency Medicine Trainees with High Emotional Exhaustion Are Associated with Lower Patient Satisfaction Scores

Background:
Burnout is a syndrome of emotional exhaustion, depersonalization and sense of low personal accomplishment. Emergency medicine (EM) physicians experience the highest levels of burnout among all specialties. Physician burnout is associated with lower quality of patient care. It is unknown if EM trainee burnout is also associated with poorer quality of care.

Objectives:
We examined the relationship between EM trainee burnout and resident-specific Press Ganey patient satisfaction (PS) scores. We hypothesized that burnout would be associated with lower PS scores.

Methods:
In this cross-sectional survey study conducted in October 2015 we assessed burnout in all post-graduate year 1-4 EM trainees at a single academic program using the Maslach Burnout Inventory. Resident-specific PS measures included: (1) likelihood to recommend; (2) courtesy; (3) taking the time to listen; (4) keeping the patient informed; and (5) concern for patient comfort. In our primary analysis overall burnout was dichotomized by high depersonalization or emotional exhaustion subscale scores and compared to PS scores using an independent samples t-test. In our secondary analyses each burnout subscale was treated as a continuous variable and compared to PS scores via linear regression.

Results:
Thirty-six out of 54 (66.7%) eligible trainees responded to the survey and 27 (75.0%) reported burnout. Excluding trainees lacking PS data, mean PS scores for the remaining 20 participants were: (1) 66.8 (SD ±11.3); (2) 70.8 (±11.3); (3) 67.6 (±11.8); (4) 62.7 (±12.0); and (5) 66.2 (±11.5). In our primary analysis there were no significant associations between overall burnout and PS scores. In our secondary analyses, however, high emotional exhaustion scores were negatively associated with all PS scores: (1) 95% CI (-0.86, -0.08), p=0.02; (2) CI (-0.88, -0.10), p=0.02; (3) CI (-0.88, -0.04), p=0.03; (4) CI (-0.92, -0.08), p=0.02; and (5) CI (-0.85, -0.02), p=0.04. There were no significant associations between the depersonalization and personal accomplishment subscales with PS scores.

Conclusions:
EM trainees’ emotional exhaustion scores were negatively associated with all PS scores. We did not find associations between overall burnout with PS scores, but these results may have been limited by the study’s small sample size.

*Abstracts longer than one page will not be accepted.
Research Day Abstract

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Abstract Category:* Education Research
Principal Investigator:* Dennis B. Liu, MD
Department:* Urology/Pediatric Urology

Does this research involve women's health?* No

Abstract Title: * Urology Resident Education in Research Fundamentals: Is there room for improvement?

Introduction:
The “advancement of resident knowledge in the basic principles of research” is one of the core requirements set forth by the ACGME on urology residency training programs. Although 78% of residency programs provide dedicated research time, we hypothesized that few residents currently receive formal education in research fundamentals. The aim of this study was to assess the current state of resident education in research fundamentals and their perceived need and interest in a formal curriculum.

Materials and Methods:
A 15-question survey was administered to attendees of the American Urological Association Resident forum. The survey assessed the residents’ exposure to dedicated research time, didactic teaching in research principles, their confidence and knowledge of basic research fundamentals, and their interest in a research curriculum if it were available.

Results:
168 surveys were returned, of which 10 had incomplete responses. While 113 (67%) of respondents indicated dedicated research time in their residencies, only 66 (39%) indicated that formal training in research principles was provided. 87 (55%) of respondents indicated confidence in submitting an IRB proposal. However, 86 (54%) expressed little to no confidence in research design principles and 114 (72%) expressed little to no confidence in their knowledge of biostatistics. In a brief 4-question assessment of basic research knowledge, only 11 (7%) were able to answer all 4 questions correctly. 63 (40%) answered 3 of 4 correctly, 29 (24.7%) answered 2 correctly, 42 (26.6%) answered 1 correctly, and 3 (1.9%) answered 0 correctly. There was no significant difference in correct answers to the 4 question assessment or level of confidence in knowledge between residents who have and have not completed their research time. 112 (73%) of respondents indicated an interest in participating in a formal research curriculum as part of their residency training.

Conclusion:
Formal education in research principles is currently lacking in urology residency training programs despite strong resident interest. The presence of dedicated research time alone was insufficient for improving residents’ confidence and knowledge in research fundamentals. Our study demonstrates that there exists both a need and interest amongst urology residents for a formal research curriculum in their residency training programs.
Research Day Abstract

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Position: Medical Students
Abstract Category: Education Research
Principal Investigator: Gabriel A. Arenas, BS; Pamela Wax, BA; Gregory E. Brisson, MD
Department: Medical Education
Does this research involve women's health?: No

Abstract Title: An Innovative Approach to Career Development through a Network of Alumni and Medical Students

Summary: Medical students often experience anxiety when choosing a specialty because they may have little knowledge about the daily lives of attending physicians and also because of concern that making a choice narrows options in their future careers. Consequently, career development programs are an essential part of medical school and employ a wide range of formats, including student-led specialty interest groups, specialty advisors, and shadowing experiences. While students find these programs valuable, there are some potential limitations: They primarily rely upon faculty devoted to teaching and research, offering limited exposure to physicians with careers that extend beyond traditional academic circles; and students may be inhibited to ask candid questions about the personal lives of faculty who may at some point evaluate them. To augment existing programs, we identified Feinberg School of Medicine (FSM) alumni as a potential resource for students and developed a program, the Real Physicians of Feinberg (RPF), through which students have an opportunity to talk with alumni in a casual, intimate setting and learn about the everyday lives of attending physicians with diverse backgrounds, professional paths, and personal interests.

Objective: RPF exposes students to attending physicians with diverse backgrounds and multifaceted careers, enabling them to learn about personal and professional lives of physicians. The goal of RPF is to reduce students’ anxiety about making their specialty choice by helping them to better understand the daily lives of physicians after residency training and recognize the versatility of a medical career independent of specialty.

Sample: FSM medical students from all four years of training were invited to attend RPF sessions.

Methods: In partnership with FSM Alumni Relations, we recruited mid- to late-career alumni with professional experiences that include and extend beyond traditional academic circles to participate in a series of casual dinners with medical students. These alumni have had diverse career paths, including global health, medical education, research, community engagement, hospital administration, private practice, and entrepreneurship. At dinner, participants engage in informal conversation centered around the physician’s life story, including career path from medical school to present, what the physician does at work all day and his/her life outside of medicine. A few days later, we followed up with student participants by sending an email containing a link to a voluntary, anonymous survey about the RPF session. Survey responses were quantified using a 5-point Likert Scale (1—strongly disagree to 5—strongly agree).

Results: To date, 11 RPF sessions have occurred, and 16.8% (122/728) of FSM students have participated in at least one session. The breakdown of student participants by year of training was: 64% M1s, 31% M2s, 3% M3s, and 2% M4s. The survey response rate was 49% (60/122). Our results demonstrate that students find RPF sessions helpful with career planning (rating average=4.13). Respondents report reduced career-related anxiety (rating average=4.03; figure 1) and recognition of the importance of finding work-life balance in medicine (rating average=4.48; figure 2).

Conclusions: Students find RPF sessions helpful with career planning. These sessions can reduce medical students’ anxiety about choosing a specialty and promote the importance of work-life balance.

1. RPF reduced my anxiety about picking a specialty

2. RPF helped me understand that all physicians have to develop their own plan for work-life balance.
Research Day Abstract

Presenting Author: Kelly O’Hara, MD
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Position: Instructor
Abstract Category: Education Research
Principal Investigator: Jeffrey H. Barsuk, MD, MS
Department: Medicine

Does this research involve women’s health? No

Abstract Title: Examining the Effects of Simulation Based Mastery Learning on Thoracentesis Outcomes

Background: Medical procedures are the second most common cause of serious or fatal iatrogenic complications in hospitalized patients. Traditional training methods do not prepare residents to perform these procedures safely. Simulation provides an opportunity for residents to gain these skills. Our institution has successfully used the mastery learning model with simulation to train residents on procedural skills including Advanced Cardiac Life Support, CVC insertion, lumbar puncture, and paracentesis. This study examined the impact of a simulation-based mastery learning (SBML) thoracentesis curriculum on resident skill and patient outcomes. Our hypothesis was that the SBML training would lead to improved thoracentesis skills and patient outcomes (decreased pneumothorax and hemothorax rates). Our objective was to assess the effectiveness of the SBML thoracentesis curriculum in the simulated and clinical environments.

Methods: We performed a randomized wait-list control study of internal medicine residents who were about to rotate on the medical wards from December 2012 to May 2015 at Northwestern Memorial Hospital in Chicago. A 20% sample of these residents was selected to participate each month. Study residents were evaluated on their simulated thoracentesis skills (pretest) using a 26-item checklist. Subsequently, residents watched a video recorded lecture and participated in deliberate practice on the simulator. Finally, residents were posttested and expected to meet a minimum passing score (MPS) before training completion. All thoracenteses performed on the medical wards during the study period were identified by a query of the Enterprise Data Warehouse. The presence of a post-procedure pneumothorax and hemothorax was assessed by chart review by two authors (KO, SK) independently. We compared complication rates of procedures performed by residents who participated in SBML to those who did not.

Results: 111 residents participated in the SBML thoracentesis training. The median pretest score on the clinical skills checklist was 58.0% (IQR 42.0, 77.0) correct and the median posttest score was 96.0 (IQR 96.0, 100.0) (p<0.001). 20 (18%) residents failed to meet the MPS at posttest during their first attempt. All were able to meet the MPS with less than one hour of additional deliberate practice. We collected data on 764 thoracentesis procedures performed on 584 patients. 52 (6.8%) thoracentesis procedures were performed by SBML trained residents and 60 (7.9%) thoracentesis procedures were performed by non-simulator-trained residents. Compared to procedures performed by SBML trained residents, procedures performed by non-simulator-trained residents had higher rates of pneumothorax (5.8% and 10.0% respectively; OR 2.81; 95% CI 0.6-12.3; p=0.17). Differences in hemothorax rates between SBML trained and non-simulator-trained residents (0% and 3.3% respectively) were not statistically significant.

Conclusion: Residents who completed the SBML curriculum were able to dramatically improve their thoracentesis skills. SBML is an effective tool for training on procedure skills. The effects of the training are also seen in the clinical environment as trained residents performed procedures with improved patient outcomes. SBML should be a key component of resident education as it leads to well-trained residents who perform procedures safely.
Research Day Abstract

Abstract Title: Building a culture of accountability and respect: Results from a resident-led professionalism curriculum

**Purpose:** As an ACGME Core Competency, Professionalism is a key piece of residency training. There are various approaches to teaching Professionalism, but no reported curriculum where learners themselves have been involved with the development and implementation. Resident-led professionalism training activities can address barriers to teaching professionalism by providing learner buy-in, promoting competency-based models and identifying realistic case-based examples and effective learning modalities. This article describes a resident-initiated and resident-led Professionalism curriculum at the Northwestern McGaw Family Medicine Residency during the years of 2013-2015.

**Method:** Specific activities included formalized peer-to-peer feedback sessions, training for faculty and residents on communication and leadership skills, 360-degree yearly evaluations of residents, case-based group workshops and a resident-created Code of Conduct. Annual curriculum evaluation and professionalism culture assessment was conducted with the PMEX, a validated professionalism assessment tool. Small group qualitative interviews regarding professionalism training were also conducted with residents.

**Results:** The results demonstrate that a targeted intervention can have an impact on specific behaviors. The results also indicate that residents prefer case-based and situational professionalism training and value self-awareness of professional behaviors. Quantitative Analysis: Twenty-one respondents evaluated professionalism at baseline, 26 evaluated it at the end of year one, and 20 in year two. An ANOVA was used to analyze the differences in group mean scores between the three measurement phases—Baseline, Year 1 and Year 2. Mean scores were compared for each of the PMEX items and for the four subscales-- doctor-patient relationships, time management, reflective skills and inter-professional relationships.

Qualitative analysis: The themes fell into four broad categories- Professionalism Definitions, Current Methods of Teaching Professionalism, Desired Methods of Teaching Professionalism and Evaluation of remediation of Professionalism. Residents expressed a clear preference to learn on the job and in case-based discussions rather than large didactic lectures. Residents also commented on the importance of professionalism as a competency and that unprofessional behaviors must be addressed. Notably, residents expressed belief that development of professionalism requires personal self-awareness and an individual ability to self-regulate.

**Conclusions:** A resident-driven professionalism curriculum can provide structure and focused learning activities to enhance self-awareness and promote a culture of professionalism. The PMEX is a useful tool to survey professional culture and implement targeted interventions.