International Electives During Orthopaedic Residency: Barriers and Opportunities

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Objectives: There is a growing interest among residents of various specialties for international medical missions. The goal of our study was to evaluate the perceived barriers and opportunities for an elective resident rotation overseas among North American orthopaedic residency programs.

Methods: All 179 North American orthopaedic residency programs were surveyed using an online questionnaire, assessing the logistics and perceived barriers of having an international elective for orthopaedic residents. All 31 current residents of a single orthopaedic residency program that was planning to initiate an overseas elective were also surveyed. Survey responses were analyzed for trends in frequency and mean. Statistical analysis was performed to detect any significant differences in responses between programs with an international elective, and those without such an elective.

Results: Fifty-six (31%) of the surveyed orthopaedic residency programs and 29 (94%) residents responded to the survey. Eighteen orthopaedic residency programs reported currently having an international elective for residents. The size of these programs ranged from two to 12 residents/year (mean =5). The most commonly cited objective amongst these programs was to increase cultural awareness (72%) and make international connections (50%) for the trainee. The most popular overseas sites for such electives were in Africa and Central America. Electives were offered during the last three years of residency (PGY-3-5), for either two or four weeks. Twelve (66%) programs provided their residents with some financial assistance from scholarships and grants. Compared to programs without an overseas elective, a significantly greater percentage of programs with an elective (61% versus 20%; p=0.004) selected “safety while abroad” as a barrier. On the other hand, a greater percentage of programs without an overseas elective (73% vs. 39%; p=0.02) selected “financial costs” as a barrier. No correlation was found between the orthopaedic residency program size, or location, and their offering an international elective to their residents. Twenty-five (86%) of the 29 responding orthopaedic residents were interested in participating in an international elective, if offered. Fourteen (48%) of the responding residents were willing to use their vacation time to travel overseas for such an elective. When asked to rank their expectations of an international elective, 62% of the responding residents ranked “improve technical skills” as the most important reason to participate in an international rotation. The most popular time to do an overseas elective was the PGY-4 and 5. Four weeks was
considered the optimal time for this experience by 62% of the responding residents. The most frequently cited concern among residents was the financial cost (90%), with 18 residents reporting a current education debt of over $150,000. No correlation was found between the surveyed residents’ age, educational debt, marital status, or having children, and their desire to do the elective.

**Conclusion:** At least 10% (18/179) of orthopaedic residency programs in North America already have established international electives for their residents. Over half of these programs offer some form of financial support for residents to undertake the overseas elective. Despite a growing interest among orthopaedic residency programs to pursue clinical experience overseas, there are perceived barriers including personal safety, financial costs, and administrative constraints. Further research is needed to assimilate the experience of existing orthopaedic overseas electives to assess the feasibility and benefit of creating these electives at other residency programs. Such additional information will also help identify the psychosocial and educational impact of an overseas elective on all parties: residents, residency programs, and the host country/institution.

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Objectives: Current training for spine surgeons in the United States consists of a residency in either orthopaedic or neurological surgery followed by an optional spine surgery fellowship. Program director survey data may assist in ongoing efforts to improve contemporary spine training. The goals of this study were to (1) collect data on spine surgical experience during orthopaedic and neurological surgery residency and (2) assess the opinions of program directors (PDs) from orthopaedic and neurological surgery residencies and spine surgery fellowships regarding current spine surgical training in the United States.

Methods: An anonymous questionnaire was distributed to all PDs of orthopaedic and neurological surgery residencies and spine fellowships in the United States (N=382). A five-point Likert scale was used to assess attitudinal questions. A two-tailed independent-samples t-test was used to compare responses to each question independently.

Results: One-hundred and forty-seven PDs completed the survey. Orthopaedic PDs most commonly indicated their residents participate in 76-150 spine cases during residency, while neurological surgery PDs most often reported >450 spine cases during residency (p<0.0001). When asked about time spent dedicated to spine surgery in current orthopaedic surgery residency training in the United States, 73.1% of Orthopaedic PDs answered that the dedicated time was “just right,” while 50% of neurological surgery PDs and 71.1% of spine fellowship PDs answered “too little” (p<0.002). When asked about time spent dedicated to spine surgery training in current neurological surgery residency training in the United States, 53.8% of Orthopaedic PDs had “no opinion,” while 83.3% of neurological surgery PDs and 71.1% of spine fellowship PDs answered “just right” (ns). Forty-two point six percent (23/54) of orthopaedic surgery PDs felt their trainees were highly confident in performing spinal instrumentation and decompression at the conclusion of their training program, while 100% (43/43) of neurological surgery PDs reported high confidence in their trainees (p<0.001). When asked if their trainees were highly confident in performing adult spinal deformity surgery at the conclusion of their training program, only 13.0% (7/54) of orthopaedic surgery PDs and 31.8% (14/44) of neurological surgery PDs agreed (p=0.030). Over 88% of orthopaedic surgery program directors and 0% of the neurological surgery PDs recommended that their trainees complete a fellowship if they wish to perform community spine surgery (p<0.001). In contrast, 98.1% of the orthopaedic PDs and 86.4% of neurological surgery PDs recommended that their trainees complete a fellowship if they wish to perform spinal deformity surgery (p=0.038). The majority of PDs agreed that surgical simulation and competency-based training could improve spine surgery training (76% and 72%, respectively). Less than half (26/53) of orthopaedic residency PDs and 52.4% (22/42) of neurological surgery PDs reported that they were satisfied with the current spine training
model in the United States, while only 28.9% (13/45) of spine fellowship PDs were satisfied with the current spine training model.

**Conclusion:** This study examined the opinions of orthopaedic and neurological surgery residency and spine fellowship PDs regarding current spine surgery training in the United States. While a majority of orthopaedic PDs felt that orthopaedic residency training provides adequate exposure to spine surgery, most neurological surgery and spine fellowship PDs believe that orthopaedic residency provides too little spine exposure. A large majority of PDs felt that both orthopaedic and neurological surgical trainees should complete a fellowship if they plan to perform spinal deformity surgery. These results provide a background for further efforts to optimize contemporary spine surgical training.
A Porcine Knee Model is Valid for Use in the Evaluation of Arthroscopic Skills in a Residency Program

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Objectives: The aim of the following study was to validate a porcine model of the knee for knee arthroscopy skills evaluation in a residency program and to develop a model of meniscus tear for skills development in knee arthroscopy.

Methods: Participants, including orthopaedic residents, fellows, and staff surgeons, were recruited and asked to complete pre-study surveys including level of training and arthroscopic surgical experience. Each participant completed a diagnostic knee arthroscopy on a human cadaveric specimen and a porcine knee specimen. Ten minutes were allotted for each diagnostic arthroscopy but unlimited time was given to perform a partial meniscectomy on the porcine specimen. A hand view and an arthroscopic view were recorded in conjunction with each arthroscopic procedure. The previously validated Objective Assessment of Arthroscopic Skills form and a published diagnostic knee arthroscopy checklist evaluation were utilized for un-blinded global skills assessment of each participant. The internal consistency was measured using Cronbach’s alpha. Pearson’s correlation coefficient was used to associate previous arthroscopic experience with global and checklist scores.

Results: Internal consistency for each of the three procedure simulations, as well as between the procedure simulations, was found to be high in the human cadaver diagnostic arthroscopy (0.94), the porcine diagnostic arthroscopy (0.96), and the porcine meniscectomy (0.96). There was a strong correlation between years in practice and arthroscopic skill level which increased as the difficulty of the surgical simulation increased (human diagnostic arthroscopy: 0.75, porcine diagnostic arthroscopy: 0.80, porcine meniscectomy: 0.84).

Conclusion: A porcine model has shown initial validity as a knee model for the evaluation of arthroscopic skills in a residency program. Given a 40-fold reduction in cost, the porcine knee may represent a viable alternative to infrequent cadaver courses or skill development in the operating room. Further blinded assessment is necessary to demonstrate reliability of the results found above.
Orthopaedic Boot Camp: Objective Analysis of Basic Surgical Skills Using Motion Analysis Technology

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Objectives: Recent changes have been introduced to the PGY-1 orthopaedic surgery year in response to decreased training opportunities. Intensive surgical skills programs such as boot camps have been proposed as a method to efficiently and effectively teach residents basic surgical skills. By reducing the time to learn basic motor skills, residents would be able to maximize the current learning opportunities available to them. Previous studies have examined the effectiveness of orthopaedic boot camps by utilizing the objective structured assessment of technical skills (OSATS) test. While OSATS has been validated as a metric, its results rely on grading scales and the subjective interpretation of expert examiners. Current literature lacks truly objective data demonstrating that trainees’ basic surgical skills improve. This study aims to provide objective data regarding these programs’ effectiveness by utilizing motion analysis technology for monitoring. Question: Do orthopaedic surgery interns’ basic suturing and knot-tying skills objectively improve after completion of boot camp?

Methods: Four PGY-1 orthopaedic interns completed a basic surgical skills boot camp for the first month of their residency training. Specific sessions on suturing mechanics consisted of both bench-top ex-vivo suturing as well as one-on-one guided practice while dissecting and suturing cadaveric tissue. Sessions were led by both the orthopaedic surgery program director and senior residents. Tasks selected for measurement were one- and two-hand knot tying, instrument knot tying, and running suture. Interns completed the above tasks using a technique of motion analysis instrumentation that incorporates sensors underneath a surgical latex glove. Performance was measured pre- and post-boot camp with motion analysis technology. Statistical analysis was completed with repeated measures ANOVA.

Results: Following boot camp interns’ time to completion decreased with one-hand knot tying by an average of 3.77s (p<0.05), two-hand knot tying decreased by 5.12s (p<0.05), instrument knot tying decreased by 10.06s (p<0.05), and running suture also decreased by an average of 11.52s (p<0.05). Evaluation of effect size reveals considerable variation in path length and time to completion for hand knot-tying tasks. Less variation was demonstrated with the path length of running suture and instrument knot tying. Path length was decreased with one-hand knot tying by an average of 0.8m (p=0.02), two-hand knot tying decreased by 8.08m (p<0.05), instrument knot tying decreased by 16.28m (p<0.05), and running suture also decreased by an average of 16.24m (p<0.05).

Conclusion: As a group, the interns significantly decreased their time to completion and path length with each of the four surgical tasks. These findings correlate with prior boot camp studies and provide objective data to support the belief that basic surgical skills can be improved in a rapid, structured manner with intensive training programs. With earlier proficiency of basic surgical skills, it is possible that more operative time could be dedicated to learning more complex tasks and new techniques.
Systematic Instruction of Arthroscopic Knot Tying: An Objective Evaluation Tool

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Objectives: Although the operating room remains the most widely used forum for teaching surgical skills, the variability in acquisition of these skills makes it difficult to assess residents' technical abilities and ensure they are all exposed to the same core procedures. These issues have made surgical simulation an important and increasing aspect of resident education. Instruction, evaluation, and feedback are composite roles of the academic surgeon, however, resident self-assessment is also important for their long-term development. A Proficiency Formula was developed and introduced as an objective self-evaluation method for evaluating basic arthroscopic knot-tying skills in a laboratory setting. The correlation between the Proficiency Formula and the gold standard pass/fail dichotomy was demonstrated, as well as with other popular evaluation tools including Task Specific Checklist (TSC) and Global Rating Scale (GRS).

Methods: A step-by-step video tutorial was used to instruct 35 medical students on how to tie an arthroscopic SMC knot secured by three half hitches. During this instructional period expert faculty feedback was also provided. Participants were video recorded performing arthroscopic knot tying and assessed on their success in tying a Samsung Medical Center (SMC) knot, pass or fail, and through three outcome tools: the Proficiency Formula, GRS, and the TSC. During the video recording only their hands and knot were visible to blind the evaluators to the identity of the participants. The Proficiency Formula is a composite score assessing both speed (timing score) and precision of performance (penalty score). The penalty score took into account the accuracy and security of the knot and was a sum of three knot components (approximation, slippage, and disruption). The TSC represents an operation-specific score and an arthroscopic SMC knot-specific checklist was developed in consultation with five expert arthroscopic surgeons who routinely tie arthroscopic knots to ensure that the instrument captured the salient dimensions of tying a SMC knot. Independent samples t-test was used to compare the GRS, TSC, and Proficiency Formula scores, between those who were passed or failed by the evaluators. Correlation between the measurement scales was tested using Spearman' rho correlation coefficient.

Results: Participants received a mean proficiency score of 195 (140-249). The mean Proficiency score for those who passed was 323 (95% CI: 272-374), for those who failed, 87 (95% CI: 26-148, p<0.001). We found strong linear correlation between the Proficiency Formula and GRS and TSE (0.83 and 0.78 respectively).

Conclusion: The Proficiency formula can be used to objectively assess simulator-based arthroscopic knot-tying skills. It has sufficiently high correlation to already accepted outcomes using pass/fail, GRS, checklist, and proficiency scores. This is a useful tool to allow orthopaedic residents to perform self-assessment of their arthroscopic knot tying skills and an evaluation tool that allows faculty to quantify and track progress in resident skill acquisition and progress. Additionally, this serves as an evaluation model that can be applied to other Orthopaedic or surgery simulators.
Does Lecture Length Affect Learning in Residency?

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**Objectives:** The purpose of this study is to determine if the length of lecture affects the ability to retain information either immediately post lecture or at an extended time point.

**Methods:** Eighteen orthopaedic residents at Medstar Georgetown University Hospital were divided into two groups based on their current rotation schedule. Nine residents, including two PGY1, two PGY2s, one PGY3, three PGY4s, one PGY5 were given four one-hour lectures on separate days. A second group of nine residents, one PGY1, two PGY2s, three PGY3s, three PGY5s were given the lectures in one four-hour block. One board certified orthopaedic surgeon gave the lectures. Both groups were given a pre-test, an immediate post-test, and a one month post-test. The lecture topics included gout, muscle injury, performance enhancing drugs, and brachial plexus injuries. Each test was made up of five questions from previous orthopaedic in-training exams.

**Results:** Initially the four tests were grouped together and analyzed as a whole. No significant difference was found using a multivariate model between the two groups after controlling for PGY (P value 0.9292). However, there was a significant difference between grouping the junior residents, PGYs 1-3, and the senior residents, PGYs 4-5 (P value 0.0375). The combined score of the four-hour group’s pre-test for the PGYs 1-3 was significantly lower than the PGYs 4-5 (P value 0.0338), but the immediate post-test and one month post-test had no significant difference. For the gout lecture in the one-hour group, the PGYs 1-3 had significantly lower scores than PGYs 4-5 (P value 0.0124) but there was no significant difference after the pre-test. For performance enhancing drugs and brachial plexus injuries in the four-hour group, the senior residents did significantly worse on the immediate post-test (P value 0.0225 and 0.0225 respectively) but the difference was insignificant at one month.

**Conclusion:** This study showed no significant difference among the three time periods after controlling for PGY, but it did show a significant difference between the groups PGYs 1-3 and 4-5. This is likely due to the small sample size; there was only one PGY5 in the four one-hour testing group and therefore residents were grouped as junior (PGY1-3) and senior (PGY4-5) residents. A drop in scores was seen in the immediate post-test for the third and fourth lecture hours of the four-hour group, illustrating a possible dip in concentration at this time. The junior residents in the gout lecture in the one-hour group had lower scores than the senior residents, but this difference was insignificant at the post-test and one month post-test. It is possible that the younger residents retained the information from the lecture and were able to reduce the difference in scores in the post and one month post-test. This study has limitations, primarily its small sample size. Another confounding variable is a resident’s familiarity with the subject prior to the lecture. The senior residents scored high on the pre-test and therefore did not have much room for improvement. The lectures were given at different times of the day with the four separate lectures given in the morning and the one four-hour block at the end of the day. This is a pilot study on lecture length and the effects on
learning and retention, and a larger randomized study is needed to evaluate lecture formatting in order to better prepare future surgeons. With restrictions on work hours and the intensity of a surgical residency, lectures should be optimized so that residents can maximize their learning and retention; thus, the development of a curriculum that supports the most effective methods of learning is needed.
The Value of Cultural Competency in Orthopaedic Residency

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Objectives: Standardized educational goals and methodologies for practicing culturally competent care (CCC) are not currently available in orthopaedic surgery. The Accreditation Council for Graduate Medical Education (ACGME) requires orthopaedic residents to offer culturally competent care for our patients. The Diversity Advisory Board (DAB) of the American Academy of Orthopaedic Surgeons (AAOS), as one of its goals, has developed an educational program on Culturally Competent Care. The program was developed in 2009 and has been presented at numerous orthopaedic venues since then. The objective of this study was to measure the self-reported results on the efficacy and benefits of this program to orthopaedic residents, faculty, and practicing orthopaedic surgeons.

Methods: A standardized cultural competency grand rounds educational program was created by the AAOS DAB for presentation at individual residencies. A total of 16 presentations were given and evaluated by 237 individuals. The presentation was given at 13 different residency programs over three years.

Results: The average age of the program participant was 31.0 years. 67.9% self described themselves as Caucasian, 5.5% as African-American, 13.9% as Asian-American, and 4.6% as Hispanic-Latino. 96% felt that culturally competent care should be taught in medical schools while 90.8% felt that it should be taught in residency programs. 73.1% of evaluations graded their satisfaction as at least four out of a maximum of five.

Conclusion: Orthopaedic surgery residents felt that culturally competent care should be taught within the residency educational curriculum. The vast majority of orthopaedic residents were satisfied with such educational programs. A grand rounds lecture program is a useful tool to provide focused, educational advice in improving knowledge on CCC and fulfilling this ACGME requirement.
Objectives: Mobile tablet computers are quickly becoming commonplace in personal life, business, and education. They are also redefining the health care field in clinical and educational realms by transforming the ability of providers to connect, disseminate knowledge, and access patient care information. In response to the increasing interest in mobile computing and rich digital content among residents, our program developed a Digital Curriculum Initiative (DCI). Its purpose was to construct a robust, integrated digital environment of high quality orthopaedic content online. In addition, the initiative provided a preconfigured tablet computer to each resident to enhance their learning experience and clinical efficacy by providing a mobile integrated access point for education, collaboration, and patient care. The purpose of this study was to evaluate resident preferences regarding learning and mobile computing, in addition to evaluating its initial impact on resident education.

Methods: Forty residents in an orthopaedic surgery residency program were anonymously surveyed prior to starting the DCI regarding preferred study methods and their interest in a tablet-based learning platform. Six months after launch, surveys were repeated. Proportions were compared with Fisher exact tests, and trends in subjective responses were evaluated.

Results: Surveys prior to the DCI showed 89% (31/35) were “very interested” and 9% “fairly interested” (3/35) in instituting a tablet-based learning platform, yet less than a third of respondents owned a tablet. Only 20% (7/35) of residents indicated their preferred method of studying was reading physical books or journals. Six months after the launch, survey response rate was 83% (33/40), with two of these residents excluded after electing not to receive a tablet. Overall satisfaction with the DCI was 97%. The number of residents using a tablet as their primary means of studying increased from 28% to 55% (p=0.03). Use of digital textbooks and journals also significantly increased (p<0.05). All responders thought the tablet and digital online ecosystem optimized the resources available, and 90% felt it had enhanced their education and residency experience. Furthermore, 58% had directly used the tablet for patient education, and 71% used it for clinical duties more than once a month. Consistently, residents most appreciated the tablet’s portability, easy access to electronic books and journals, as well as having a centralized location for notes and resources. Residents requested more tutorials, and enhancements with how the tablet integrated with a shared server and online resident portal.

Conclusion: A tablet-based platform for orthopaedic surgery education was implemented in a program of 40 residents. Prior to its launch, surveyed residents showed widespread interest in mobile computing, and six months after implementation there was a significant increase in digital content usage and studying. Overall satisfaction was high, especially regarding the tablet as an easy to use, portable means to access consolidated electronic resources and secure patient information. Results also demonstrated encouraging tablet use for point of
care patient education and resident collaboration. While enabling residents to have a centralized mobile library of rich digital content, organization is necessary to provide guidance and avoid information overload. Coordination with technology staff ensures support and proper security protocols are followed. Future studies will evaluate the ability of this innovative platform to enable collaboration among residents, as well as patient perceptions of tablet-based patient education by physicians.
Prospective Analysis of a Novel Orthopaedic Residency Advocacy Education Program

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Objectives: Orthopaedic residents are the future leaders of our specialty, and each year the practice of orthopaedic surgery becomes more complex in response to increases in innovation, regulation, and specialization. Residents need to be aware of the mounting impact these forces will have on their patients, their practice, and their specialty. Future orthopaedic leaders must be able to critically assess health care policy. Currently, there exists no nationally accepted, standardized curriculum to provide specific education during residency training with regard to these important topics. We therefore developed an “Advocacy” curriculum for our own orthopaedic residents designed to direct particular attention to patient advocacy and specialty advocacy, as well as overall health care policy. The objective of this study was to assess the perceived benefits of this novel orthopaedic advocacy education program.

Methods: A novel advocacy education curriculum was created for orthopaedics residents and implemented with GME and departmental funding. Residents received a series of lectures on specific advocacy-related topics, and participated in grand rounds and journal clubs focusing on advocacy-based concepts. Residents were given pre- and post-curriculum questionnaires to gauge their perception of the relevance, importance, strengths, and weaknesses of this curriculum. A paired t-test was used to compare pre- and post-curriculum responses. A p-value of <0.05 was used to determine statistical significance.

Results: 21 of 24 orthopaedic residents completed the pre-curriculum and post-curriculum questionnaire regarding the importance of advocacy education (87.5 % response rate). Overall, 85.7% (18/21) of responders ranked the curriculum on orthopaedic advocacy as good or excellent. Prior to the advocacy curriculum, 33.3% (7/21) of residents felt that learning about orthopaedic advocacy was important or very important to their education, while following the curriculum 100% (21/21) felt so (p<0.05). The percentage of residents who considered health policy to be important increased from 71.4% (15/21) to 95.2% (20/21) following the curriculum (p<0.05). The relevance of underinsured and uninsured advocacy increased from 66.6% (14/21) to 100% (21/21) (p<0.05) following this curriculum. The relevant impact of education about state level advocacy increased from 40% (8/20) to 90.5% (19/21) (p<0.05). Lastly, following the advocacy curriculum, 90.5% (19/21) of responders would be interested in getting involved in orthopaedic advocacy as a resident and/or fellow if ever afforded such an opportunity.

Conclusion: This study examined the educational results of a novel orthopaedic advocacy program. This curriculum significantly increased residents' belief in the importance of advocacy issues. Following the curriculum, 100% of residents considered orthopaedic advocacy as an important component of residency training. Future orthopaedic leaders will clearly need the tools to be able to influence public policy. Physicians are likely the only group who truly understand the implications of policy decisions on their patients, their practice, and
their specialty. An advocacy curriculum may serve as an integral preparatory educational core component paramount to residency training in the 21st century.
From Peer-Reviewed Meetings to Peer-Reviewed Journals: The Rate and Impact of Trauma Articles in the COA Meetings

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Objectives: Scientific meetings constitute an important element in exchange of expertise and novel ideas. Studies presented in those meetings pass through a peer review process before reaching the podium. Naturally, a number of those articles will be published in peer reviewed journals as part of the knowledge dissemination process. The Canadian Orthopaedic Association meeting (COA) is one of the most important meetings in Canada and North America. The research presented in this meeting represents a collaborative effort of many surgeons and scientists in Canada and all over the world. Trauma papers represent one of the major subjects presented in the meeting. The number of papers presented often exceeds other subspecialty areas in orthopaedics and are assigned several sessions in every meeting. The aim of our study was to review the trauma papers presented in the COA meeting between 2008 and 2012 and assess the rate of publication in peer review journals.

Methods: All trauma papers presented as a podium or poster at the trauma section of COA meetings from 2008 to 2012 inclusive have been assessed for publication. The databases of PubMed, Science Direct, and Scirus have been used in this review process. If the study was not published under the presentation title, an individual search of the first two authors and the senior author was conducted looking for studies with similar aim, outcome measures, and methodology. Our primary outcome of interest was the publication rate of the literature presented at the COA meetings. We also assessed the time to publication, any changes in title, authorship, methodology, and sample size. The level of evidence of the study and the Journal impact factor have also been documented.

Results: In total there were 185 articles accepted as a podium or as a poster presentation for the trauma section of the COA meetings between 2008 and 2012. Out of the total 141 papers presented as podium, 49 (35%) articles were subsequently published in peer-reviewed journals and 13 (30%) articles were published out of the 44 posters. On average, the impact factor of the journals was 2.2 (range 1.3-4.4). The level of evidence was >3 in 44% of the clinical published studies. There were changes in 30 out of the published 62 titles (papers or posters) and 28 study authorships were altered prior to publication. Sample size had been changed in 10 of the total published studies and methodology in six studies with a similar declining pattern.

Conclusion: Publication rate of subspecialty trauma papers at the COA is comparable to publication rates of other international association meetings. Articles in general were published in high impact journals. The trend of altering title, authorship, sample size, and methodology is declining over time. The potential role of a COA journal to significantly change the rate of publications and add a high level of evidence to the body of literature remains an important question.
Factors Impacting Musculoskeletal Knowledge and Clinical Confidence in Graduating Medical Students

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Objectives: Despite the prevalence of musculoskeletal (MSK) disorders, the degree to which medical schools are providing students the knowledge and confidence to treat these problems is unclear. This study evaluated the factors that impact MSK knowledge and clinical confidence in fourth-year medical students.

Methods: Over a three-year period, 253 fourth-year medical students participated in the study at a single institution. MSK knowledge was evaluated using a National Board of Medical Examiners (NBME) MSK medicine subject examination. Factors analyzed included: MSK elective experience during medical school; whether students were pursuing careers in MSK medicine or primary care medicine; and overall satisfaction with the MSK curriculum.

Results: Participation rate was 95%. The NBME MSK assessment score was 70.7±2.9 for all fourth-year medical students. Taking an MSK elective increased knowledge (p<0.001) but not clinical confidence. Increased satisfaction with how MSK medicine was taught led to increased clinical confidence (p<0.01). No significant differences were seen if students were going into MSK medicine or primary care for either MSK knowledge or clinical confidence. Multivariate analysis of MSK knowledge found that taking an MSK elective for two weeks led to a six point (out of a possible 100) increase in NBME scores.

Conclusion: This study reveals that participation in a clinical elective is the only factor that led to a significant increase in MSK knowledge in fourth-year medical students. A two-week clinical elective can be sufficient time to have a major impact on MSK knowledge, but it alone does not increase clinical confidence. Further studies are needed to determine how to improve MSK clinical confidence.
Assessment of the Intrinsic CanMEDS Roles using an Objective Structured Clinical Examination (OSCE): Incorporation of Summative and Formative Feedback

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Objectives: Previous research at the University of Toronto Orthopaedic Department demonstrated that a CanMEDS OSCE is a valid and reliable method of assessing the understanding and application of the CanMEDS Intrinsic Roles. Now a mandatory component of training for all postgraduate year three residents, we sought to evaluate the usefulness of an immediate feedback session, as well as remediation for residents found to be under-performing in comparison with their peers.

Methods: The CanMEDS OSCE development was facilitated by an exam blueprint and case development guides. The OSCE was one hour long and composed of six ten-minute stations designed to assess the Roles of Communicator, Collaborator, Heath Advocate, Manager, and Professional. Each station tested at least two Intrinsic Roles using case-based scenarios (with or without the use of standardized patients). Scoring was performed using role-specific rating scales. Immediately following the OSCE, each resident received feedback on their performance at each station from the faculty examiners. Immediate results were generated by the use of online scoring and tablets, allowing resident performance on each station and Role to be compared with their peers. Faculty and residents completed a questionnaire regarding the OSCE and the feedback session.

Results: Ten PGY3 residents sat the OSCE, with six faculty members as raters. Overall, three residents were deemed to be performing below par on a total of five stations - these stations focused on the Roles of Manager, Health Advocate, and Collaborator. All of the faculty and residents strongly agreed that the feedback session was useful, and that the scenarios reflected actual clinical scenarios. However, both faculty and residents were undecided how often this OSCE should be undertaken in residency - opinions ranged from annually for all residents to once during training. Following the OSCE, under-performing residents were asked to attend a remedial session with faculty, present material regarding the application of the Role in question, and facilitate a discussion of the key competencies within that Role.

Conclusion: The addition of formative feedback has proven useful in this OSCE assessing the Intrinsic Roles, allowing both the identification of under-performing residents, and appropriate remediation to take place.
Orthopaedic Fellowship Trends in Canada: Results of a National Survey

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Objectives: To investigate whether gaps in residency training were promoting Canadian residents to increasingly pursue fellowships

Methods: A cross-sectional mixed-exploratory survey was distributed to graduating Canadian orthopaedic residents to inquire about their preferences, attitudes, and motivations for pursuing fellowships. The data was statistically analyzed for quantitative and qualitative information.

Results: A 33% (N=148) response rate was obtained with the majority of residents undertaking one (27%, N=49) or two (59%) fellowships. Arthroplasty, followed by sports medicine and pediatrics, were the three most popular fellowship selections, while hand and oncology surgery were the least popular. Surgical skill development was reported as the most common motivating factor, followed by employment and marketability. The overwhelming majority of residents (94%, N=49) felt adequately prepared by their residency training for independent practice and 85% of respondents did not feel that the current fellowship trends were due to inadequacies in resident training. On the contrary, most respondents felt there was an increasing expectation among health care professionals and employers to be fellowship certified. Three underlying themes were present in the residents’ comments; the growing expectation to be fellowship-certified, the integration of fellowship training into the orthopaedic training hierarchy, and the need for residency training programs to adapt to this trend.

Conclusion: Canadian orthopaedic residents are primarily pursuing fellowships to improve their surgical experience and skills. The majority are confident of their residency training but perceive a growing expectation to be fellowship-certified. Arthroplasty, sports medicine, and pediatric orthopaedics are the three most popular fellowship selections among graduating residents.
Compartment Syndrome Training Assessment and Education Tool

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Objectives: Assessing orthopaedic technical and motor skills is becoming an increasingly important component of resident education. New mandates on residency graduation requirements and programs’ own interest in graduating competent surgeons necessitate a means to evaluate the progression of our trainees throughout residency training. Assessment methods, however, are underreported. In general surgery, residents are evaluated using the Objective Structured Assessment of Technical Skills (OSATS) and Global Rating Scale (GRS). To our knowledge, no such assessment tool has been validated in assessment of compartment syndrome release, the topic of our current investigation. The purpose of this study is to utilize five methods of assessing orthopaedic surgical competency (knowledge test, OSATS, GRS, and surgical approach pass/fail assessment) and determine the reliability and validity of these assessment tools. We plan to obtain a pre-test knowledge assessment, administer a standard pre-assessment didactic session, and then proceed with assessment tests. A similar evaluation was performed on shoulder exposures, demonstrating a significant difference in GRS scores based on year of training. The checklist scoring system proved to demonstrate superior inter-rater reliability when compared to GRS and subjective pass/fail measurements. A significant difference was also found in completion time when comparing PGY1 residents to more experienced trainees (PGY2-5). We hope to replicate these results, and develop a validated means to evaluate this specific surgical procedure in orthopaedic surgery residents.

Methods: Twenty four residents spanning five years of surgical training (five post-graduate year (PGY) -1, five PGY-2, five PGY-3, four PGY-4, and five PGY-5) will be tested for their knowledge base and technical skill pertaining to compartment syndrome release. All residents will take an electronic knowledge test on clinical assessment, surgical anatomy, surgical positioning, and surgical steps related to one- and two-incision compartment release of the lower extremity. Residents will be evaluated independently by two orthopaedic specialists trained in trauma orthopaedic surgery. Evaluation tools will include the Objective Structured Assessment of Technical Skills (OSATS) with a detailed checklist score, global rating score, and final pass/fail assessment. Time to completion will be recorded. Our study will take place in November 2013 with the use of cadaveric lower extremities in a state-of-the-art orthopaedic biomechanics/motor skills laboratory.

Results: The knowledge test and assessment checklist were developed utilizing a modified Delphi technique. The checklist was used in a pilot study earlier this year, and preliminary results demonstrated significant differences between residents based on post-graduate year of training. The current study will take place in November 2013, so complete results of the study will be available by December 2013.

Conclusion: Residency programs across the nation have long been tasked with training the
next generation of orthopaedic surgeons. Emphasis has always been placed on developing sound clinical knowledge and excellent surgical/technical skills to create competent, safe practitioners. However, with the heightened focus on competencies implemented by the ACGME, in corroboration with tightening restrictions on duty hours, the orthopaedic surgery community needs to develop standard assessment methods to ensure our residents achieve these goals, and do so in a step-wise manner throughout their training. Based on data obtained from a similar study performed at our institution on evaluation of resident surgical exposures of the shoulder, we feel we will obtain valuable data from our evaluation of compartment syndrome release knowledge and surgical skills assessment. Compartment syndrome release is a procedure with which orthopaedic surgeons require intimate familiarity. Focusing on this procedure provides an opportunity to investigate potential skill assessment tools which can be implemented at training programs across the nation, as no previous study has been published on validated evaluation of this procedure.
Treating the Trauma Knowledge Gap: A Validated Approach to Understanding Resident Knowledge and Addressing Deficiencies

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Objectives: Define the trauma knowledge gap in junior residents and determine if this gap can be addressed through a structured trauma curriculum.

Methods: 355 residents participating in three national trauma courses using a standardized curriculum were prospectively given a 20-item test of basic fracture knowledge before and after participation in the course as part of a quality initiative. The test items were designed to test 15 distinct areas of knowledge and were formatted in keeping with the Royal College of Physicians and Surgeons of Canada standards for multiple-choice question design. All questions were validated for content through fellowship-trained trauma faculty testing. Knowledge deficits were defined as questions which received <50% correct responses prior to course participation.

Results: The baseline knowledge averaged 63% on the pre-test and 81% on the post test (p<0.001). The pre-test response score was less than 75% for 15/20 items indicating a significant knowledge gap. Eighty percent of the questions had a statistically significant increase in score from pre-test to post-test (p<0.0001 to 0.02), indicating that the course changed the score for these items. There was no change in score for a control question (subject not covered at this course, p=0.79) or for two questions where the baseline knowledge was high (e.g. 99%) on the pre-test.

Conclusion: Junior residents appear to have a relatively low baseline knowledge level upon entrance into a basic fracture course suggesting that supplemental fracture courses may play an important role in resident education. Details of the knowledge gaps allow for course planning through a validated needs assessment as well as changes in curriculum for topics that do not improve during the course or are already known on entrance to the course. Further, this particular format showed significant improvement in resident knowledge indicating that in the short term resident knowledge is impacted significantly by the course. Further studies await investigation if this effect is long lasting and what educational techniques optimize this benefit.
Objectives: Resident selection is integral to all residency programs and the future of our profession. The American Academy of Orthopaedic Surgeons’ Committee on Resident Selection specified three domains that may predict resident performance: motor, cognitive, and affective. There is no consensus amongst residency directors regarding consistent and systematic assessment of these factors in residency applicants during initial screening, the interview process, and generating a final rank list. The aim of this report was to describe our systematic approach to orthopaedic resident selection, including a tool for high-volume application screening (part 1), and for a semi-structured interview (part 2).

Methods: This study took place in a single academic orthopaedic surgery department over two years. In part one, 628 applications were screened and scored in seven categories, with a total maximum score of 100: USMLE score, class rank, honors in clinical rotations, Deans’ Letter, Letters of Recommendation, Research, and a subjective “Intangible” score. Fourteen faculty reviewed the applications, and those who had a screening score above a threshold were selected by the residency director for an invitation to interview. In part two, an online survey was devised by faculty based on their experience with a semi-structured interview process in the affiliated medical school. Three domains (cognitive, affective, activities), and an impression score were ranked from 1 (Exceptional) to 6 (Concern). A summary score was generated of all of the scores. Over a two-day period in each of two years, 150 total candidates interviewed for a position in the residency. 13 interviewers conducted interviews of candidates, and completed the survey immediately following. A preliminary rank list was generated from the summary scores and the final rank list after discussion in a formal rank meeting. R2 values were calculated to assess correlation between the preliminary (pre-rank meeting) and final (post-rank meeting) lists and between the rank lists and the screening scores. Student’s t-test was performed to determine the differences between applicants who had significant movement (>10 spots) or minimal movement (<5 spots) between the preliminary and final rank lists.

Results: In part one, the average screening score was 62.3 (range: 4-100). The average score of applicants invited for an interview was 83.4 (range: 54-98). Every applicant who had a screening score less than 70 who was invited for an interview performed a rotation in orthopaedic surgery in our department (N=9). In part two, the average overall score was 67.2 (range: 35.1-93.7). The average domain scores were: cognitive 2.35±0.49, affective 2.58±0.63, and activities 2.62±0.56. The initial screening score correlated with preliminary rank (p=0.02), but not final rank (p=0.12), indicating that the discussion during the rank meeting was critical to the establishment of our final rank list. Following the rank meeting, 115 applicants moved 0-5 spots; 15 moved greater than 10 spots. Applicants who moved more in the final rank list were initially ranked higher (p=0.001), with higher cognitive (p=0.01), affective (p=0.01), activity (p=0.02), and impression scores (0.004).
Conclusion: A systematic approach was used to screen and evaluate a large number of orthopaedic surgery applications to an academic program to establish a preliminary rank list of orthopaedic residency candidates following an interview. Our structured system demonstrated excellent feasibility and predictability for the final rank list, and the rank meeting was a critical component in the establishment of our final rank list. Future work will evaluate predictive validity for future success in orthopaedic residency.
Objectives: The goals of this study were to: 1) define the current use of video modeling and review by orthopaedic surgeons and trainees, and; 2) to explore whether there is a role for expanding intra-procedural video recording for self-learning and the education of trainees. Our hypothesis was that orthopaedic residents and attendings use video extensively inside and outside the field, but intra-procedural, self-collected video is rarely used as a teaching or self-learning tool because of perceived barriers that have not yet been fully defined. We further hypothesized that new technologies (personal point-of-view video cameras), and familiarity with effective video teaching mechanisms have the potential to expand the use of intra-procedural video in the education of orthopaedic surgeons.

Methods: A descriptive and explanatory survey was constructed to achieve the stated goals of the study. Item content was chosen using the authors as a group of experts. Each item was designed to answer a specific aspect of the research question, and questions were modified throughout the process to establish face validity. The survey was pilot tested and distributed to all 235 orthopaedic surgery attendings and residents at five different hospitals from four different academic teaching institutions in North America. The data were collected and analyzed using 95% confidence intervals and the Wilson score method.

Results: The survey had a relatively high response rate (81%), with a higher response rate among residents. In all venues, respondents had familiarity with capturing and watching video for educational purposes. Respondents capture and reference video outside of work on a regular basis, and they found the use of video modeling and review outside of orthopaedics very useful. Respondents find video demonstrations of orthopaedic procedures useful and reference them often, but infrequently capture video of their own intra-procedural video for self-learning or to educate others. Interest in tools to make self-collected intra-procedural video capture easier was high, though few had used these tools. One of the potential reasons that intra-procedural video capture is rarely used is that the vast majority of respondents saw at least one barrier to using video in the operating room. Familiarity and interest in expanding the role of intra-procedural video capture was higher among residents than attendings.

Conclusion: Orthopaedic attending physicians and trainees are very familiar with capturing video and referencing video modeling to emulate technique. Many have been coached using video and found it useful. Despite this, respondents rarely take intra-procedural video and rarely use it to actively teach trainees. Numerous barriers were perceived to capturing intra-procedural video, but interest in expanding video’s use is high. Technological advancements have the potential to make the expansion of video as a teaching and learning tool easier moving forward.
A Comparison of Orthopaedic Faculty and Resident Perceptions of the Operative Learning Needs of Residents

**Objectives:** The goal of this study was to determine whether faculty and residents within a Canadian orthopaedic surgical program, have similar notions about the learning needs of residents’ operative management as well as operating room (OR) preparedness.

**Methods:** A previously published three-part 27-item 1-5 scale questionnaire was administered to Orthopaedic residents and faculty at McMaster University using online LimeSurvey. Data were retrieved from website in excel sheet and prepared for analysis in SPSS software. Mean scores with standard deviation with p values are reported. A p-value of 0.05 was considered for statistical significant.

**Results:** The total study sample (n=41) captured 50% of Orthopaedic residents across all five years of training and 35% of faculty within the Division of Orthopaedic Surgery at our institution. We achieved a response rate of 50.0% for residents and 34.8% for faculty. Thirty-eight percent of the participating residents were postgraduate year (PGY)-5. The mean years of practice for faculty surgeons was 11.0 years. The male to female ratio was 4:1 for both residents and faculty. When considering traditional and web-based resources for OR preparation, residents and faculty had a similar notions of resource use. The top three most frequent responses were, Google (46.2%) followed by PubMed (38.5%) and other search engines (19.2%). Eight of 26 residents (30.8%) wrote in the additional web-based resource including VuMedi as another resource used. Other resources used by residents but not included in the survey included the Journal of the American Academy of Orthopaedic Surgeons (JAAOS), Wheeless’ Textbook of Orthopaedics, and Orthobullets. Residents and faculty did differ in their perceptions of resident peri-operative learning needs with respect to natural history of disease, patient selection, and patient outcomes. Six of the top eight topics faculty felt residents were least prepared for despite preparation for the operating room were all technical topics.

**Conclusion:** Needs assessments in orthopaedic surgical education are instrumental to develop the introduction and use of novel teaching modalities into orthopaedic curricula. We found a discrepancy between faculty and resident perceptions of resident learning needs with respect to Patient Outcomes, Patient Selection, and Natural History of Disease. The magnitude of non-peer reviewed resource use for OR preparation among orthopaedic residents underscores the importance to emphasize evidence-based curricula in orthopaedic surgery. Curriculum development in orthopaedic surgical education should focus on enhancing resident use of stronger EBM resources when preparing for the OR. Larger national/international needs assessments are required to identify and quantify disparities in faculty and resident perceptions of orthopaedic resident operative learning needs.
Learning Curve, Skill Erosion, And Skill Recovery Of Arthroscopic Knot Tying In Orthopaedic Residents

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Objectives: Simulation has proven to be important across various surgical subspecialties in teaching basic surgical skills. While the learning curve concept for surgical procedures has been well-described anecdotally, objective documentation of learning curves for various skills, particularly in orthopaedics, is lacking. In the present study we documented the learning curve associated with the arthroscopic knot tying of a SMC knot in orthopaedic residents. This was assessed with time to completion, the Proficiency score, and number of errors made.

Methods: Thirty-two orthopaedic residents were recruited to perform a SMC knot and three half hitches. Performance was measured on an arthroscopic knot-tying simulator three times during two phases separated by six months. Resident skill was measured by time to complete the task, a previously validated Proficiency score, and number of errors made. The previously published Proficiency score is calculated based on the time to complete the task and a penalty score taking into account the accuracy and security of the knot. A Proficiency score of 321 is considered a pass score. Two expert FRCS(C) Orthopaedic surgeons with predominantly arthroscopic practices determined penalty scores.

Results: Twenty-six of the initial 32 recruited orthopaedic residents performed both phases of the study. Sixty-six percent of the residents had no prior operating room knot tying experience. Resident knot tying performance improved across each assessment for both phases of the study when measured by time to complete the SMC knot and Proficiency score. Figures 1 and 2 show means and standard deviations for Time and Proficiency score. Mean time to complete each knot decreased from 348s (CI 95% 405, 291) to 162s CI 95% 173, 150). Proficiency scores improved from 118 (CI 95% 162, 75) to 352 (CI 95% 390, 313). A similar trend of improvement across the three attempts was observed during the six-month retest. Time to complete SMC knot improved from 250s (CI 95% 300, 200) to 140s (CI 95% 405, 296). Proficiency score improved from 183 (CI 95% 246, 121) to 392 (CI 95% 437, 349). A pass Proficiency score was achieved on average by the second attempt during Phase 2 versus the third attempt during Phase 1. Statistically differences could not be demonstrated between the initial learning curve and the second learning curve for the retest.

Conclusion: The learning curve of simulator-based arthroscopic knot tying can be observed. Learning was objectively demonstrated through a significant decrease in the time to perform a SMC knot and an increase in the Proficiency score. Degradation of arthroscopic knot tying skills after a six-month washout phase was observed. However, resident performance recovered quickly within three attempts.
Canadian Spine Surgery Fellowship Education: Evaluating Opportunities in Developing a Nationally-Based Training Curriculum

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Objectives: Primary Aim: To determine the perceived needs of the Canadian Spine Society Membership and Executive Committee in developing a nationally-based curriculum in spine surgery fellowship education. Secondary Aims: To determine the perceived barriers as well as opportunities in enhancing fellowship education.

Methods: A survey was administered to the CSS Membership in advance of the CSS 2012 Annual Scientific Conference. Respondents represented both academic and community practice, as well as backgrounds training including both orthopaedic and neurosurgical residency. In October 2012, we also administered a similar survey independently to the CSS executive committee during their semi-annual meeting.

Results: 49 individuals responded to our Pre-2012 Annual Scientific Conference of the CSS survey. Results indicated that 86% of respondents believed that it was necessary to develop specific curricula and/or competencies in spine fellowship training. Less than half (41%) considered it important to consider background residency training either in neurosurgery or orthopaedic surgery (92% respondents also indicated that they were involved with residency education). When questioned about awareness of certification, 63% reported to be aware of the American Board of Spine Surgery opportunity in recognizing spine surgery training in the United States, and 71% were also aware of the Royal College of Physicians and Surgeons of Canada (RCPSC) Areas of Focused Competency (AFC) Diploma opportunity in recognizing fellowship education. Given these facts, 68% indicated that formal recognition of spine surgery fellowship training at the RCPSC level was desirable. 17 surveys of the CSS executive committee (100% response rate) were obtained. 94% of respondents indicated that fellowship training in Canada can and should be improved, including the development of a nationally-based curriculum. The Curriculum should consider current practices spanning the spectrum of community through academic experience as well as considering residency background training. The CSS executive endorsed establishing a working group to develop a nationally-based curriculum that may serve as a valuable guide to fellowship program directors across Canada. Perceived opportunities and barriers included consideration of background residency training considering existing RCPSC specialty spine rotation-specific objectives, the potential impact on current spine referral patterns and clinical practice, as well as funding that may be required to support an enhanced and more formalized fellowship medical education opportunity.

Conclusion: In Canada, there remains interest in developing a nationally-based curriculum in spine surgery fellowship education. This study motivates ongoing educational research.
aimed at developing as well as guiding the implementation of this curriculum. An expert consensus Delphi-approach is currently underway to explore both cognitive and procedural competencies deemed important at the fellowship level.
Resident Education and Total Knee Arthroplasty: Is There a “July Effect”?  

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Objectives: The influence of resident education in orthopaedic surgery outcomes has long been scrutinized. With annual resident turnover in July, the public has questioned the safety of novice resident involvement. Thus the purpose of this study was to examine the annual variation of short-term outcomes after primary total knee arthroplasty (TKA) with and without resident participation.

Methods: The 2005-2011 ACS NSQIP dataset was queried for patients undergoing elective TKA using CPT codes. Cases with resident involvement were identified and then further stratified into Junior (PGY1, 2, 3), Senior (PGY4, 5), and Fellow level (PGY 6). The timing of surgery was designated into annual quarters or three-month time intervals. We compared resident cases to non-resident cases using univariate comparisons for operative times, hospital length of stay (LOS), re-operation rates, 30-day morbidity, and 30-day mortality. Resident levels were also compared for the same outcomes. Propensity score matching was introduced to control for selection bias. Chi-square and ANOVA statistics were used and significance was defined as p <0.05.

Results: In total, 28,686 patients were included: 7,162 resident (R) cases and 21,524 non-resident (NR) cases. Overall TKA mortality, operative time, and hospital length of stay (p=0.53, 0.17, 0.54) did not vary throughout the year. Comparative 30-day mortality remained low throughout all quarters and did not differ significantly between R (0.07-0.29%) and NR cases (0.18-0.28%), p=0.47-0.61. Morbidity was highest for both R and NR groups during the July-September quarter (R: 15.39%, p<0.001 and NR: 15.56%, p<0.001), but did not differ between R and NR groups during that quarter (p=0.57). Operative time was significantly higher in the R vs NR group (107-111 vs 92-94 mins, p<0.001) across all quarters. Hospital LOS (3.53-3.60 days) did not vary with time of year or resident involvement. Level of resident training did not consistently influence surgical outcomes, as no differences were noted between Junior, Senior, and Fellows levels for operative time (p=0.28), return to OR (p=0.80), morbidity (p=0.11), and mortality (p=0.96).

Conclusion: Resident involvement did not increase short-term morbidity or mortality after TKA. Likewise, these short-term outcomes did not increase with resident promotion in July. Resident training level also had no detectable influence on outcomes. Resident involvement, however, did increase operative times; and this may serve as an impetus for training outside of the operating room. The public may be reassured with the apparent safety of resident participation.
Objective Structured Clinical Exams to Assess Communications in Interns and Senior Orthopaedic Residents: What are the Differences?

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Objectives: We developed and implemented an OSCE that focused specifically on communications skills and compared residents’ performance at different levels of training. Our hypothesis was that senior residents would perform better than first year residents with regards to communications skills.

Methods: Five OSCE scenarios were developed for the purpose of resident assessment. Three scenarios used standardized patients [SPs] (disclosing surgical error, obtaining informed consent, and delivering “bad news” giving MRI results) while two used standardized healthcare professionals [SHPs] (sign-out with a depressed resident, and a nurse interaction). Communications skills were scored within the domains of “information gathering,” “relationship development,” and “education and counseling.” Each item was scored as “not done,” “partially done,” and “well done” by the SP or SHP and reported as the percent “well done.” The SP and SHP were asked if they would recommend the resident based on communication skills and recorded a global rating. Chi-square was used to analyze overall communications performance, performance by domain, and global recommendation across resident years. Subgroup analyses were completed in order to compare resident performance during initial and final years of orthopaedic residency training.

Results: Sixty-one residents participated in the OSCE, including 10 PGY1 and 13 PGY5 orthopaedic residents. For all 61 subjects, the residents were rated better in the domains of information gathering (68% “well done”) and relationship developments (63% “well done”) versus education and counseling (52% “well done”). Globally, 71% of all residents were recommended based on communications skills. When analyzing PGY1 through PGY5 residents, no significant differences were found on all measures of communication. Within the subgroup analysis, the PGY5 group was significantly better than the PGY1s on ratings of education and counseling during the SP scenarios (57% “well done” vs. 42% “well done”; p=0.03). On overall ratings of communications by standardized healthcare professionals, PGY1 residents performed better (70% “well done”) than PGY5 residents (50% “well done”; p=0.04).

Conclusion: Across all residents, educating and counseling was the lowest domain reported “well done.” However, for PGY 5 residents, the ability to educate and counsel standardized patients was significantly better than the PGY 1 group and also better than the average across all residents. The PGY1 group performed better than PGY5s when communicating with SHPs. Recent emphasis on the importance of inter-professional teamwork for patient safety was not reflected in the current PGY5 resident OSCE scores. Although OSCE studies are inherently limited by the number of residents in training at an institution, these findings demonstrated differences on overall and domain level communications performance. Future studies are needed to expand our understanding of these differences and track the performance of residents by year of training.
Objective Structured Clinical Exams (OSCE) and the Orthopaedics In-Training Exam (OITE) Do Assess Different Facets of the Resident Physician

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Objectives: Although OSCEs and OITEs have been used for years, the relationship between resident performance on these exams is unclear. The current study was designed to determine whether a correlation exists between resident OITE and OSCE performance.

Methods: Five OSCE scenarios were developed to assess resident interpersonal communications and professionalism. Communications skills were scored in the domains of “information gathering,” “relationship development,” and “education and counseling.” Professionalism was scored in the areas of “accountability,” “managing a difficult situation,” and “respect.” Items were scored as “not done,” “partially done,” and “well done” by the standardized patient (SP) or standardized healthcare professional (SHP) and reported as the percent “well done.” The SP and SHP were asked to globally rate the resident and whether they would recommend the resident based on communications skills, professionalism, and perceived medical competence demonstrated during the encounter. OITE scores (percentile) were correlated with recent OSCE performances.

Results: Data from 48 residents (ranging from PGY2 to PGY5) were available for analysis. Year of training was significantly positively correlated with OITE performance (r=0.6, p<0.001). Higher OITE scores correlated with better “education and counseling” scores within an OSCE scenario on “obtaining informed consent” (r=0.4, p<0.05). Perceived medical competence on the informed consent scenario also positively correlated with OITE performance (r=0.4, p<0.05), but global recommendations based on perceived medical competence in the other scenarios failed to show any correlation. No other associations were identified between OITE performance and the domains of professionalism and interpersonal communications skills assessed by the five scenarios.

Conclusion: Medical knowledge evaluated by the OITE did not robustly predict the interpersonal and communications skills and professionalism that our residents demonstrated during observed simulated patient encounters. These findings support the use of both evaluation formats for the multi-dimensional assessment of orthopaedic resident physicians.
Impact of Electronic Medical Record Implementation on Orthopaedic Clinic Workflow

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Objectives: The federal government has mandated that physicians make the transition to an electronic medical record (EMR). The cost of this transition in terms of lost productivity both in the short and the long term is unknown. A few studies have examined this issue in primary care practices, but none has focused on orthopaedic surgery clinics. The goal of this study is to quantify changes in orthopaedic clinic workflow that occur with the implementation of an EMR. Such information will be invaluable in helping a practice to plan for the conversion to an EMR.

Methods: A time-motion study was conducted in which trained observers recorded the time required for attending level orthopaedic surgeons to complete specific tasks while seeing patients in an outpatient clinic. Observers used a custom designed medical task recorder written in Microsoft Access and run on touch screen computers to log the duration of each of the tasks. Seven orthopaedic surgeons in academic practice were observed over 670 patients visits. Three visit types (new, return, and post-operative) were defined. In order to simplify the analysis, tasks were grouped into seven categories (data gathering, collaborating, ordering, documenting, procedures, non-clinical tasks, and non-patient-specific tasks). Preliminary analysis was focused on differences in documentation time among visit types and physicians.

Results: The results of this baseline data collection showed that documentation times varied greatly both by physician and visit type. Average documentation time by visit averaged: New visit 2.6 min (standard deviation = 2.7 min), return visit 1.8 min (stdev 1.8), and postoperative visit 1.8 min (stdev 1.5 min). Average documentation time by physician ranged from 0.82 to 4.32 min. Total visit time averaged 14.2 minutes and consisted of 30% data gathering, 18% collaborating, 10% ordering, 14% documenting, 12% procedures, 4% non-clinical tasks, and 12% non-patient-specific tasks.

Conclusion: The goal of this study is to quantify changes in orthopaedic clinic workflow that occur with the implementation of an EMR. Baseline data have been collected prior to the implementation of the EMR. A significant amount of variability was found in documentation time among physicians and across visit types. It will be important to control for these differences among physicians and visit types when comparing to the post implementation data. The results of this study will serve as a valuable resource to orthopaedic practices that are contemplating the conversion to an EMR.