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586 Flipping the Pathology Classroom - The First Step

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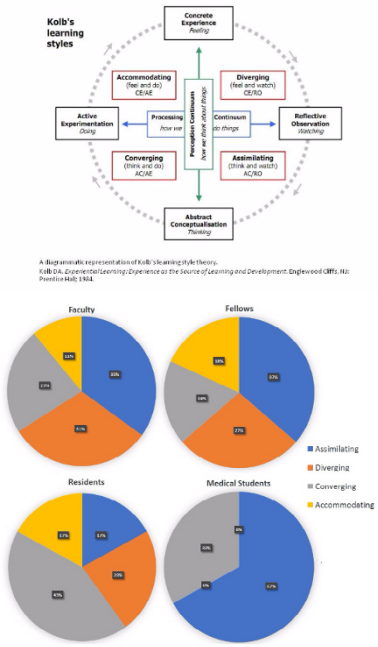
Background: Personalized training models have been reported to be linked to successful educational outcomes of learners. Pathology is a unique specialty in which learning is primarily dependent one-on-one sessions between resident and faculty (learner/teacher) providing the ideal set up for active involvement of the trainee in the learning process. The first principle of learner-centered training is based on identifying the needs and preferred learning style of the learner. David Kolb described four major learning styles that depend on how people perceive and transform experiences as shown in Figure 1. Kolb's tool has been extensively utilized by medical specialties to understand and maximize learning outcomes (PMID26154861).The aim of this study was to identify whether pathologists have a preferred learning style, and if it changes with time and experience.

Design: Kolb's learning style inventory v3.0 was sent to pathology-inclined medical students, residents, fellows and faculty in five different programs. Extensive data including (but not limited to) age, gender, medical school and sub-specialty was collected. Statistical analysis was performed on Stata 10.0®

Results: Complete data from 79 of 100 respondents (6 medical students, 36 residents, 11 fellows and 26 faculty) was analyzed. Medical students demonstrated "dominance" >> "converging" learning styles, consistent with prior published studies (PMC2909974). Pathology residents' data showed scattered distribution of 4 learning styles by each postgraduate level as shown in table 1. Fellows and faculty revealed a dominance of "assimilating" followed by "diverging" learning styles ($p<0.01$). Multinomial logistic regression did not show any correlation with demographic data within each group.

	Assimilating	Diverging	Converging	Accommodating
Medical Students	67%	0%	33%	0%
Residents:				
	17%	23%	43%	17%
Postgraduate Level:				
	16%	42%	25%	16%
PGY1				
	50%	25%	25%	0%
PGY2				
	8%	8%	50%	34%
PGY3				
	14%	14%	72%	0%
PGY4				
Fellows	36%	27%	18%	18%
Faculty	35%	31%	23%	11%



Conclusions: It is not surprising that as a very "visual" field, "assimilating" and "diverging" learning styles were consistently noted among fellows and faculty. The unequal distribution of learning styles among residents is curious and may suggest an evolving learning process that needs acclimatization to the learning requirements of our field. Interestingly, the dominance of converging style of learning in residents may be explained by the practical skills required in grossing and/or residual styles from medical school. Moreover, the multimodal learning styles in residents suggests that learning curve of residents can be shortened by incorporating resident centered blended learning models and group residents and faculty with similar styles.

587 Objective Structured Assessment of Technical Skills (OSATS) in Pathology for Medical Students: Design and Pilot Testing

Eduardo Alcaraz-Mateos[1], *Iva Turic*[2], *Marta Bander*[3], *Cecilia Pérez-Gavilán*[4], *Francisco Jorge Ribeiro-da Rocha*[5], *Petar I Shalev*[6], *Manuel Párraga-Ramírez*[7], *Enrique Poblet*[8]. [1]Hospital Universitario Morales Meseguer, Murcia, [2]University of Split (Croatia), [3]Pomeranian Medical University in Szczecin, Poland, [4]University of Valladolid, Spain, [5]University of Santiago de Compostela, Spain, [6]Medical University of Varna, Bulgaria, Varna, [7]Morales Meseguer University Hospital, Spain. UCAM, Murcia, Spain, [8]Reina Sofía University Hospital, Murcia. University of Murcia, Spain

Background: Objective Structured Assessment of Technical Skills (OSATS) is an examination for evaluating acquired medical skills and was firstly introduced in Toronto University in 1990. Despite the benefits of OSATS, there are no previous reported experiences in Pathology. The aim of this study was to design and test stations and their OSATS in two pathology procedures: gross dissection (GD) and fine needle aspiration (FNA).

Design: Training models in gross dissection (silicone handmade specimens) and fine needle aspiration skills (patented models WO2016185077 and WO2017109241), previously developed and tested by undergraduate students, were used. A 10-item 5-point Likert-like modified OSATS with a maximum score of 50 points, including not only technical skill tasks, but also other competences such as communication, clinical correlation, asepsis-antisepsis, patient safety, etc. was elaborated. Medical students (5) from 5 different universities and countries were scored by a practicing pathologist after individual workshops.

Results: Mean score of the students was 40.2 (range 35-43) for the GD training and 30.4 (range 23-43) for the FNA training. Average time for GD and FNA stations were 5'11 (range 4'06''-5'31'') and 10'47'' (range 8'03''-14'10''), respectively. Scalpel blade mounting, patient information, informed consent form filling out and compression after FNA procedure were the weakest points obtained.

Conclusions: - Utilization of OSATS, one of the most widely used metrics for technical skills evaluation, is possible in Pathology (P-OSATS), making it feasible its adaptation to the new requirements in medical education, enhancing patient safety.

- Checklists provide trainees with structured formative feedback, although further studies are necessary to certify the improving learning curve of this methodology in simulation.

- P-OSATS, could represent a way to introduce pathologists´ tasks as stations of the Objective Structured Clinical Evaluation (OSCE) formats, expanding our visibility among medical students.

588 Public Perceptions of Pathology: It is Time to Educate the Public More Efficiently

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Background: Pathology has been affected by public misconceptions and it is a largely invisible specialty with the exception of certain subspecialties. The lack of proper recognition leads to difficulties with recruiting students and does not help the lobbying and advocating efforts. Our study investigated the public perceptions of pathology and explored whether the analysis of the data suggests any specific direction to take to promote our specialty.

Design: A survey was developed in online format for the targeted population of adults (18+) within Canada and USA, with no restriction towards gender, age or occupation. The questions explored whether pathology is considered a medical specialty, what they are perceived do routinely, what they have reputation for and whether the experience of undergoing a medical procedure (Pap tests, biopsies from breast, gastrointestinal tract or prostate, or surgical excisions for suspected malignancies) improves their knowledge of the pathologists` role in the diagnosis.

Results: 387 completed survey was received. 71.1% of the respondents stated that they are familiar with what the pathologists do, but only 40.5% thought that pathologists are medical doctors. The most common activities identified as part of the routine pathology work was diagnosing diseases in living patients (35.5%) and performing

autopsies (26.2%). Most respondents indicated that pathologists have a reputation for being good investigators (73%) or having high level of intellectual curiosity (65%), as opposed to making many errors (7.4%) or being sued often (5.9%). Less than one third of the patients who underwent at least on of the above diagnostic procedures realized that the sample was actually diagnosed by the pathologists (13.2%-32.2%). Most commonly these patients named another medical specialist as the diagnostic decision maker (51% thought that GI biopsies are diagnosed by the gastroenterologists and 47.8% was convinced that the Pap tests are diagnosed by a gynecologist).

Conclusions: Many pathology organizations deserve credit for actively advocating for pathology, however these campaigns have not made the desired impact yet. Maintaining these efforts is essential along with introducing potentially more efficient approaches. The lack of understanding of the pathologists` essential diagnostic role raises the question whether direct patient-pathologist interactions should be integrated into patient care assuming the workload and billing implications would be addressed properly.

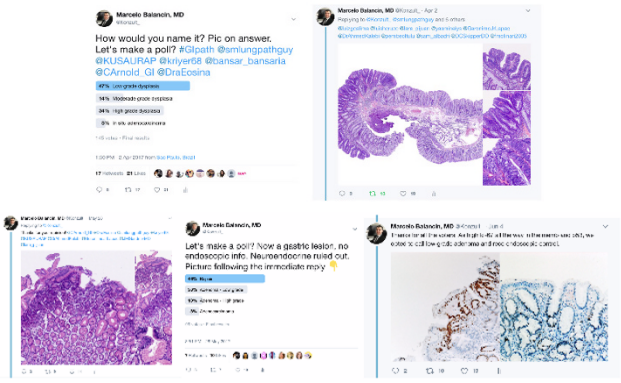
589 Controversial Cases are Controversial. A #SoMe Experience as a Potential Powerful Tool to Improve Pathology Practice

Marcelo Balancin[1], *Larissa A Defendi*[2]. [1]University of Sao Paulo, Sao Paulo, [2]Independent Medical Practice, Brazil

Background: Social Media (#SoMe) is amply conquering importance in Medicine by transposing otherwise usual physical and socioeconomical barriers that had forbidden universal access to medical knowledge and expert opinion in a global fashion. We have employed some examples from daily Pathology practice, with controversies in replicability of nomenclature and grading, in order to encompass an important unadressed issue: how #SoMe could pinpoint fragile points of Medical practice and play an important role to strengthen then. Our primary aim was to evaluate Twitter as an universal tool to assess controversial points - independently of user demographics - and improve Pathology practice.

Design: Two independent polls were made publicly available for one to five days each through Twitter (Twitter, Inc, San Francisco, CA, USA) (MLB, @Konzult_; Poll #1: Mucosectoy, Apr 2nd-7th, 2017; Poll #2: Gastric erosion, May 28th-Jun 2nd, 2017), respectively illustrated in Figures 1 and 2. Both polls employed a borderline situation in diagnosing and grading gastrointestinal pathology specimens that may also be encountered by general pathologists: a colonic mucosectomy of an adenomatous lesion and a gastric biopsy of an erosion area. Voting options were scored in a Likert-like scale with four options; for the mucosectomy as low grade (LG), moderate grade, high grade dysplasia and "in situ" adenocarcinoma; for the gastric biopsy as repair, low grade adenoma, high grade adenoma and adenocarcinoma. Brief clinical data, four representative microscopy images and a #GIPath were also available.

Results: Poll #1 received 145 votes: 47% (68) LG, 14% (20) moderate grade dysplasia, 34% (49) HG and 5% (8) In situ adenocarcinoma (fig 1A). Poll #2 received 96 votes: 46% (44) repair, 36% (34) LG, 10% (10) HG and 8% (8) adenocarcinoma. (fig 2A).



Conclusions: Our study points that non-WHO nomenclature uniformity is evident, as moderate grade dysplasia is still employed, and that both cases were controversial, as they had non-replicable diagnosis: a 1:1 rate between LG / High grade dysplasia in colonic mucosectomy and 1:1 repair / LG adenoma in gastric biopsy. Twitter has shown itself as a powerful tool to point issues in pathology practice, as actual case scenarios could be expanded encompassing other situations to be assessed.

590 Ask Your Pathologist: A Pilot Program for Patient Communication in Pathology

Ronald Balassanian[1], *Sarah Bowman*[2], *Ramie Fathy*[3], *Patrick Martin-Tuite*[4], *Abhishek K Jairam*[5], *Tim K Henderson*[6]. [1]University of California San Francisco, San Francisco, CA, [2]UCSF, San Francisco, CA, [3]University of Pennsylvania, [4]University of California San Francisco, [5]University of California Davis, [6]University of Vermont, Larner College of Medicine

Background: Patient communication is rarely addressed in Pathology. Since many treatment decisions are based on pathologic findings, patients are increasingly eager to learn more about their pathologic diagnosis. This is particularly true for breast cancer patients who are asked to make decisions about radiation therapy, chemotherapy or additional surgery on the basis of lymph node status, margin assessment, or tumor grade reported in the pathology report. We sought to determine if offering patients an opportunity to review their pathology slides with a pathologist would help them gain a visual understanding of their diagnosis and allow them to make more informed decisions regarding treatment options.

Design: The Breast Care Center (BCC) at our institution has a robust pre-med student intern program. Interns work as patient navigators to help breast cancer patients during their BCC appointments. As questions come up, the interns direct the patients to the appropriate resources. Ask Your Pathologist (AYP) was developed to help patients understand their diagnoses. Patients were invited to meet with a pathologist (RB) to review their pathology . To prepare for the AYP appointment, patients composed a list of questions which were forwarded to RB. During the session, RB reviewed the patient's slides, reports and list of questions with the patient at a multiheaded microscope. Following the session, an audio recording as well as a written summary was provided to the patient. Each patient was asked to complete a survey to assess the impact of the intervention using validated surveys modeled after the Ottawa Decision Support Framework. Responses were scored on a scale of 1-9.

Results: A total of 11 patients went through AYP. The average score for the different survey questions were: Path Report Understanding = 9, Diagnosis Understanding =9, Treatments Understanding = 8.5, Did Pathologist Address Concerns = 8.9, Did Pathologist Answer All Questions = 8.9, Overall Satisfaction = 9. Sample comments included: "This program has made an important difference in my understanding of my specific cancer" as well as "This makes patients feel like a whole person".

Conclusions: The AYP program was a positive experience for patients and an effective method to improve patient communication and understanding of the pathologic basis of their disease. This program may serve as a model for expanding patient communication in the area of Pathology.

591 Effectiveness of Whole Slide Image Simulation Education for Potential Use in Pap Test Interpretation in Under Resourced Global Settings

Anas Bernieh[1], *Zelma Cason*[2], *Kim Geisinger*, *Stephen Raab*[3]. [1]University of Mississippi Med Ctr., Jackson, MS, [2]University of Mississippi Medical Center, Jackson, MS, [3]Jackson, MS

Background: Worldwide, cervical cancer is the third most common cancer among women and the second most frequent cause of cancer-related death, predominantly occurring in under resourced global settings. We developed and measured the effectiveness of a Pathology Digital Imaging (PDI) distance simulation-based educational program for potential use in Pap test training of individuals and teams in under resourced settings.

Design: We developed, pilot-tested, and measured the effectiveness of a distance simulation-based educational program for six university and two high school American students who had no previously experience in diagnostic cytopathology. The entire program lasted 10 weeks with the last six weeks consisting of immersion in conventional Pap test screening using whole slide images retrieved from our files and scanned at 40x. The gold standard diagnosis was the original diagnosis and these slides all had been used for cytotechnologist training. Over the six weeks, the weekly volume increased from 20 to 80 Pap tests and we measured individual and team performance in the detection of high grade squamous intraepithelial lesion or higher abnormality (HSIL+). Subjects were provided feedback of screening results on a daily basis. We evaluated team performance by blinded interpretations of two or three subjects.

Results: The mean individual sensitivity and specificity for HSIL+ detection over the entire six week Pap test screening period was 64.7% and 90.4%, respectively. For the final week, the mean individual sensitivity and specificity was 74.2% and 87.2%, respectively, indicating increased HSIL+ detection. For the final week of training, randomly selected teams of two subjects increased the sensitivity of detection (based on the identification of HSIL+ by one member) to 85% with a slight decrease in specificity to 84%.

Conclusions: Our findings support the hypothesis that a PDI distance simulation-based training program may produce subjects who perform at a relatively high level of competence in 10 weeks. We think that these performance metrics also could be improved with select targeting of subject weaknesses (e.g., lower detection frequency of glandular neoplasia). We hypothesis that under resourced settings, which currently lack cytotechnologists, could adapt this type of training program and different screening models, such as dyad teams, which further would improve HSIL+ detection.

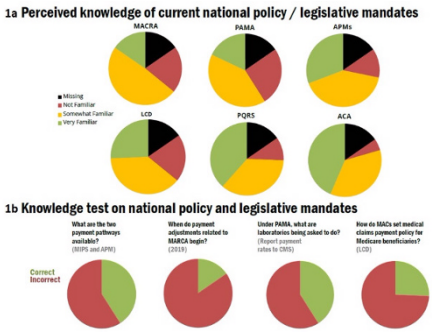
592 Pathology Leadership Perceptions of Healthcare Legislation - From Tangled Web to MACRAme

Diana Cardona[1], *David Howell*[2], *Lydia Howell*[3], *Beiyu Liu*[4], *Cindy Green*[5]. [1]Durham, NC, [2]Duke Univ Med Center, Durham, NC, [3]University of California Davis, Sacramento, CA, [4]Duke University Medical Center, Durham, NC, [5]Duke Clinical Research Institute

Background: National legislative payment reform is one of the most influential agents of change in health care. For example, the Medicare Access and CHIP Reauthorization Act (MACRA) creates two payment systems that could positively or negatively impact Medicare payments starting in 2019 based on 2017 participation and performance. Being aware of these changes could play a major role in the ability of health systems, departments or practices to prepare, adapt and survive. The aim of this study was to assess the level of knowledge and comfort of department chairs with various healthcare policy and legislative mandates.

Design: A 24-question Qualtrics survey, validated by a focus group, was sent to all clinical department of pathology chairs via the Association of Pathology Chairs listserv. The data were extracted into Excel, analyzed in aggregate with SAS version 9.4, and summarized using standard descriptive statistics.

Results: A total of 39 chairs fully participated (20% response rate (39/193)). 84.6% were male, 87.2% white, and the median tenure was 8 years (range 0.2-33.0 years). Common leadership positions held prior to being chair included vice chair, anatomic pathology/ medical laboratory director, division chief, member of board of directors, committee member of various organizations, and NIH section reviewer. Most respondents felt they were either very familiar or somewhat familiar with the national policy topics presented in the survey. On a scale of 1-5 (5 being very important), 69.7% of chairs gave a score of 4 or 5 when indicating the importance of knowing about such topics as chair. In the 4-question knowledge portion of the survey, 41.0% was the highest correct response rate (range 15.4-41.0%) (Fig 1). Most chairs who thought it was not very important for them to know about these legislative mandates incorrectly answered all the questions. There was no correlation with leadership positions held prior to being chair and their self-evaluation. Unsurprisingly, there was a significant association between the test results and their perceived knowledge base (p-value = 0.008).



Conclusions: The healthcare payment landscape is changing fast and it can be difficult for leaders to maintain the necessary knowledge base. Chairs need to be prepared to address this challenge since there is potential for serious financial impact.

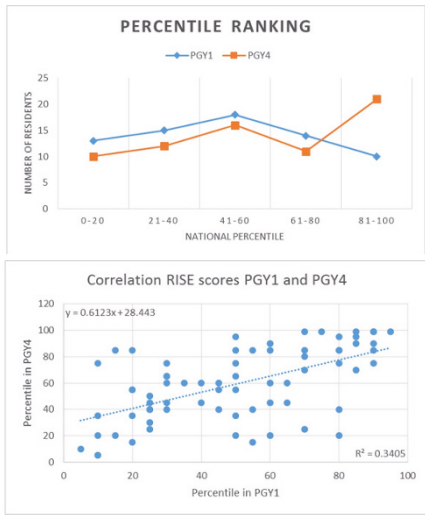
593 Examining Residency Training Program Effectiveness Using Results of the ASCP Resident In-Service Examination (RISE)

Claudiu Cotta[1], *Deborah Chute*[2], *Karl Theil*[1]. [1]Cleveland Clinic, Cleveland, OH, [2]Cleveland Clinic Foundation, Cleveland, OH

Background: RISE is one of the few tools that programs have with which to compare performance of the trainees to a national cohort, but there are no studies investigating RISE in the assessment of program effectiveness. Two prior studies have examined the correlation between RISE and USMLE scores and RISE as a predictor for subsequent performance on board certification examinations. We analyzed data derived from RISE performance of residents enrolled over nine years in a single program is analyzed to determine if it could be used as a quantitative marker of overall program effectiveness.

Design: Individual RISE percentile scores in PGY1 was compared with the same score in PGY4 for all 70 residents who completed AP/ CP training in our program from 2009-2017. In addition, the results for all PGY1 as a group were compared with those achieved as a PGY4 group. Residents who completed AP-only or CP-only training or who left the program prior to graduation were not included. As the program does not include CP rotations in PGY1, percentile scores in hematopathology (HP) and transfusion medicine (TM) between PGY1 (baseline knowledge) and PGY1 (after hands-on experience) were compared as indicators of the program's educational effectiveness in specific areas.

Results: The mean overall percentile for all 70 residents who took the exam in PGY1 was 50 (SD +/-26.1). In PGY4 they had a mean overall percentile of 59 (SD +/-27.9). The increase in 9 percentiles relative to the national cohort was a significant ($p<0.003$) improvement, and was mainly due to an increase in high performers (figure 1). There was moderate correlation between performance in PGY1 and that in PGY4 (0.61), however, the PGY1 score was not a reliable predictor of PGY4 score ($R^2=0.34$), with the exception of the high performers, who tended to remain so (figure 2). Training in HP and TM during PGY2 resulted in improved rankings in those areas (HP mean PGY1: 45.8 vs PGY2: 69.9 and TM mean PGY1: 32.4 vs PGY2: 63.9; $p<0.001$), demonstrating a temporal and causal relationship between training and performance.



Conclusions: Analysis of changes in RISE ranking of a large number of trainees significantly reduces the variability due to differences in individual motivation, test-taking ability, and previous experience. This should provide candidates, programs and accrediting bodies with a quantitative tool in the assessment of residency programs.

594 Value and Effectiveness of a July Orientation Month for PGY1 Residents

Andrew L Dunn[1], *Hannah Goyne*[2], *Susanne Jeffus*[1], *Jennifer Laudadio*[1]. [1]University of Arkansas for Medical Sciences, Little Rock, AR, [2]Little Rock, AR

Background: For resident classes prior to 2016, pathology specific orientation at our institution included a didactic curriculum and direct supervision on certain first-time rotations. Informal resident feedback indicated a more structured experience was desired. Feedback was accompanied by lower than typical supervision and instruction scores on the American Council for Graduate Medical Education (ACGME) resident survey. Residents supported a structured orientation curriculum as a possible solution. A resident-driven, faculty facilitated, orientation month was developed and launched July 2016 for the incoming PGY1 class. Surveys assessed its value and effectiveness.

Design: A four-week curriculum was designed to introduce 5 PGY1 residents to rotations most frequently encountered during the first year: surgical pathology (2 weeks), autopsy (1 week), transfusion medicine and hematopathology (1 week combined). Each mini-rotation included goals and objectives, reading assignments, example daily schedules, and checklists. In addition to faculty, each PGY1 was assigned at least one upper level resident for direct supervision. The morning didactic schedule was designed to introduce basic but practical concepts and included slide review sessions and grossing conferences. The orientation curriculum and lectures were anonymously assessed via the rotation evaluation and 2 post-orientation surveys (immediately after and 6 months later) using Likert scale questions.

Results: All PGY1s completed the rotation evaluation and both surveys. On a 1 to 5 scale, with 5 being "extremely satisfied," scores immediately after the orientation month were: 4.8 overall satisfaction, 4.8 appropriate supervision, 4.8 appropriate instruction. 6-month follow-up survey results showed all residents deemed the orientation

month of value or even "essential" with 4/5 preferring it over a future elective month. 2017 ACGME survey scores improved (from mean 3.8 to 4.5 out of 5) for amount of supervision and (from mean 4.2 to 4.8 out of 5) for appropriate level of supervision.

Conclusions: Based on surveys and feedback group discussions, the orientation curriculum was deemed successful and has been retained for 2017. By applying the Plan-Do-Check-Act (PDCA) cycle, the curriculum was improved for July 2017. For the second cohort, autopsy was a longitudinal; blood bank and hematopathology were each 1-week long. More emphasis was placed on procedural technique in surgical pathology and checklists were slightly modified based on feedback.

595 WhatsApp as a Supplemental Learning Tool for Pathology

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Background: WhatsApp is a free application that offers a simple and reliable platform for multimedia messaging. These messages can include high-resolution images of pathology slides, website links and documents. The easiness of acquiring and sharing information, together with the connectivity a social media tool offers, made WhatsApp an ideal platform for learning. The aim of the study is to assess the benefit of WhatsApp as a supplemental tool for teaching pathology.

Design: A WhatsApp group, by the name "pathology cases", was created by one of the authors two years ago to include a group of residents and junior pathologists. A designed online survey was sent to the group to assess their views about the application and its usefulness in learning pathology. We also gathered and analyzed data from the application about shared cases, documents/articles, web links and the participation of group members in case discussion.

Results: The group has 24 members, including the authors. In the last 2 years, 230 cases were discussed, with an average of 2-3 cases per week. Most of the cases (219/230) were surgical pathology. During these two years, 1957 pictures and 69 articles/pdf documents and pathology-related website links were shared. 23 members participated in the survey (96% response rate). Members characteristics are as follows (PGY1-2: 7, PGY3-4: 10, PGY5: 2, and 4 practicing pathologists). 20 members (83%) either agreed or strongly agreed that WhatsApp is a convenient way for learning pathology. 21 members (87.5%) stated that they learned about new entities through the WhatsApp group. 19 members (79%) thought the discussion was useful. 13 members (54%) noted that the cases discussed differ from their daily practice cases at their respective institutes. 11 members (48%) use other social media platforms like Twitter and Facebook to learn pathology.

Conclusions: WhatsApp is a great platform to supplement learning for pathologists in training. It's an innovative, simple and quick tool for sharing pathology cases and relevant information.

596 Improving Residents Laboratory Administrative Training - An Institutional Experience

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Background: Internal review (IR) is a critical measure for quality assurance (QA) program and ensuring the diagnostic accuracy to provide best for patient care. At the tertiary teaching medical center, part of our residency training is closely related to anatomic pathology (AP) practice. In addition to continuous AP quality improvement (QI) activities, we have encouraged residents to participate in QI projects, monthly QA meeting, and daily internal cases review. Since 2015, we have assigned residents to perform laboratory self- inspection annually to correct deficiency of "lack of peer review" citated by CAP inspection in 2015 and also find and correct any other possible deficiencies.

Design: Residents participated in all QA/QI activities in our department which consist of but not limited to: 1) daily intradepartmental review of cases (consensus conference), 2) random 2% retrospective cases review, and 3) multidisciplinary tumor boards. AP QA/QI results are reviewed at monthly faculty meeting to address any ongoing QA related issues. Residents also conducted annual laboratory self-inspection (mock inspection) and voluntarily participated in QI projects with faculty members.

Results: Review of QA data shows: 1) decrease discrepancies between internal and external peer review. In the period of January 2016 to July 2017, 5283 cases were reviewed in consensus conference and 360 cases were reviewed as 2% random case. 2) Turnaround time (TAT) improved (biopsy TAT from average 4 days to 2 days). 3) In the same period residents conducted two internal laboratory self-inspections that helped department to find deficiencies and correct them, so number of citation in CAP inspection significantly decreased (from 11 phase I and II deficiencies in 2015 self-inspection to only 1 phase I deficiency in 2015 CAP inspection). 4) Two QI projects were presented at national meetings by residents. 5) According to the feedback from residents after mock inspection, most of them believe that participation of residents in QA program is a great opportunity for learning lab management and also a good experience for their future career.

Conclusions: This study demonstrates that involvement of residents in laboratory QA/QI program can help them to learn lab management better and build up very strong administrative skills for their future career. Meanwhile participation of residents in QI projects like lab self-inspection can improve laboratory proficiency, minimize errors, and maximize patient safety.

597 Global Pathology Training in Residency and Fellowship: Trainee Collaboration with Resource Restricted International Laboratories is Mutually Beneficial

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Background: There are global health training tracks in numerous medical residencies. Few pathology training programs offer structured exposure to pathology in limited resource settings, despite the increasing global cancer burden. In Trinidad, there are 5 pathologists (2 subspecialty trained) serving a population of 1.5 million. Due to resource limitation, local hospitals are unable to provide rapid turnaround of pathology samples. Thus, private labs provide most pathology services and often run at a deficit serving the low-income population. A needs-based assessment revealed the need for more subspecialized pathology services and faster turnaround time (TAT) in the region. While telepathology has been attempted for subspecialty consultations, this particular lab, like many in resource restricted settings, was found ill-equipped for such an intervention. Overnight slide delivery is a cheaper alternative. Taking advantage of trainee interest in global pathology and the need for services in this region, we began a year-long pilot collaboration with two US-based fellows and a lab in Trinidad that serves a low-income population. We hypothesized that having trainees review slides would: 1) alleviate the burden of overextended pathologists and 2) be of educational benefit for the trainee.

Design: AP boarded fellows from two tertiary US institutions reviewed clinical cases from Trinidad and Guyana from June 2016 to June 2017. Slides were sent via overnight delivery to the US once a week. Overall costs, TAT, clinician, patient and trainee satisfaction were evaluated.

Results: Cost of shipment averaged 80.00 US/wk. Trainees reviewed an average of 76 cases/wk. Fellow TAT was 3 days from shipment and 5.5 days from procedure date. TAT for the in-lab pathologist was 2 days ($p<0.005$). The fellows' review averaged 3hrs/wk. Clinician feedback was notable for some difficulty in communication. The trainees reported that the experience was educational, particularly in the setting of limited immunohistochemistry. The collaboration resulted in one case report of gastrointestinal amyloidosis. Other interesting cases included a chondroblastic osteosarcoma and an epithelioid neurofibroma (confirmed by expert pathologist at the trainees' institutions).

Conclusions: This study shows that the structured engagement of pathology trainees in global health is mutually beneficial and details a low cost intervention that can act as a template for larger scale global pathology academic training tracks.

598 Effectiveness of Cytopathology Education Using Rapid Image Based Pattern Recognition

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Background: The field of diagnostic cytopathology is largely based on cytopathologists and cytotechnologists using pattern recognition cognitive processes. Diagnostic skills generally are thought to develop or improve with experience in real practice. Our goal was to determine if novice subjects could be taught to identity high grade squamous intraepithelial lesion or higher (HSIL+) lesions using a rapid image based educational method.

Design: We recruited eight subjects with no experience in examining Pap test slide or digital images. We developed 20 tests, including a pre- and a post-test, each comprised of 50 digital image challenges. Following the pre-test, an experienced cytotechnologist educator provided six 30 minute lectures on Pap testing and the criteria for the identification of HSIL+ lesions. Over six weeks, the participants attempted to identify HSIL+ lesions in 18 tests comprised of 15 HSIL+ images and 35 < HSIL+ images. The participants were provided

immediate feedback following the completion of each test. We assessed pre- and post-test individual and group performance characteristics.

Results: The mean accuracy in detecting HSIL+ and standard deviation of the pre- and post-test scores was 18±11% and 74±7%. The mean time for test completion was 8.3 minutes. The major improvement among all subjects largely related to improved specificity, with participants recognizing that HSIL+ was not present. The mean post-test sensitivity of detection was 42.5%, although two subjects had a HSIL+ detection sensitivity of 80% and 73% and a specificity of 77% and 89%, respectively. Apart from these two subjects, combinations of other subject scores for HSIL+ detection did not approach these high levels of sensitivity and specificity.

Conclusions: Although large volume rapid image review improves novice subject performance, substantial improvement in both sensitivity and specificity of HSIL+ image detection was seen in only 25% of subjects. These data indicate that some individuals may highly benefit from rapid image examination, although the majority of subjects may require a different form of educational training to separate lesional from non-lesional cells. These data also indicate that some subjects may be rapidly trained for select tasks, such as HSIL+ detection, a needed skill in under served parts of the world.

599 Interactive Microscopy: An Effective Format for Board Review in Anatomic Pathology

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Background: Interactive Microscopy (IM) has become a powerful format by which some conferences for continuing medical education are now organized by USCAP. The IM format emphasizes previewing selected slides prior to review at the multiheaded microscope - thus recapitulating a modality of learning familiar to most pathology trainees. However, a literature search does not reveal the extent to which anatomic pathology (AP) residents benefit from IM. Thus, the goal was to determine the impact of the IM format on residents who took their AP board exams.

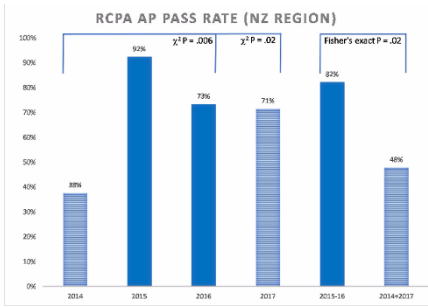
Design: I organized weekly (Saturday) IM sessions in 2014-15 & 2015-16 at my institution in New Zealand (NZ), where I selected 10 slides from current and/or recently archived cases for regional AP residents to review. From November to March, the IM sessions served to prepare the residents for the AP board exam series (Parts 1,2) that is administered annually (in May/June) by the Royal College of Pathologists of Australasia (RCPA).

The residents previewed the slides as a team for up to 1 hour - after which I reviewed each slide with them as a group at the multiheaded microscope. Our review included interactive discussion & questions. I then distributed optional homework questions to expand upon key concepts that were beyond the scope of the session.

In April, the residents took mock exams that I wrote, which simulated the corresponding RCPA Part 1 or 2 AP exam. After grading the exams, I held 1-on-1 feedback sessions to review each exam with each resident. The residents who participated in the IM sessions & mock exams did so on a completely voluntary basis.

Results: The pass rate for the RCPA board exam series in 2015 (12/13=92%; N=5) & 2016 (11/15=73%; N=5) increased for the regional AP residents, compared to the year before the IM sessions/mock exams were introduced (2014: 6/16=38%; N=7). The higher pass rate remained preserved the following year, even when the IM sessions/mock exams were discontinued (2017: 5/7=71%; N=3). And across the IM years combined, the pass rate significantly increased (2015-2016: 23/28=82%; N=7), compared to the year before & after (2014+2017: 11/23=48%; N=9) (Fisher's Exact P = .02).

2014	Part 1, Written	Part 1, Slides	Part 2, Small Bx	Part 2, Cytology	Part 2, Slides	Part 2, Viva
Res A	P	P	Yes	Yes	Yes	Yes
Res B	Yes	Yes	NA	NA	NA	NA
Res C	P	P	No	No	DNT	NA
Res D	No	No	NA	NA	NA	NA
Res E	No	No	NA	NA	NA	NA
Res F	No	No	NA	NA	NA	NA
Res G	No	No	NA	NA	NA	NA
2015	Part 1, Written	Part 1, Slides	Part 2, Small Bx	Part 2, Cytology	Part 2, Slides	Part 2, Viva
Res B	P	P	No	Yes	Yes	NA
Res C	P	P	Yes	Yes	Yes	Yes
Res D	Yes	Yes	NA	NA	NA	NA
Res E	Yes	Yes	NA	NA	NA	NA
Res F	Yes	Yes	NA	NA	NA	NA
2016	Part 1, Written	Part 1, Slides	Part 2, Small Bx	Part 2, Cytology	Part 2, Slides	Part 2, Viva
Res D	P	P	Yes	Yes	Yes	Yes
Res E	P	P	Yes	Yes	Yes	Yes
Res F	P	P	Yes	Yes	No	NA
Res H	P	P	No	Yes	DNT	NA
Res J	No	No	NA	NA	NA	NA
2017	Part 1, Written	Part 1, Slides	Part 2, Small Bx	Part 2, Cytology	Part 2, Slides	Part 2, Viva
Res F	P	P	P	P	B then Yes after repeat	Yes
Res J	Yes	Yes	NA	NA	NA	NA
Res K	Yes	No	NA	NA	NA	NA
Yes = passed		P: already passed		B: borderline		
No = failed		NA: not applicable		DNT: did not take		



Conclusions: The IM format successfully increased the passing rate for the RCPA AP board exam series in the consecutive years it was implemented. Despite the small sample size, the IM format should be regarded as an effective tool for AP board review.

Special thanks to: Drs. Steven D. Billings, Russell K. Brynes, and Laura W. Lamps.

600 Impact of Internet Based Social Media on the Public Perception of Pathology

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Background: "And after diagnosing your only role is in postmortem." This was the online comment in response to a message posted by a pathologist regarding his role in clinical medicine. "Conventional" print and visual media may have a role in creating a perception of an isolated pathologist working in a dim lit basement. This overall passive notion to pathology is reinforced by our generally non-patient facing role, little community involvement, and minor representation in various community education forums. Current social media sites are utilized for education of pathologists' peers and have limited participation by the general public. The goal of our study was to target the public using the same social media platforms to create awareness of pathology in ongoing clinical care, scientific discovery and contribution to collaborative research.

Design: A survey was designed to gain feedback of lay public on their understanding of the role of pathology. The participants ranged from high school students to adults of all ages (n=33). The survey participants were selected at random and excluded practicing physicians. Instagram ™ page was created to represent pathologist role to the online users. The images presented on the social site linked different etiologies of diseases to the histology images. The caption for the images described how a risk factor may lead to disease pathogenesis and how pathologists would derive histological diagnosis. Five online followers of Instagram ™ webpage were asked to evaluate the webpage after three months of online activity. These webpage followers were asked to take into account usability, accessibility, utility and relevance of the online information.

Results: Three months after creating the Instagram ™ page, there were 1400 subscribers following the informational webpage. The pre survey showed that although the public is aware that a pathologist is a doctor, they are not aware that the pathologists invest time into making diagnosis using a microscope. The webpage evaluations depict that the public finds Instagram™ to be an effective tool to heighten awareness to the public about the completeness of the role of a pathologist in clinical medicine.

QUESTION	RESPONSE					Total number of participants
Have you or anyone you know ever had laboratory test performed?	Yes (26)	No (7)				33
Should there be strict rules with lab results to make sure they are correct?	Yes (32)	No (1)				33
Do you know anyone who has suffered from cancer?	Yes (30)	No (3)				33
There are many types of cancer, how is a specific type of cancer diagnosed?	laboratory test (15)	MRI (7)	CT scan (10)	Looking through a microscope (7)		33*
Are you familiar with autopsy and who performs the autopsy procedure?	Yes (26)	No (7)				33
Who is a pathologist?	Helps with speech, a speech therapist (2)	Medical doctor for diagnosing diseases (25)	a lab technician (0)	a specialist in ancient artifacts of medicine (2)	doctor who only performs autopsies (4)	33
If you answered question 6, what type of degree do pathologist have?	Master's (3)	Medical doctor (MD or DO) (30)	PhD (7)	Bachelor's of science/art (BA/BS) (3)		33

Evaluation of Effectiveness of Instagram Pathology Page		
Evaluator	Scale of 1-10	Comment
2nd year medical student	9	Sometimes I fail to see the practicality of medicine, page reminds me that medicine is more than chemical pathways. You take the everyday medical issues and invite us to see how pathologists solve them. I learned that pathologists manage the blood bank, I honestly never knew that Score of 9 because of irrelevant images
Senior associate of health and human services (KPMG)	8	Attractive, colorful, informative, fun and easy to understand. Some pictures derail from the subject matter. Should be strictly focused on pathology, not enough material. Post more!!!
College student	10	Start a you tube channel called pathology for dummies
2nd year family medicine resident	9	The diversity of topics mentioned are eye opening to how pathologists play a role in the medical field. This outlet serves as a great way to inform those unaware of the field in a more user friendly way, as social media is widely used by the public. A score of a 9 because a hyperlink for viewers to expand their knowledge would be helpful
4th year ENT resident		

Conclusions: Although many people are aware of who a pathologist is, the lay public is unaware of what a pathologist does. This study takes an innovative approach towards impacting the public's perception. The results show that the public can be effectively educated through social media platforms like Instagram ™.

601 MyPathologyReport: An Online Pathology Education Resource for Patients

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Background: An increasing number of healthcare providers are providing patients with access to their electronic medical record (EMR). Laboratory results, including pathology reports, are amongst the most frequently accessed pieces of information in patient-accessible EMRs. The pathology report is an important source of information regarding diagnoses, treatment, and prognoses, but the information can be difficult to understand due to its specialized language.

MyPathologyReport is a novel website that exclusively provides pathology education to patients. It is a free online resource designed to help patients understand the language of pathology, to effectively navigate their pathology report, and to illustrate the processes of obtaining a pathologic diagnosis.

Design: At the onset, input was solicited from pathologists, residents, clinicians, and the lay public. Feedback was analyzed and the results were used to develop the content of the website. Specifically, select clinicians were asked to complete a questionnaire regarding their use of pathology reports, their experience discussing pathology reports with patients, and whether MyPathologyReport provided useful information frequently requested by patients. Lay reviewers were asked about the readability and usability of the site.

Results: There are four content areas of MyPathologyReport, including: i) the basic structure of a pathology report; ii) an illustrated pathology dictionary; iii) articles outlining the most common pathological diagnoses; iv) answers to frequently asked questions about pathology and pathology reports. Currently, we are recruiting additional clinicians to assess the MyPathologyReport online resource. Our goal is to recruit at least 20 clinicians from a range of subspecialties, allowing us to draw meaningful conclusions from a diverse set of clinical practices.

Conclusions: An informed patient is an active member of the healthcare team. We expect that clinicians will find MyPathologyReport to be a useful patient resource that allows them to have more efficient conversations surrounding diagnosis and treatment with patients. We also expect that this project will improve collaboration between clinical and diagnostic specialties and will highlight the central role of pathologists in patient care. Important next steps will involve longitudinal assessment of the understandability and utility of MyPathologyReport from non-medical community members and evaluation of patient satisfaction and knowledge with access to this resource.

602 Development of Clinical Pathology Residency Curriculum in Laboratory Management and Quality Improvement

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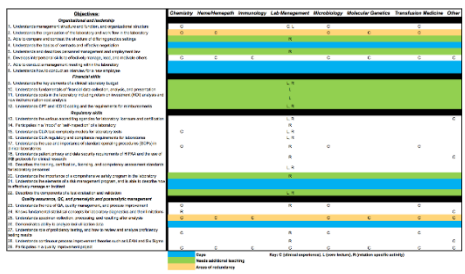
Background: Development of curricula in laboratory management (LM) and quality improvement (QI) are essential to ensure graduates of pathology residency training programs are competent practitioners based on the ACGME Milestones. We identified LM and QI as areas specifically in need of additional teaching through surveys of recent graduates from our Clinical Pathology (CP) training program, in which 90% of respondents indicated they wanted more training in LM and QI. In addition, a survey of potential employers by the College of American Pathologists found a similar need for additional training in LM for pathology residents.

Design: A needs assessment of our existing LM and QI curricula was performed using a curriculum mapping strategy. A set of 29 learning objectives relating to LM and QI was created based on the ACGME Milestones and guidelines proposed by Smith et al.[1] Our current curriculum was mapped to these objectives by rotation and teaching method.

Results: We identified 5 objective gaps in our curriculum: understands the basics of contracts and effective negotiation (4), able to conduct a management meeting within the laboratory (7), understands how to conduct an interview for a new employee (8), understands the elements of a risk management program, and is able to describe how to effectively manage an incident (21), and demonstrates ability to analyze test utilization data (26). We also identified 8 objectives that may benefit from additional teaching: able to compare and contrast the structure of differing practice settings (3), understands and describes personnel management and employment law (5), financial curriculum objectives (9-12), understands the importance of a comprehensive safety program in the laboratory (20), and describes the components of a test evaluation and validation (22). Additionally, two areas of possible redundancy in content were identified.



Conclusions: Curriculum mapping is an effective method of needs assessment for pathology residency training programs. The curricular needs identified in this project will direct future efforts to develop new curricula, or improve existing curricula, in the areas of LM and QI. In addition, our LM and QI objectives may be transferrable to other pathology training programs.

Smith BR et al. Curriculum content and evaluation of resident competency in clinical pathology (laboratory medicine): a proposal. Am J Clin Pathol. 2006 Jun;125 Suppl:S3-37.

603 tAUTOMER: An Automated, Objective Tool to Measure Pathology Trainee Performance

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Background: ACGME core competencies, and the additional milestones developed by ABMS member boards, attempt to provide a framework by which residents in training can be evaluated. Currently, pathology faculty are asked to provide subjective impressions of resident progress using key elements of each competency. We provide an automated, bias-free and standardized tool to objectively evaluate Residents during their training. The primary objective of this study is to assess the utility of comparing preliminary and final LIS diagnosis templates as a means of identifying meaningful gaps in Residents' knowledge. The secondary objective is to identify gaps in the residency training program.

Design: We compared preliminary resident breast lumpectomy templates for ductal carcinoma in-situ (DCIS) or invasive carcinoma cached within the department's LIS archives with the final report templates signed by the attending physician. We wrote a computer program (tAUTOMER) to extract data from the following diagnostically critical fields: primary tumor size (pT), regional lymph node status (pN), Nottingham grade, in situ and invasive carcinoma margin status. These elements from resident and attending reports were compared, and classified as minor discrepancy, major discrepancy, or no discrepancy based on a priori criteria. All steps from data extraction to discrepancy evaluation were automated using custom software written in Python 3.4.

Results: As a proof of principle prior to scaling up the size of this analysis, the data from a single resident completing his 2nd year of anatomic pathology training were evaluated across two, week-long breast service rotations separated by three months. The resident completed fourteen lumpectomy cases during this period and was evaluated by five different attending physicians. The breast lumpectomy templates associated with these cases, both the resident's preliminary template and the attending physician's final diagnosis template, were pulled from the Pathology department's LIS archive and analyzed.

	Minor discrepancy	Major discrepancy	No discrepancy
Primary tumor (pT)	2 (14%)	1 (7%)	11 (79%)
Lymph nodes (pN)	1 (7%)	0 (0%)	13 (93%)
Nottingham grade	1 (8%)	0 (0%)	12 (92%)
Carcinoma margin	3 (23%)	0 (0%)	10 (77%)
DCIS Margin	5 (36%)	0 (0%)	9 (64%)
Overall	12 (18%)	1 (1%)	55 (81%)

Conclusions: The data from the initial proof of principle analysis shows that our custom software program, tAUTOMER, can use the Pathology LIS to provide an objective, quantitative, and valid means to measure performance and to determine performance improvement. The study will be expanded to include both breast and cervix neoplasm templates for all residents and fellows who have rotated through the breast and GYN services from 2014 to 2017.

604 Leading Introductory Slide Sessions in Surgical Pathology is a Valuable Career Development Tool for Upper Level Residents

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Background: Recent surveys of employers hiring pathology residency graduates have noted deficiencies in the critical areas of teaching and communication skills. This highlights the need for pathology residency programs to build and develop these skills in trainees. Ensuring proper development of residents as teachers is challenging as it often involves informal teaching which is difficult to evaluate. As part of first year orientation, our training program instituted slide sessions for first year residents led by upper level residents. While the initial intention of these sessions was to provide introductory learning to first year residents, benefits in career development to the leaders of the sessions have been appreciated. Not only did these sessions prepare trainees for the job market but they also served as a way to assess important Accreditation Council for Graduate Medical Education (ACGME) milestones in teaching and communication.

Design: Our training program has instituted introductory twice weekly didactic/microscope sessions during the summer months led by upper level residents. The sessions are divided into ten sub-subspecialty organ systems with an attending and resident assigned to each organ system. The attending provides an introductory lecture and the resident leads a glass slide session each lasting one hour. After this series, we obtained demographic information and feedback from the leaders of the sessions largely using a 5 level scale from "Strongly disagree" to "Strongly agree."

Results: Eight of ten slide sessions leaders responded with feedback. These leaders were in various years of residency (37.5% PGY2, 50% PGY3, 12.5% PGY4) and most (75%) had not given a slide session before. The majority (75%) spent over 6 hours preparing for the slide session and attended the corresponding lecture by the attending (75%).

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Leading a slide session was similar to one on one teaching at the microscope as a mentor and other informal experiences.	12.50%	12.50%	0%	50%	25%
Leading a slide session was more challenging than I anticipated.	0%	25%	25%	37.50%	12.50%
Because of this experience, I feel better able to organize a slide session for a job interview and/or my future career.	0%	0%	12.50%	25%	62.50%
Leading a slide session helped me learn more about the pathology I was teaching.	0%	0%	0%	25%	75%
Leading a slide session helped me learn more about how to teach.	0%	12.50%	0%	25%	62.50%
Overall, I think leading a slide session was beneficial for my career.	0%	0%	12.50%	12.50%	75%

Conclusions: The development of teaching/communication skills in residents is necessary but challenging to assess. We implemented slide sessions that provided a unique experience allowing upper level residents to practice and hone their teaching skills. This proved beneficial for the development of teaching/communication skills but also increased pathology knowledge and served as preparation for a competitive job market. These sessions align with the ACGME milestone for teaching and enhance communication skills which are emphasized in other milestones. We feel our experience can be used by other programs to enrich residency and prepare trainees for future careers.

605 Leveraging Educational Technology and Evidence-Based Education to Improve Outcomes in Pathology Residency Education

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Background: Pathology residency education must be efficient, versatile, and up-to-date. With these goals in mind, our institution undertook a massive curriculum overhaul with the aim of improving learning, engagement, and board-relevance of resident learning in anatomic pathology (AP) and clinical pathology (CP)

Design: In the new model, we introduced a weekly system of subspecialty-based AP "traditional" didactic lectures, AP unknown slide sessions, CP unknowns, professional development sessions (PDS), team-based learning (TBL) exercises, "quick-fire" interesting case conferences.

Residents are assigned required reading prior to each week, as well as digitized unknowns slides that correspond to the didactics and required reading. Residents are also divided into seven groups of four members each, in which they take a group-oriented quiz (TBL) that encourages discussion among themselves, followed by an attending-led discussion of the answers. PDS included lectures on curriculum vitae creation, situational leadership, and time management. The "quick-fire" interesting case conference allows for 5-6 residents to present interesting cases for 10 minutes each.

To assess the quality of these changes, questionnaires were distributed amongst attendings, residents, and observers (five-point Likert questions as well as qualitative responses)

Results: Twenty one residents, four faculty, and six observers responded to the questionnaires. Significant results include:

Residents

Learning process affected?	4.0
Engagement during lectures?	75% (15/20) said yes; 15% (3/20) said maybe, and 10% (2/20) said no.
Improved understanding of the AP subjects in AP didactics and corresponding unknowns?	4.7
Improved understanding of the CP subjects and CP unknowns?	4.2
Board-relevance?	4.5
Team-based learning sessions as effective educational tool?	4.4

Faculty

Teaching style modified?	100% (4/4) yes
More interested to teach based on the new format?	100% (4/4) more
Resident engagement increased?	100% (4/4) yes
Team-based learning is an effective teaching tool?	5.0

Observers

Rate the current curriculum at our program?	4.5
Based on the curriculum, to what degree would you consider this program as a place to enroll in pathology residency?	4.2

Conclusions: Perceptions of the new curriculum are consistent between faculty and residents. Both parties believe that the new curriculum is both beneficial for learning and improves resident engagement. When observers visit our program, these changes also reflect well on the department. Weaknesses of this study include a small number of faculty and observers, though more data will be collected over the next several months

606 Responding to Resident Educational and Service Dissatisfaction: The Impact of a Multidisciplinary Inflammatory Dermatopathology Conference

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Background: The initiation of a monthly interdisciplinary case conference can improve resident education in areas of discomfort and increase resident satisfaction with on-call duties. In our department, inflammatory dermatopathology cases are often reviewed exclusively by dermatopathology fellows and attendings, bypassing residents. A 2016 resident survey within our program identified inflammatory dermatopathology education as an area of perceived weakness. Residents also expressed dissatisfaction toward processing and grossing overnight "rush" medical dermatopathology specimens while being unable to review these cases. We present the results of an educational conference designed to address these problems.

Design: Our program instituted a recurring, monthly interdisciplinary conference for pathologists and dermatologists to review inflammatory dermatology cases seen in our hospital system over the past month. The dermatology attending and resident presented clinical histories and photos taken at bedside while dermatopathology fellows described the case's histologic features and reviewed differential diagnoses. Slides from each case were scanned and whole-slide images were archived into a digital library. An inflammatory dermatopathology quiz was administered before the initiation of the conference and six months afterwards to assess impact.

Results: Six monthly interdisciplinary conferences were held, reviewing 24 in-house inflammatory dermatopathology cases. Cases have included Steven-Johnson's syndrome, toxic shock syndrome, and acute graft-versus-host disease. A digital library of clinical photos and whole-slide images was created, containing 20 cases to date. An unpaired two-sided t-test of the inflammatory dermatopathology quiz showed residents scored 56.2% higher after six months of the program ($p < 0.05$). Subjectively, residents report greater satisfaction processing overnight rush dermatopathology cases on-call after interacting with their clinical colleagues and seeing bedside photographs during conferences.

Conclusions: Monthly interdisciplinary case conferences are an effective educational tool which can enhance education in perceived areas of weakness and improve resident attitudes toward service duties. In our institution, it has created a forum in which pathology and dermatology residents can learn from one anothers' diagnostic approaches. Further investigation of the program's impact on additional metrics including ASCP Resident In-Service Exam scores is currently ongoing.

607 Searching for a Guide to Becoming an Effective Educator

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Background: The Accreditation Council for Graduate Medical Education requires training programs to provide faculty development, a key element to improve the quality of graduate medical education. There is scant literature focused upon developing skilled educators. The objective of this study was to determine the qualities/skills/traits deemed important in graduate medical educators.

Design: Educators winning institutional teaching awards (Educator of the Year, Clinical Mentor of the Year, and Research Mentor of the Year) over the past 9 years were surveyed to identify the most important qualities of outstanding educators. Pathology trainees were then asked to identify the 5 most important traits of an outstanding educator out of the comments provided by faculty members. Literature review was conducted via PubMed by searching key words such as Mentors, Mentorship, Education, Medical, Graduate, Pathology, Residency, and Fellowship from 1990 to April, 2014 and compared with our institutional experience.

Results: Among 31 faculty members (2 pathologists), 25 responded to the request of submitting up to 5 most important qualities of a great educator. After analyzing the participants' responses, qualities/skills were grouped into 5 categories conveying the overall theme of each response. As depicted in Table 1, trainee's valued each personal quality in a similar manner as faculty. Trainee and faculty surveys both indicated that priority is given to the category "Managing Yourself" (role model/willingness to teach) with participants selecting this category 31% and 36% of the time. The trainees selected the category "Manage the Resources" (connectivity teamwork) as an important quality 6% more often than faculty. Among 150 reviewed publications, 8 contained lists or tables of attributes of successful physician mentors with attributes overlapping with our findings.

Category	Educator's answers	Trainee's selections
Manage yourself (role model/ willingness to teach)	29 (31%)	23 (36%)
Manage the talent (empowerment/ encouragement)	19 (21%)	10 (16%)
Manage your time (availability/efficiency)	18 (20%)	12 (18%)
Create a win-win situation (reciprocity)	16 (17%)	8 (12%)
Manage the resources (connectivity/teamwork)	11 (12%)	12 (18%)
Total responses	93 (100%)	65 (100%)

Conclusions: Our study highlighted attributes of successful graduate medical educators, identified both by the educators themselves and by the trainees who receive the education. Personal qualities are highly regarded in educators in combination to clinical skills. This shed lights on future faculty development focusing on noncognitive skills associated with effective teaching.

608 Resident Performance in Surgical Pathology: Quantitative Diagnostic Assessment Identifies Specific Subject Areas for Focused Training

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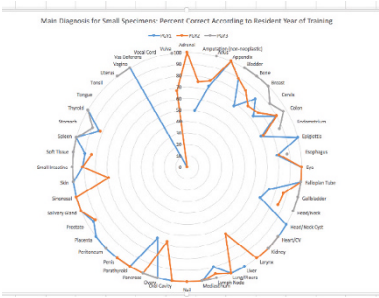
Background: Surgical pathology quantitative diagnostic assessment (SP-QDA) is a potentially valuable tool that can track trainee performance through time, track group performance through time and provide information on trainer scoring reproducibility and consistency. Additionally, subject matter can be assessed regarding volume, diversity and diagnostic accuracy per organ site. In this study, we queried our database to identify any areas that pose persistent diagnostic challenges throughout training.

Design: Five surgical pathologists used a standardized scoring form to quantify resident diagnostic accuracy according to organ site and specimen type ("small" or "big"). The pathologists and two senior residents had jointly reviewed sample cases to facilitate scoring consistency. Residents previewed all cases prior to sign-out with the attending. Twenty three residents (PGY1-PGY5) were scored in 178 sign-out sessions. Number of correct and incorrect diagnoses were assessed according to specific body site (n= 48) and specimen type ("small" or "big"). Resident year of training and number of rotations in surgical pathology were recorded for each sign-out session. Data were entered into a Microsoft Access database by an experienced

administrative assistant. Scoresheets were retained to perform periodic QC on data entry.

Results: Biopsy specimens with the greatest persistent diagnostic error comprised: 1) endometrial (low of 67% correct), 2) cervical (low of 71% correct) and 3) esophageal (low of 74% correct). The percentage of correct diagnoses was <90% across PGY1 to PGY3 trainees without a statistically significant improvement from junior to senior residents. Diagnostic accuracy of other small biopsy specimens such as colon, small intestine, pancreas/bile duct, liver, stomach, breast, larynx, oral cavity and prostate directly correlated with resident year of training and number of surgical pathology rotations.



Conclusions: By SP-QDA scoring, low diagnostic accuracy did not significantly improve through the course of training years PGY1 through PGY3 for biopsies of endometrium, cervix and esophagus. Diagnoses rendered at these sites are often non-neoplastic, may entail subtleties of pattern recognition, and may be subject to greater inter-pathologist variation in diagnostic interpretation than other biopsy sites. Additional factors that may influence diagnosis accuracy at these sites may be Department-centric.The three biopsy sites will be targeted for focused training (methods to be determined).

609 Evaluation of the Effect of Interactive and Exercise Based Teaching Modules in Improving Residents' Diagnostic skills in Gastrointestinal Pathology

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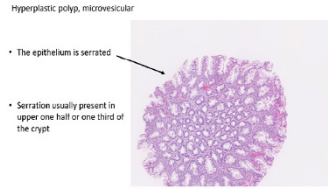
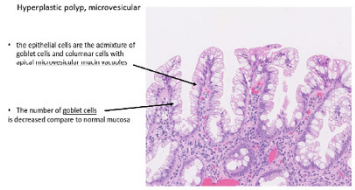
Background: Pathologists in training need to develop the ability to recognize cancer and cancer precursors on limited biopsy material obtained during the course of cancer screening procedures. Designing an effective model for mastering such diagnostic skills is especially important as residents are expected to be able to practice independently upon completion of residency.

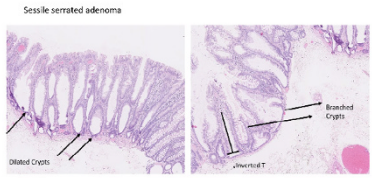
Design: We designed a learning module that includes a pretest set of still images or virtual slides from 30 polyps, to document baseline diagnostic skills and a posttest set of still images or virtual slides, from 30 different polyps, to measure level of improvement after following an educational presentation. From a library of more than 500 whole slide images of colonic polyps, we selected 60 samples that include: hyperplastic (microvesicular and goblet cell rich) polyps, tubular adenomas, sessile serrated adenomas/polyps, tubular adenomas with high grade dysplasia, intramucosal adenocarcinomas and invasive adenocarcinomas. The instructional exercise includes images taken from the lesions selected for the pre-test. Teaching module alongside pre and posttest material is posted on our website. Pathology residents from the authors' academic institutions were asked to participate in the study. The goal is to extend access to trainees around the country. The module effectiveness was measured and correlated with PGY training level and type of polyp/lesion. The statistical analysis is performed using IBM SPSS (Version. 20) software.

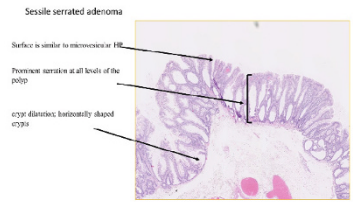
Results: Data has been collected from 20 residents: 9 residents were PGY1 (45%), 2 PGY2 (10%), 5 PGY3 (25%), 4 PGY4 (20%), who completed the assessment of 60 different polyps and the teaching module. Comparison of the pre and post-test score means shows statistically significant overall improvement in achieving the correct diagnosis (p=0.001). There was a significant improvement in the ability to diagnose HPMVs in the posttests. The highest correct scores in pretest and posttest were seen in tubular adenomas (Table 1).

	Pre-test mean score	Posttest mean score	P value
HPMV	43	71	0.000
HPGC	42	59	0.034
SSA	55	74	0.004
TA	78	81	0.481
TAHGD	53	61	0.520
Invasive	63	73	0.028









Conclusions: We designed the teaching module to improve the ability of residents to diagnose different types of colonic polyps. We have shown that our teaching module can significantly improve residents' overall diagnostic abilities, especially regarding HPMV and SSA. We will continue collecting data and will present the final results with the goal of fifty residents participating in the study. We hope these results will pave the road for more interactive and exercise based training modules in pathology

610 Surgical Pathology "Boot Camp": A Military Experience

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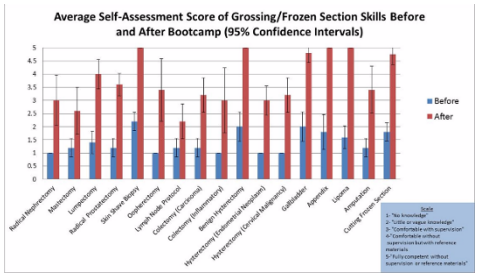
Background: A common concern among pathology residency faculty is the variability to which incoming residents have or have not attained basic pathology competencies during undergraduate medical education (UME). While multifactorial, deficiencies are likely due to an apparent de-emphasis of pathology during preclinical years of UME as dedicated basic science and clinical courses are replaced by integrated organ system-based learning modalities and an abbreviated preclinical experience. Methods of accelerating the transition from medical student to pathology resident are crucial but not standardized. Here, we describe the results of a 4-week surgical pathology "boot camp" in the largest military residency in the U.S.

Design: Six pathology interns were assigned to two 3-person teams. A 20-item pretest, including 10 glass slides and 10 written questions, and a 33-item self-assessment of grossing/microscopic skills were administered on the first day. The self-assessment was scored using a Likert-type scale from 1 to 5. Each team alternated between grossing and signout the following day without preview. The daily grossing workload (~150 cases) was split evenly among the team members. Direct grossing supervision was provided throughout the boot camp by upper level residents, staff pathologists, and pathologist assistants. A daily organ-based microscopic didactic session was given by an upper level resident and a daily gross conference was led by the interns. A 58-item posttest, including the 10 pretest slides plus 15 additional slides, a 33-item follow-up self-assessment of grossing/microscopic skills, and a frozen section skills practical were administered on the last day.

Results: The average overall score on the pretest was 36.0±16.2%(SD) which increased to 80.0±12.6%(SD) on the posttest ($p<0.05$). The average score on the baseline slide practical was 32±12.0%(SD) which increased to 74.0±16.2%(SD) ($p<0.05$). The average score on the additional posttest slide practical was 81.4±10.9%(SD). An increase in self-assessment scores was seen for all grossing and microscopic skills (Figure 1). Interns successfully completed a frozen section practical within an average of 11.5 minutes.



Conclusions: A combination of high expectations and intensity of a 4-week long surgical pathology rotation specifically tailored to incoming interns was successful in transitioning medical students to surgical pathology residents within a relatively short time.

611 Case-Based Interactive Asynchronous Modules for Pathology Teaching in Undergraduate Medical Education

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Background: Currently undergraduate medical education (UME) is shifting away from independent pathology courses to vertically and horizontally integrated curriculums, where pathology education is threaded throughout medical school. UME is also evolving from passive to interactive teaching methods, including case- and team-based learning. Both of these changes are efficacious and popular with medical students; however, associated logistical issues include finding space for multiple small groups, increased faculty involvement, and scheduling conflicts when many students are 'offsite' for clinical rotations. Case-based interactive asynchronous modules (IAMs) are online modules which teach pathology in a clinical context that can be done independently. In this study, we examined using IAMs to teach gynecologic pathology to third-year medical (MS3) students during their obstetrics and gynecology (ObGyn) clerkship.

Design: MS3 students at Thomas Jefferson University were given an IAM midway through their ObGyn clerkship. The module was designed to simulate the clinical course of three patients from their initial Pap test to their definitive gynecologic treatment. Students were able to interact with histologic and clinical images, and given multiple choice and open-ended questions regarding clinical management skills, gynecologic diagnoses, and general principles of pathology. The students were asked to voluntarily complete a 7-question pre- and post-module assessment. These assessments were separate from the clerkship grade.

Results: 139 students from 5 blocks completed a pre-test, of which 68 students in 3 blocks completed a post-test. In the blocks where pre- and post-test scores were obtained, the average scores were as follows: Block 1- Pre: 90%, Post: 95.29%; Block 3-Pre: 87.57%, Post: 91.43%; and Block 4-Pre: 77.71%, Post: 85.87%. The average increase in score was 5.7%.

Conclusions: IAMs offer a solution to many of the challenges presented in modernizing an integrated pathology curriculum in UME. In our study, all participants showed improved knowledge of pathology. Case-based IAMs present principles of pathology in a clinical context that reinforces not only pathology as a discipline but a pathologist's role in clinical care. Further studies include expanding the current ObGyn IAM as well as creating pathology IAMs for other clinical clerkships.

612 Effectiveness of an Ultrasound Fine Needle Aspiration (US-FNA) Training Workshop in Dar es Salaam, Tanzania

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Background: Tanzania is facing a major public health challenge with an increase in cancer rates and inadequate resources to meet this burden. Muhimbili National Hospital (MNH) is the largest national referral hospital and public teaching hospital affiliated with Muhimbili University of Health and Allied Sciences (MUHAS) in Tanzania, and has a biweekly FNA clinic. The majority of suspected cancer cases in Tanzania are referred to MNH for pathologic confirmation. Fine needle aspiration (FNA) is a cost-effective and minimally invasive diagnostic biopsy technique that can be performed in low resource settings. The addition of ultrasound (US-FNA) allows for direct visualization of the targeted lesions and ensures more accurate sampling. A major limitation of US-FNA is that diagnostic accuracy depends on how much formal training the operator has received.

Design: The aim was to evaluate the effectiveness of an intensive training program on performance of US-FNA. A team of Pathologists and Radiologists taught a 3-day workshop in US-FNA at MUHAS. Pre- and post-workshop assesments were performed. Course participants took a survey on their experience with US-FNA and were administered an assessment of skills related to US-FNA before and after the workshop (including 12 measures to analyze the participant's ability to perform an US-FNA and prepare an aspirate smear). Pre- and post-test differences were measured with a paired sample t-test.

Results: Twenty-six participants (pathologists, radiologists and residents) enrolled. Course participants significantly improved in all areas of measured assessment ($p<0.05$). Following training, most participants were able to successfully target the lesion in one pass using both the parallel (20% before and 80% after training, $p<0.05$) and perpendicular (20% before and 85% after training, $p<0.05$) US-FNA approach and make an aspirate smear (9% before and 80% after training, $p<0.05$). Additional data showed that the participants learned how to successfully prepare the US equipment, identify the lesion and measure it in 3 dimensions by US, and prepare an aspirate smear of high quality.

Conclusions: Trainees with varying levels of experience who participated in an intensive workshop in US-FNA significantly improved in all areas of measured assessment. This practical workshop on US-FNA was an effective way to improve participants' skill sets and may be informative to improve future practical workshops and to explore the feasibility of US-FNA in low resource settings.

613 Interest in Pathology Sharply Declined Among Senior United States Medical Students from 2008-2017: A Longitudinal Analysis of Residency Match Data

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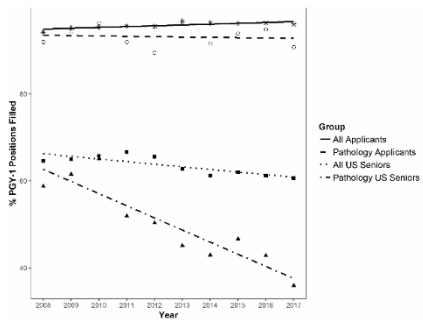
Background: Despite exciting recent developments to the field of pathology and its increasing relevance to patient care, recruitment of the next generation of pathologists remains a challenge. As demands on medical school curricula have increased in the United States (US), most focused preclinical pathology courses have been dismantled, limiting student exposure to pathologists and their work. However, trends in medical student interest in pathology across this time period have not been formally assessed. This study aims to longitudinally evaluate pathology National Resident Matching Program (NRMP) data to better understand changes in the pathology recruitment landscape.

Design: Archived publically available data from the NRMP Main Residency Match between 2008 and 2017 were reviewed. NRMP data for applicants in pathology and across all specialties were tabulated. Mann-Kendall analysis was used to assess the significance of trends over time.

Results: Although the number of offered pathology positions in the residency match increased 18.3% from 508 to 601, the number of US seniors applying in pathology decreased 28.8% from 298 to 216. There was a corresponding decrease in the percentage of pathology positions filled by US seniors from a high of 65% to a current low of 35.9% ($p=0.002$). This is in stark contrast to a concomitant overall 29.7% increase in PGY-1 residency positions across all specialties from 22,240 to 28,849 and 16.3% increase in total US senior applicants from 22,626 to 27,048. There was also a smaller decline in the percentage of total PGY-1 positions filled by US seniors from 66.6% to 60.6% ($p=0.02$). Similarly, while the percentage of positions filled in pathology remained stagnant between 91.9 and 90.7% ($p=0.79$), the percentage of PGY-1 positions filled across specialties increased steadily from 94.2% to 96.0% ($p=0.02$).



Conclusions: Despite consistent increases in the number of US senior residency applicants and filled PGY-1 residency positions across all specialties, there has been a marked decrease in the number of US senior applicants to pathology and stagnation in filled pathology positions during the last decade. These findings strongly suggest interest in pathology is declining among medical students. Although more focused studies are needed to fully understand the reasons for this shift, efforts to increase the visibility of pathology and to optimize recruitment methods are urgently needed to guarantee that this field can attract the best and brightest students in the future.

614 Virtual Case Seminars Using Whole Slide Digital Scans and Screencast Technology to Enhance Pathology Education

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Background: Many residency programs are currently based on a subspecialized model where residents work intermittently with a relatively small number of surgical pathology cases during their 4 years of training. Slide seminars where residents are asked to diagnose "unknown" cases have traditionally supplemented exposure to challenging diagnostic problems. There has been little interest in developing virtual case seminars using digital tools. Screencasts are videos with digital recordings of computer screen output with interactive features.

Design: Twenty virtual pulmonary pathology cases were prepared using whole slide digital scans utilizing Aperio scanner (Leica Biosystems, Buffalo Grove, IL) and Camtasia 2.0 (TechSmith, Okemos, MI) screencast software. They included: brief clinical history, video of chest CT scan or chest X-rays, video showing virtual slide at various magnifications, a pretest, video with a description of the virtual slide by an attending pathologist and a posttest. Results of quizzes were automatically emailed to an attending pathologist. Screencasts were stored in the internal departmental server and at screencast.com. Screencasts links were emailed to 12 residents and ancillary pathology staff who were asked to provide feedback to various questions on a 0-5 scale. Statistical analysis was performed using the paired *t* test.

Results: The screencasts included digital multimedia container file format (MP4) ranging from 10 to 90 megabytes. They lasted up to 5 minutes unless viewers elected to stop the videos to replay portions representing virtual slides. They could be viewed with desktop or laptop computers using Windows and Mac operating systems, and mobile devices using Android and iOS platforms.

Participant feedback was very favorable, showing average scores ranging from 4.38 - 4.75 to survey questions. Participants viewed the screencasts as a valuable and fun to use addition to their education. Using the paired *t* test, there was a significant difference in the pretest (48.5% ±31.2%) and posttest (87.0% ± 21.6%) results ($P<0.0001$). Participants favored viewing the screencasts on computers over mobile devices and preferred the length to be up to 5 minutes long.

Conclusions: Virtual case seminars using whole slide digital scans and screencasts can be easily produced by pathology staff and housestaff without the need for specialized technical support. They were well received by our housestaff and provide a useful tool to enhance surgical pathology education in the digital era.