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ABSTRACTS (341-355)

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EDUCATION COMMITTEE

ABSTRACT REVIEW BOARD

341 Clinical Pathology Web Unknowns: A Case-Based Repository of Core CP Teaching Points

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Background: Case based learning provides a practical structure to aid in the understanding and retention of abstract concepts. We identified a need for the creation of a centralized and accessible resource to retain clinical pathology (CP) cases that demonstrate important educational concepts. Historically, a component of our microbiology (MICRO) resident curriculum included the creation of an educational "newsletter" detailing an interesting case from the resident's rotation. This included a multiple-choice question (MCQ) and discussion. Beginning in 2018, residents presented 1-2 interesting cases per CP rotation during weekly CP Call Rounds. These newsletters and presentations contained valuable case-based educational material which was not catalogued, and thus not easily accessible to current or future residents.

Design: Modeled after our institution's existing "Surgical Pathology Unknown Conference" website, a "Clinical Pathology Unknowns" website was created where users could view a clinical vignette and relevant figures, interact with a MCQ, and review a discussion. Google Analytics® (GA) tracked website usage. Revisions of the CP Call Rounds presentation guidelines included creation of a MCQ with discussion for incorporation into the website. The Department established a team of "CP Unknowns" residents, who are responsible for posting cases, as well as ensuring all cases are: (1) approved by subspecialty CP faculty; and (2) fully de-identified.

Results: A pilot version of the website went live on the internal network in May 2019. After go-live, the website link was distributed to pathology residents, CP faculty, transfusion medicine (TM) and MICRO lab staff, and infectious disease faculty. As of August 2021, 52 TM, 42 MICRO, 10 clinical chemistry, 2 hematopathology, and 1 hematology/coagulation cases have been posted. From go-live to August 2021, GA tracked 3,375 page views and 2,491 unique page views.

Conclusions: Herein we describe our experience designing and implementing a digital repository of CP cases. The number of cases posted over the pilot phase increased after formal incorporation of CP Call Rounds presentations. Preliminary website utilization metrics highlight robust website use. Future directions include surveying website users (i.e. pathology and non-pathology trainees, laboratory professionals, faculty) to assess patterns and motives for website use. We also expect to make the website public to benefit the broader pathology community.

342 PRIME Model for Grossing: An Introductory and Foundational Framework to Introduce Grossing and the Importance of Gross Descriptions for PGY-1 Pathology Trainees

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Disclosures: Christopher Attaway: None; Maria Gubbiotti: None; Danielle Fortuna: None

Background: The art of grossing and formulating the gross description (gr-desc) is a challenging task for a learner in pathology, especially early in training. We introduced a foundational framework to grossing, PRIME model (Fig1): P=process/picture, R=relationships, I=internal, M=margins, E=external. PRIME provides a general approach to evaluating a specimen's key aspects to assemble a gr-desc, emphasizing asking big picture questions, correlating with clinical scenario, understanding the anatomy, documenting the process and steps, and being able to reconstruct (or draw) a specimen based on words. During our workshop, we also aimed to assess a pilot effectiveness of PRIME by allowing residents to evaluate the quality of gr-desc.

Design: PRIME was introduced during a 60 minute workshop as part of incoming pathology trainee orientation didactics (PGY-1, n=7; student fellow/MS3, n=1), which included reviewing PRIME followed by an interactive activity. Three gr-desc (G1-3) were read aloud at three different points; trainees were asked to score the quality of each G at these three sequential scoring intervals (SI),

(1-10; 10 = outstanding G). G1-3 described fruit; G were superficially adequate but overall lacked key discerning details (ex: color, cut surface, size, etc; Table1). Scoring G occurred as follows: SI-1 before the workshop started; SI-2 after discussing PRIME. SI-3 occurred after trainees participated in an interactive activity, in which they were asked to draw the specimen on the whiteboard based on the provided G for the group to review. After the activity, the group offered various potential diagnoses (fruits) based on the provided G1-3; areas for improvement were discussed (Table 1).

Results: Using Wilcoxon rank sum test, paired scores (given by each trainee) for each G were compared at the three SI. For all G, there are statistically significant differences ($p < 0.05$) in the paired scores between SI-1 and SI-2 (after introducing PRIME) and SI-1 and SI-3 (after the interactive drawing activity). Fig2 shows the plotted mean scores for G1-3 at each SI.

Gross Description (G)	Description provided	Intended Diagnosis	Discussion of Gross
G1	The specimen is received after being picked from a tree and is designated as "fruit 1." The outer surface of the fruit is red, and its shape is round to slightly ovoid. At the most proximal end is a tan-brown and firm to slightly flexible stem. The specimen is opened to reveal at least one small firm brown pit. The specimen is serially sliced and submitted in cassettes 1A-1C.	Cherry	• Cherries, plum, apples are red and contain pits • No size is given • Ambiguous number of pits • No mention of cut surface • No mention of whether representatively or entirely submitted • No mention of margins
G2	The specimen is received following purchase from a grocery store shelf and is designated as "green object number 1." The specimen measures 6.5 x 4.2 x 3.1 cm in overall dimension and is oval-shaped. The outer surface consists of a tan to green skin. The specimen is serially sectioned to reveal a slightly firm to fleshy and soft interior with no discolorations grossly identified. Representative sections are submitted in cassettes 1A-1F.	Avocado	• Pears and avocados have similar sizes • Outer surface can apply to both pears and avocados • The interior color should be defined in the gross • Pits or stems (margins) are not recorded
G3	The specimen is received following purchase from a farmer's market and is designated as "melon." The melon measures 10.5 x 7.5 x 6.4 cm in overall dimension and is uniformly round. The outer shell is tan and textured with no defects or lesions identified. The specimen is serially sectioned to reveal a firm to fleshy interior with scattered small seeds. Representative sections are submitted in cassettes 1A-1J.	Cantaloupe	• Watermelon, honeydew, and cantaloupe have similar sizes • Outer surface is not completely described • Color of cut surface not described • Shape, color, size, and distribution of seeds is not recorded

Figure 1 - 342

Process (continuous)/Picture

P
- Most important: What is the overall **big picture** here? Why was this procedure performed, and what is the clinical scenario? This frames our goal.
- Walk us through your findings by outlining the process that you used
  - Did you ink it?
  - Did you cut or open it?
  - What planes of transection did you cut along? What axis did you cut along?
- Take pictures
- *Can I draw a picture based on the gross description?*

External

E
- The anatomy
- What organs or tissue do we have here?
- Dimensions
- How would you describe the external aspect of the specimen?

Relationships

R
- What are the relationships to the various structures?
- If a lesion, where is it located (with respect to margins, surrounding tissue, layers or regions of the tissue, etc)? What part of the tissue does it involve?
- If not a lesion, what are the structures and do they make sense? Is the anatomy altered?

Internal

I
- Describe the tissue on cut section
- If opened, what did you find?

Margins

M
- What needed to be transected in order to remove this tissue or organ(s)?
- How have these areas of transection been delineated?
  - Stapled, open, clips, cautery

Figure 2 – 342

Scores of Gross Descriptions at Scoring Intervals

Conclusions: As a foundation to organ-specific grossing, PRIME offers guidance on the major elements of a gr-desc. PRIME workshop was successful in beginning to help trainees understand key aspects of gr-desc. We plan to further investigate how PRIME has impacted grossing, as PGY-1 residents embark on their first few months of surgical pathology. Consistent implementation of PRIME during initial training may shape perceptions and guide learners when grossing and formulating the gr-desc.

343   Expansion of a Pathology Resident Wellness Initiative Amidst the COVID-19 Pandemic

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Background: The focus on physician wellness and burnout continues to build in the era of the COVID-19 pandemic. The pre-COVID rate of burnout among pathology residents was reported to be approximately 46-52%, but there is little data on this group during the period of COVID-19. Amongst residents as a whole, the burnout rate during the COVID-19 pandemic is about 50%, with 69% of young healthcare workers (ages 18-29) reporting burnout. In addition to the limitations on direct social interaction, uncertainty pertaining to redeployment, risk of exposure to COVID-19, and future job security has added to the challenge of maintaining resident well-being during the pandemic.

Design: An established Pathology Resident Wellness Initiative program at a large academic institution was expanded to address the well-being needs of pathology residents during the COVID-19 pandemic. With oversight from senior residents and department leaders, the Pathology Wellness Committee (PWC) planned both virtual and socially distanced in-person events to foster resident wellness while complying with safety guidelines. An annual Wellness Survey was modified in 2020 to assess resident well-being during the pandemic.

Results: In compliance with COVID-19 safety guidelines, the PWC creatively designed social events including virtual yoga classes, an outdoor photo scavenger hunt, wellness hikes, holiday events, and periodically provided individually packaged meals and baked goods for residents. The Wellness Survey distributed during the pandemic revealed that 76% of residents felt satisfied or very satisfied with their relationships with coworkers, friends, and family despite social distancing guidelines. There was no significant change in the amount of residents who reported feeling cheerful (p=0.38), fulfilled (p=1.00), or appreciated (p=0.38) more than half of the time compared to pre-COVID results.

Conclusions: The COVID-19 pandemic created many unique challenges for maintaining wellness during residency, including for pathology trainees. With expansion of an existing pathology resident Wellness Initiative, our Wellness Committee was able to creatively and safely continue to promote wellness objectives and adapt to the challenge of social distancing during the COVID-19 pandemic.

344   Gynecological Pathology Journal Club: A 17 Month, Worldwide Virtual Learning Experience with a Focus on Mentorship and Inclusion

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Background: Journal Clubs (JC) are a common format used in teaching institutions to promote trainee engagement and develop skills of seeking out evidence-based medicine and critically evaluating literature. Digital technology has made these formats accessible to worldwide audiences, which allows for increased inclusion of globally diverse presenters and attendees. Herein we describe the experience of the first 17 months of a virtual gynecologic pathology journal club designed with the goal of increasing inclusivity and providing mentorship to trainees and early career pathologists.

Design: JC began in a virtual format in April of 2020 as a response to the necessity of remote learning during the Covid-19 pandemic. Each JC had one moderator, lasted one hour, featured up to three trainees/early career pathologists, and covered articles on gynecologic surgical pathology/cytopathology. Recruitment of trainees was performed via direct contact by moderators and via social media. Prior to presenting, feedback was provided, and live practice was conducted with the moderator. A template

was used for presentation. Evaluations were provided to presenters and attendees for feedback. Recordings of the meetings were made publicly available following the events via YouTube, a society website, and directed emails sent to registrants.

Results: 37 unique presenters participated, presenting 50 articles, and most were trainees (32/37; 86%) from North America (23/37; 62%), with additional presenters from Asia (7/38; 18%), Europe (3/38; 8%), Africa (3/38; 8%), and Australia (2/38; 5%). An average of 6 hours were spent per month on mentorship/feedback. Live events had a total of 905 attendees, and recordings were watched 7,923 times. Amongst those who self-identified on provided surveys, the attendees were most commonly from Europe (73/179; 41%) and were overwhelmingly practicing pathologists (189/236; 80%; Figures 1 and 2). The experience, including mentorship, format, and content were positively reviewed by attendees and presenters (Table 1).

Audience Feedback Survey Results - Percentage						
	1*	2	3	4	5	Total # respondent
The topic was relevant to my practice of Pathology.	0	0	3	18	76	234
The information furthered my knowledge of the topic of the month	0	0	5	17	78	259
Discussion of the articles enhanced my ability to critically evaluate the literature	0	0	14	24	61	257
The content was appropriate for my level of training.	0	0	6	19	73	233
The speakers were knowledgeable on the topic.	0	0	6	25	68	234
The speakers were organized and clear in presenting the material.	0	0	2	21	76	233
The speakers were free of commercial bias.	0	0	1	10	87	235
The moderator was effective at introducing speaker/topic and guiding the audience through the use of the webinar format.	0	0	1	10	87	234
The use of polls and Q&A functions increased my engagement with this format.	0	1	11	16	71	227
The format (Zoom webinar) allowed for clear presentation of the material.	0	0	1	12	85	234
The sound and image quality was appropriate.	0	0	1	14	83	232
The Q&A process was straightforward (submitting and upvoting questions).	0	0	4	18	76	232
Registering for the session was straightforward.	0	0	1	9	88	233
My internet connection was stable throughout the session.	0	0	3	12	84	234
I would recommend this activity to my colleagues.	0	0	1	8	91	259
Presenter Feedback Survey Results - Percentage						
The pre-session written feedback improved my understanding of the material.	0	0	4	38	58	24
The pre-session written feedback improved my presentation skills.	0	0	8	21	71	24
The pre-session live practice session improved my understanding of the material.	0	0	4	33	63	24
The pre-session live practice session improved my presentation skills.	0	0	4	13	83	24
The topic of the article I reviewed was relevant to my practice of Pathology.	0	0	8	25	67	24
The content was appropriate for my level of training.	0	0	4	17	79	24
Overall, my knowledge about the topic of the month increased as a result of my experience	0	0	4	17	79	24
The provided time was sufficient to present the material	0	0	0	17	83	24
The moderator was effective in guiding discussion	0	0	0	8	92	24
The use of question and answer and polling functions benefitted the overall experience.	0	0	4	17	78	23
The format (Zoom webinar) allowed for clear presentation of the material.	0	0	4	13	83	24
The sound and image quality was appropriate.	0	4	4	8	83	24
I would recommend this activity to my colleagues.	0	0	0	9	91	23

*Responses were noted on a 5-point scale, with 1 representing "strongly disagree" and 5 representing "strongly agree"

Figure 1 - 344

Level of Training and Role in Journal Club
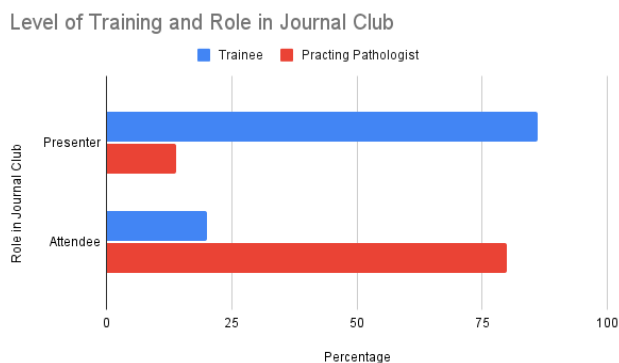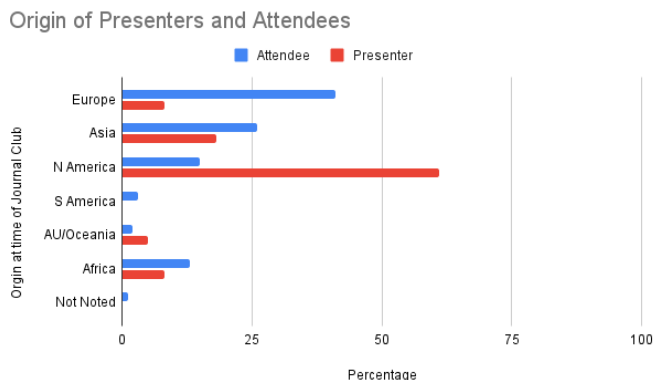

Figure 2 - 344

Origin of Presenters and Attendees

Conclusions: JC is an inclusive educational opportunity which was able to engage trainees and early career pathologists from around the globe. In addition, the JC was widely viewed by attendees from multiple countries, the majority of whom were practicing pathologists. Based on feedback, JC expands the medical knowledge of the attendees and empowers presenters to develop their expertise and communication skills.

345 Surgical Pathology Fellows Releasing Preliminary Reports- Experience During the First 6 months of Implementation

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Background: Progressive independence is critical to building confidence and decisiveness in medical trainees. However, this can be difficult to accomplish in the strict regulatory environment of pathology. We previously piloted and adopted a process whereby fellows independently manage a subset of cases and release preliminary (prelim) reports. Herein we describe our experience in the first 6 months of implementation.

Design: Board-certified surgical pathology fellows were eligible for prelim report sign-out if approved by the clinical competency committee, after completing at least 1 month in the frozen section laboratory for evaluation. After 1 week on service and approval by the rotation director, they could independently manage cases sent from outside institutions for confirmatory review. Prelim reports were released at their discretion and viewable in the electronic medical record. Fellows could choose to share the case with a subspecialty pathologist before prelim report release, and safety measures were employed to ensure timely and accurate release of final reports.

Results: Five of 6 rotating fellows were eligible for prelim report sign-out (1 had not yet completed boards). The 5 fellows released 83 prelim reports out of 739 total cases reviewed (11.2%). There were no major discrepancies between the prelim reports and the final reports released by attending pathologists, and no adverse effect on turnaround time. Seven cases (8.4%) were shared with a subspecialty pathologist before prelim report release, and 28 cases (34%) were shared after prelim report release and before final report release. The prelim reports included 36 gastrointestinal, 23 breast, 9 genitourinary, 6 gynecologic, 3 soft tissue, 2 endocrine, and 1 each in dermatopathology, pulmonary, cytology and head and neck. The number of reports released by each fellow was quite variable (2-48), likely a reflection of both external factors (number of trainees on service, case volume fluctuations) and trainee-specific factors (confidence, efficiency, etc.).

Conclusions: Surgical pathology fellows show good judgement when independently managing cases for prelim report sign-out. When combined with pilot data, we have observed just 1 potentially significant discrepancy between prelim and final report out of 142 cases (<1%). No patients have been adversely impacted. Adoption of this process varied widely among fellows and may require closer monitoring and encouragement for fellows that are tentative about releasing prelim reports.

346 Video Based Education Improves Sampling (Grossing) Confidence in Pathology Trainees

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Background: Pathology resident education has a steep learning curve due to inadequate exposure to pathology in medical school. Specimen handling and sampling for adequate histologic analysis, staging, and diagnosis are intimidating for new trainees. Specimen sampling (grossing) is a procedural and manual task. Procedural fields overcome this challenge through adding video materials to their curriculum, to familiarize trainees with procedure(s), reduce errors, decrease turnaround time (TAT), and improve patient care. Our team applied this strategy to develop original and specific content for our program.

Design: Sampling (grossing) videos covering all major organ systems (AMOS) demonstrating proper technique were created for PGY1 trainees, each was a maximum of 15 minutes. Structure is based on the point of view (POV) protocol with pre- and post-production (PPP) removing protected health information (PHI) under Health Insurance Portability and Accountability Act (HIPPA). POV is defined as 90° perpendicular to sampling surface. Content was tailored for consistency, reliability, and replicability with an introduction, staging summary from the College of American Pathologists Cancer Protocol Templates, sampling tutorial, and written sampling example. Videos were hosted on a Northwestern Cloud Server for on-demand access. Trainees completed 3 surveys (0, 6, 12 months (mo)) evaluating sampling confidence across in-house, commercial, video, and auxiliary material (AUX) content. AUX is defined as videos and in-house and/or commercial content.

Results: Sampling (grossing) confidence significantly improved at 6 and 12 months (mo) ($p<0.0001$) across AMOS and PGY levels (APL) (Figure 1A). AUX significantly improved confidence ratings compared to no AUX use across APL at 6 ($p < 0.001$) and 12 mo ($p < 0.01$) relative to 0 mo (Figure 1B). AUX significantly improved confidence for PGY1's at 6 and 12 mo ($p < 0.0001$); for PGY2's and PGY3's confidence significantly improved at 6 mo ($p<0.0001$) (Figure 1C).

Figure 1 - 346
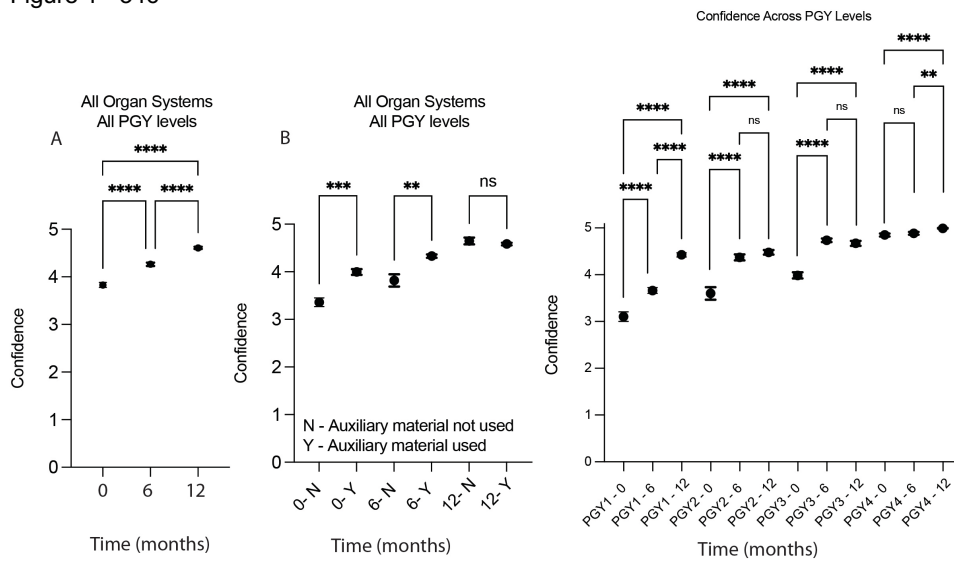
Figure 1 - Effect of auxiliary resources on sampling confidence. A, Sampling confidence across all organ systems. B, Sampling confidence across all organ systems relative to auxiliary material use. C, Sampling confidence across all post graduate year levels. ns, not significant; *, P <0.05; **, P < 0.01; ***, P < 0.001; ****, P < 0.0001. Error bars, SEM. PGY - post graduate year.

Conclusions: To the best of our knowledge this is the first yearlong longitudinal study evaluating sampling (grossing) confidence of pathology trainees spanning a 4-year residency. Point of view (POV) and pre- and post- production (PPP) improve trainee specimen sampling confidence. Specimen handling education is imperative and improves patient care by reducing diagnostic error and turnaround time.

347   The Power of a Dedicated, Embedded Pathology Communications Team

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Disclosures: Christina Crowe: None; Hannah Weems: None; George Netto: None; Brandi McCleskey: None

Background: The importance of a dedicated, embedded communications team within the UAB Department of Pathology has never been more evident than during the past 18 months, when the world experienced a global pandemic. As the university and hospital system's messaging focus necessitated a pivot to covering COVID19, having a team of highly trained individuals within the department allowed for timely, thoughtful messaging to our constituents, both internal and external.

Design: Our team expanded from a single full-time employee to add an intern, who became a second full-time employee, as our scope of work continues to broaden. In addition to the usual communications at the school- and institution levels, the department saw a need for and value in having this team to disseminate information across a variety of platforms, in real time. This team has direct, regular interactions with the department chair and executive leadership to determine key messaging—a crucial element to successfully communicating what is necessary (and not fatiguing our audiences) during the pandemic, as rules and guidelines change constantly. We manage and create original news content for our department's website, a YouTube channel, a monthly newsletter, and an annual magazine, in addition to digital signage (located in high-traffic areas of our hospital). In the past 18 months we expanded from social media accounts on two platforms (Twitter, Facebook) to add Instagram and LinkedIn profiles; all four have greatly expanded impressions, engagements and followers in the past 18 months (or since account inception). Our communications director serves on both the wellness and the diversity, equity and inclusion committees for our department, further enhancing the breadth of offerings we provide to the department at large.

Results: Stories about our department faculty and their leadership during the pandemic, generated in part by our team, garnered increased visibility for our program nationwide. In addition to timely communication in a crisis situation, our team supports the necessary pivot by programs such as Grand Rounds, endowed lectureships and other in-person talks and meetings with digitally recorded webinars. This includes a 100% virtual residency and fellowship recruitment program, for the first time in our 30-year training program history. We also offered a series of lectures on best practices for communications in science.

Figure 1 - 347
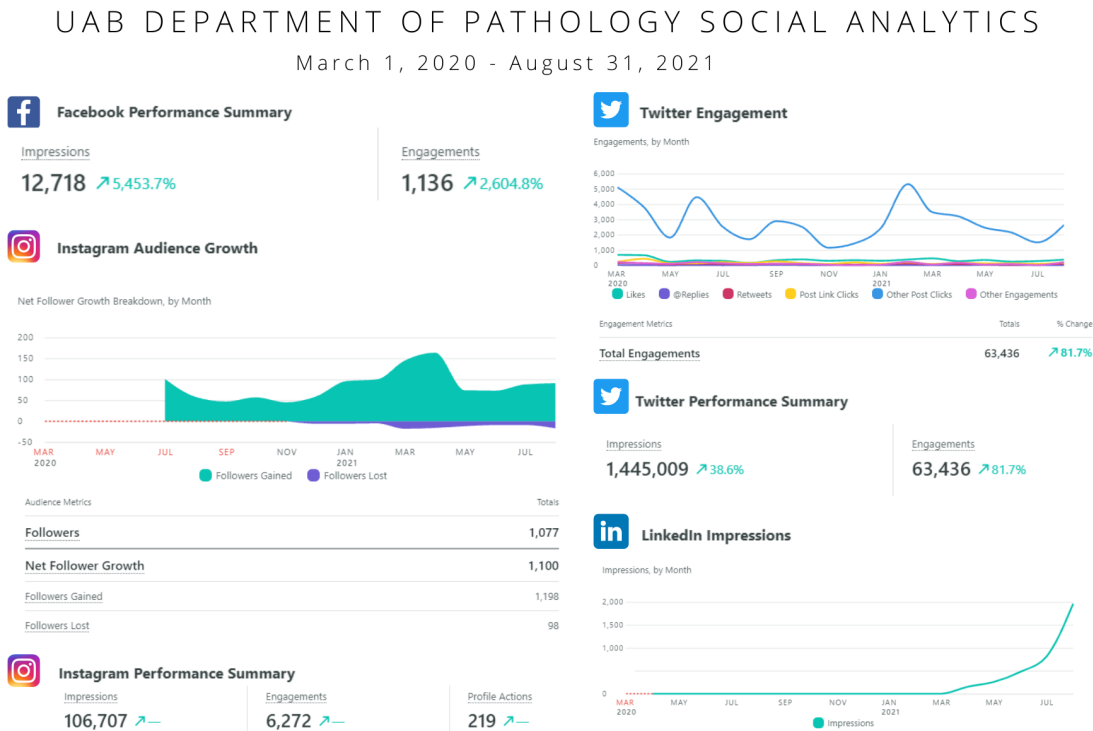
Conclusions: Communication is a crucial element of effective leadership of your pathology department.

348 A Sustainable, Web-Based International Medical Education Program Utilizing Dynamic Quiz Banks, Cloud Technology and Virtual Microscopy

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Background: Global health is less about geography than it is about equity. Tremendous disparities exist in access to care and in the conditions that make good health possible throughout the world. Investigators at Rutgers Global Health Institute, Rutgers Cancer Institute of New Jersey and the University of Botswana School of Medicine have entered into a productive collaboration to implement and adopt a low-cost, high-fidelity digital pathology technology; design, develop and deploy point-of-contact computer-assisted diagnostic tools; and deploy a cloud-based dynamic database of "gold-standard" cases to provide asynchronous, clinical decision support and training to pathologists and students at each participating global sites.

Design: A portable software is tailored for users to transform text, images and video into web-ready, interactive tutorials and examinations. A dynamic quiz bank (DQB) module is developed for educational and training objectives of the project. The DQB features whole slide images (WSI) and radiological images of growing database of pathology and oncology cases. The Google cloud-based platform features WSI serving back ends (OMERO and SmartInMedia) and an educational web front end that provides detailed instructions for operating the WSI component of dynamic quizzes. The pathology question databases are being developed through a collaborative effort among faculty members at participating sites using de-identified cases exhibiting a range of morphological presentations and disease states. The quizzes target different levels of difficulty and provide hints/feedback to the end-user during training sessions.

Results: Faculty and students from the US, Botswana and Kenya with different levels of computer proficiency have tested the DQB platform to date. During the preliminary performance studies, the cloud service showed no significant latency or degradation of quality while viewing the WSI and using the educational material. A new digital pathology system was just recently installed in the Botswana site to facilitate expansion of the DQB.

Conclusions: The DQB software program facilitates access and authoring and maintenance of Web-based medical educational materials. The modular, cloud-based design of the System maximizes flexibility of the exercises and allows for continued optimization of workflows and content. Through the implementation of the DQB on Google cloud the speed and efficiency of content is facilitated for delivery to other sites throughout the globe.

349 Incorporate A Unique Molecular Pathology Module into Cytopathology Fellowship Training in the Era of Precision Medicine

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Disclosures: Qiong Gan: None; Sinchita Roy-Chowdhuri: None; Tieying Hou: None; John Stewart: None

Background: In the era of precision medicine the role of the pathologist has evolved from providing an accurate diagnosis to including evaluation of tumors for molecular testing. Pathologists, especially cytopathology trainees, who are in the unique position of overseeing the tissue acquisition during rapid on-site evaluation to optimizing the processing of the small biopsy/cytology specimen for an accurate diagnosis and downstream biomarker testing, should be encouraged to assume a key role in this process through appropriate education and training. The aim of this study is to share our institutional experience on incorporating a molecular pathology module into the cytopathology fellow's training.

Design: Design a structured molecular pathology module with a written guideline. The module includes: a) Setting up an orientation with a cytopathology and molecular pathology trained pathologist using clinical cases; b) Writing multiple-choice questions to target the salient points pertaining to biomarker testing from pre-analytic evaluation to interpretation of the results, and incorporate the questions into an online education platform – Canvas, to easily moderate the quiz before and after the orientation and training (Figure 1); c) Selecting representative cases for the trainees to practice evaluation of specimen adequacy and estimation of tumor fraction; d) Reinforcing the molecular pathology knowledge with two didactic lectures; e) Monitoring the progress and receiving quarterly feedback from the fellows about their rotation on the molecular service.

Results: 1. The molecular orientation itself significantly improved the accurate rate for total of 20 multiple-choice questions in twelve cytology fellows from two academic years (Table 1). 2. Two months of molecular service (mixed with other routine cytology services) improved the accuracy of tumor fraction evaluation on cytology cases including smear and cell block preparation (Figure 2), but not on surgical cases including biopsy and resection-derived formalin-fixed paraffin-embedded section.

Table 1. The performance of cytopathology fellows on quiz designed to evaluate the knowledge related to biomarker testing

	Fellow	Pre-Orientation Quiz Accuracy	Post-Orientation Quiz Accuracy
	1	53%	81%
	2	48%	83%
	3	58%	80%
	4	55%	95%
	5	65%	80%
	6	65%	80%
	7	38%	85%
	8	58%	75%
	9	53%	90%
	10	35%	80%
	11	43%	85%
	12	53%	80%
Average Rate		52%	83%

Figure 1 - 349
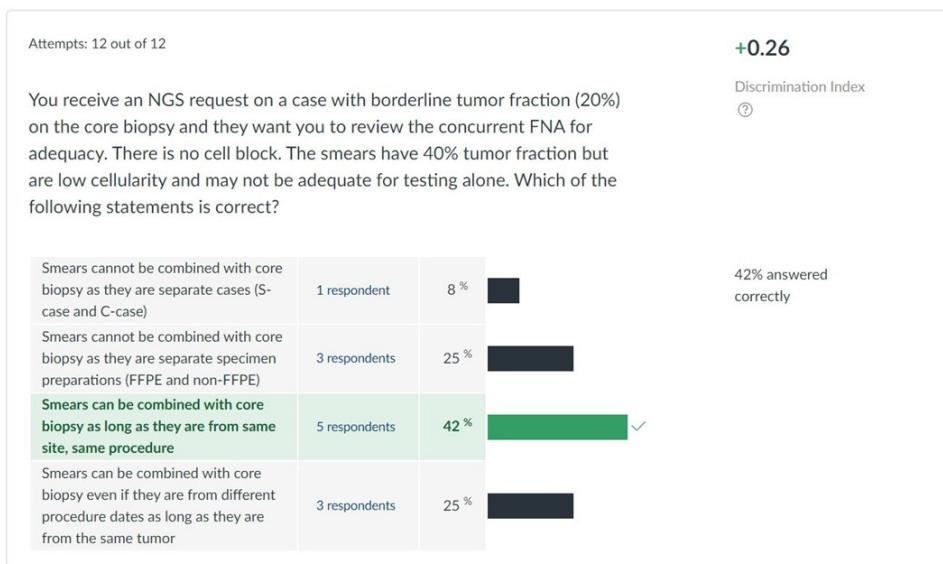
Figure 1. A representative multiple-choice question from the quiz on *Canvas*, which showed the distribution of selected answer as well as the correct answer in green.

Figure 2 – 349
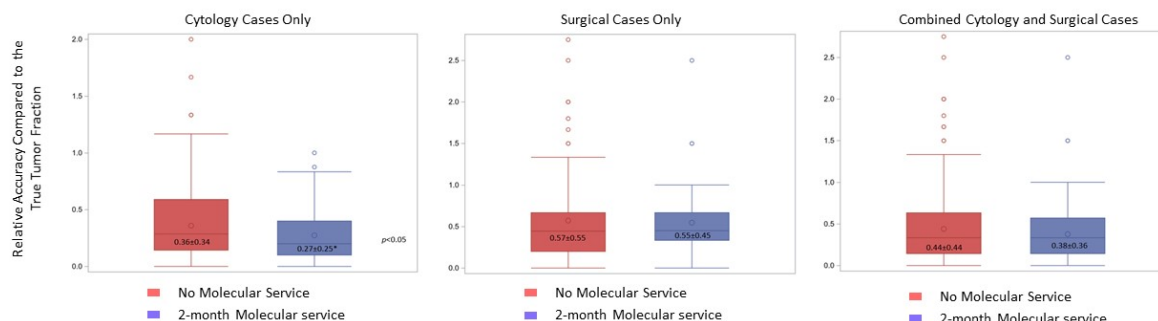
Figure 2. Relative accuracy compared to the true tumor fraction acquired from next-generation sequencing result between fellows without molecular service and fellows after 2-month molecular service. The closer the value is towards zero on y-axis, the more accurate the tumor fraction evaluation is comparing to the true tumor fraction.

Conclusions: 1. A well-designed and structured molecular pathology module can be seamlessly integrated into the cytopathology fellowship training to improve and expand the training experience for next generation pathologists. 2. This module is designed to bridge the gap between conventional pathology training and the expanding demand of biomarker testing for personalized treatment in cancer patients.

350 Undergraduate Medical Student Perspectives on the Role of Autopsy in Medical Education

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Disclosures: Patrick Hearle: None; Wing Fei Wong: None; Joanna Chan: None

Background: Autopsy has historically been considered a valued experience in undergraduate medical education (UME), however student participation has declined in recent years. Medical education literature from the educator point of view supports autopsy as an educational tool, but there is little data on the undergraduate medical students (UMS) perspective on autopsy in their education. This study aims to assess pre-clinical and senior UMS opinions on the role of autopsy in UME.

Design: The study was conducted in two parts, a general survey offered to all UMS, and an essay response by fourth year UMS at Sidney Kimmel Medical College (SKMC). The survey was an optional 51 question survey on autopsy and medical education using a 5 point Likert scale. In the second part, 27 senior UMS on an advanced basic science rotation were assigned a 500 word essay on hospital autopsies which included a prompt asking their opinion of autopsy's role in medical education. All senior UMS students were given an opportunity to observe an autopsy within the two weeks prior to the assignment.

Results: 87 pre-clinical students responded to the initial survey. They were neutral in their perceived importance of viewing an autopsy in their pathology ($\mu=3.7$) and overall medical ($\mu=3.6$) education. They agreed that witnessing an autopsy can improve anatomic knowledge ($\mu=4.3$), observational skills ($\mu=4.1$), and clinico-pathologic correlation ($\mu=4.3$). Respondents agreed that it can increase understanding of the role of pathologists ($\mu=4.3$) and autopsy ($\mu=4.3$) in patient care. 85% of pre-clinical UMS were interested in seeing an autopsy.

All 27 senior UMS responded to the essay prompt and their opinion was categorized into general topics. Overall, respondents indicated that autopsy is essential and/or should be made more prominent in medical education (85.2%). Majority of respondents specified that autopsy increases clinical and anatomical understanding (63.0%).

Conclusions: This study suggests that similar to medical educators, the majority of UMS acknowledge the importance of autopsy in their education, specifically clinical and anatomic knowledge as well as the role of pathologists in medicine. UMS, both prior and post clinical experience, recognize the applicability of autopsy to their education. This concurrence of UMS opinion with the medical

education literature supports making autopsy participation a widely available, if not mandatory component of undergraduate medical education.

351   A North American Collaboration Integrating Digital Pathology into Residency Curriculum: Steps towards Global Training in the Digital Age

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Disclosures: Brian Keller: *Grant or Research Support*, Turnstone Biologics; *Consultant*, Amplitude Ventures; Zuzanna Gorski: None; Matthew Tsang: None; Anthony Perry: *Employee*, PathNet Laboratories; Jared Szymanski: *Stock Ownership*, Lumea; Trevor Flood: None

Background: Digital pathology is emerging as a critical tool in daily practice as highlighted by the SARS-CoV-2 pandemic. Pathology residents must gain adequate exposure to this technology as they approach independent practice. In this feasibility study, Canadian residents worked remotely with a United States (US)-based laboratory to help them prepare for careers in the digital age.

Design: As part of their Canadian-based genitourinary (GU) pathology rotation, three 3rd-year Anatomical Pathology residents engaged in longitudinal screening and drafting of reports for digitally scanned US-based prostate biopsy cases prepared by a US laboratory specializing in digital pathology technology. Each trainee screened routine US-based digital case work as part of their curriculum and had access to artificial intelligence (AI) diagnostic software (Figure 1) during their case analyses. Residents also completed a digital pre- and post-test to assess diagnostic accuracy and time spent per core. Neither AI nor immunostains were permitted during the pre- and post-test sessions. Diagnoses were considered correct when no major discrepancies existed between resident and approved report.

Results: Residents each screened and reported 10 digital prostate biopsy cases in addition to routine GU workload (Table 1). The digital pathology software allowed trainees to annotate specific histologic features and leave notes as required which could be subsequently reviewed remotely by supervisors. Feedback was provided by three anatomical pathologists, one practicing at the residents' home institution and the other two practicing at the US-based laboratory. Sign out session format varied but included video meetings with screen sharing, text messaging, phone calls, and/or email messages. Residents scored 76.67% (SD 5.7%) on the pre-test and 96.67% (SD 5.7%) on the post-test with respect to diagnostic accuracy; the average time per core decreased over the course of the rotation (Table 1).

Table 1: Metrics from participation of Canadian pathology residents in routine US-based digital prostate biopsy casework.

	Screener 1	Screener 2	Screener 3	Average, diagnostic accuracy (SD)	Average, time/core
Pre-test score (time per core)	70% (1:58)	80% (2:01)	80% (2:02)	76.67% (5.7%)	2:00
Post-test score (time per core)	100% (1:44)	90% (1:43)	100% (2:14)	96.67% (5.7%)	1:54
Cases screened (digital)	10	10	10	---	---
Cases screened (conventional light microscopy)	7	10	11	---	---

Figure 1 - 351
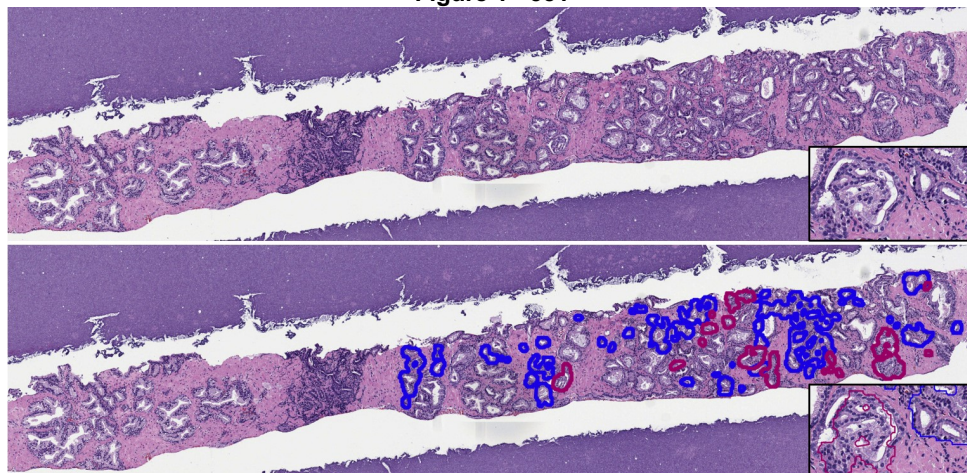
Figure 1: A) H&E photomicrograph of a representative case of prostatic acinar adenocarcinoma, Gleason 3+4=7. Overlay of artificial intelligence diagnoses can be observed (B). Blue = Gleason 3, Red = Gleason 4. Inset images demonstrate high-power view of representative examples of Gleason 4 and 3 foci, respectively.

Conclusions: In this feasibility study, Canadian residents used a US-based digital pathology platform to remotely preview routine prostate biopsy casework. The residents gained exposure to digital pathology technology, including AI. Over the course of their rotations, all residents improved. These findings provide a framework for future global pathology education outreach.

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352   Web-Based Pathology Education Is an Effective Curricular Adjunct: The PathElective.com Experience as a Model for Novel Pathology Pedagogy

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Disclosures: Cullen Lilley: None; Michael Arnold: None; Christina Arnold: None; Adam Booth: None; Jerad Gardner: None; Xiaoyin "Sara" Jiang: None; Sanam Loghavi: None; Kamran Mirza: None

Background: In response to the pandemic's restrictions on interaction with trainees, we developed a free website aimed at developing and disseminating pathology educational material. Since its start in May 2020, PathElective.com curriculum material has been incorporated into medical student and resident training programs at numerous institutions across the world, serving as a unique means of delivering high-quality pathology and laboratory medical education at multiple levels of training.

Design: The website was developed using Squarespace (New York, NY). Website traffic and geographic/source data (May 1, 2020, to April 22, 2021) built-in Squarespace analytics. Students were assessed before and after interacting with course materials using a dual form crossover quiz design. Quiz data were anonymous, and improvement was determined using a paired t-test. A novel analysis was performed aimed at examining the attrition rate of students as more modules are added to an online course.

Results: Over the tracking period, PathElective.com received 529,358 page views, 114,354 visits, 54,976 unique visitors, and 8,564 registered users who earned 14,176 certificates. Most visitors (70.6%) arrived at the site via a direct URL input, 16.4% through a search engine, and 11.1% through social media. Most visitors were from the US (44.2%). With a total of 1518 test pairs being analyzed from all clinical pathology (CP) modules and 5,820 from the anatomic pathology (AP) modules, the average increase in score was 14.3% (p=1.4e-09) and 12.98% (p=5.5e-14), respectively (Fig. 1). All but five of the 56 courses experienced a statistically significant increase in score. Courses were well received with median scores of Very Satisfied/Satisfied in all six assessment domains for all courses. There were no significant correlations found between student satisfaction and assessment performance/ improvement. Aggregate attrition data revealed a unique negative polynomial relationship (R2=0.987) in which

participation dropped expediently with the addition of the first 3 lessons, less so between lessons 3 and 6, and after lesson 6, there was an additional drop in participation (Fig. 2).
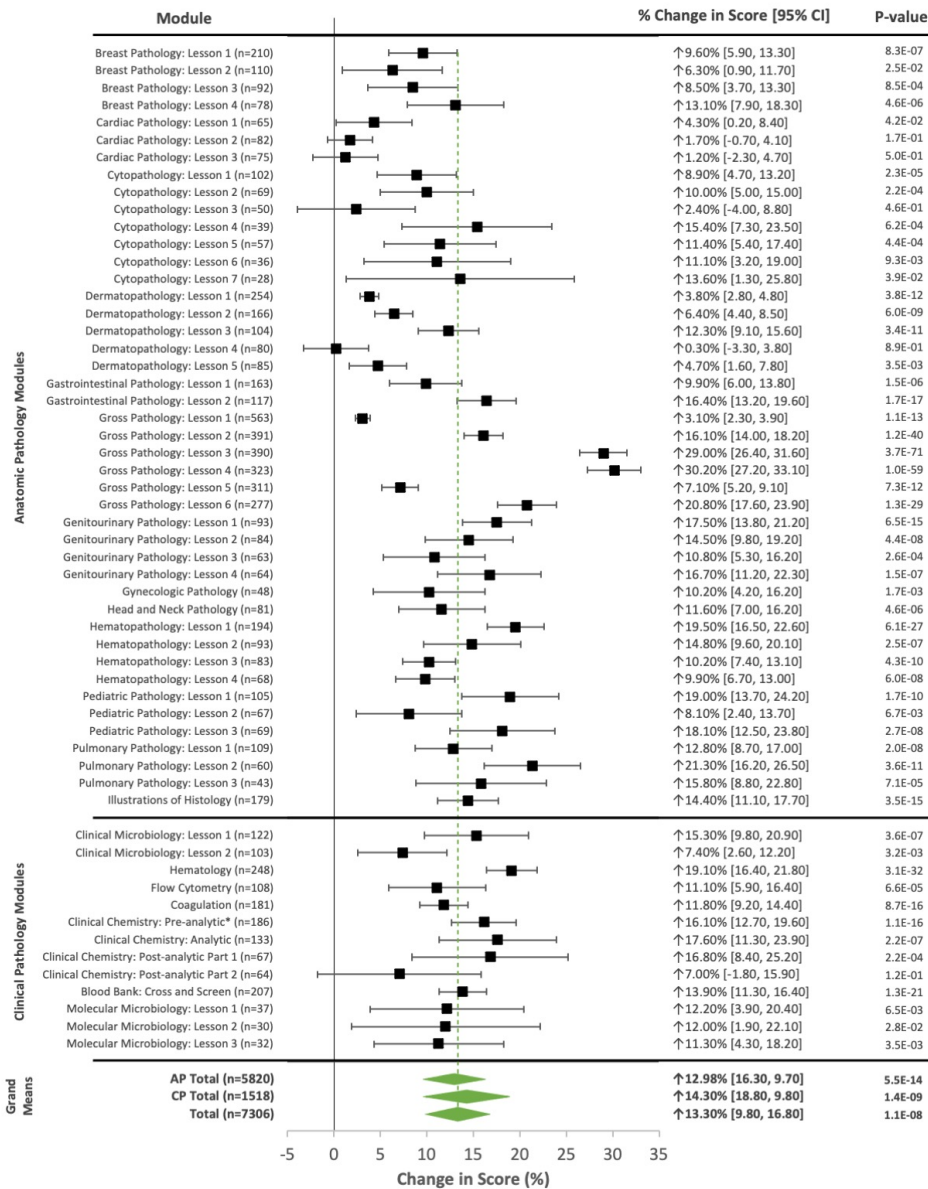
Figure 1 - 352

Module	% Change in Score [95% CI]	P-value
Breast Pathology: Lesson 1 (n=210)	↑9.60% [5.90, 13.30]	8.3E-07
Breast Pathology: Lesson 2 (n=110)	↑6.30% [0.90, 11.70]	2.5E-02
Breast Pathology: Lesson 3 (n=92)	↑8.50% [3.70, 13.30]	8.5E-04
Breast Pathology: Lesson 4 (n=78)	↑13.10% [7.90, 18.30]	4.6E-06
Cardiac Pathology: Lesson 1 (n=65)	↑4.30% [0.20, 8.40]	4.2E-02
Cardiac Pathology: Lesson 2 (n=82)	↑1.70% [-0.70, 4.10]	1.7E-01
Cardiac Pathology: Lesson 3 (n=75)	↑1.20% [-2.30, 4.70]	5.0E-01
Cytopathology: Lesson 1 (n=102)	↑8.90% [4.70, 13.20]	2.3E-05
Cytopathology: Lesson 2 (n=69)	↑10.00% [5.00, 15.00]	2.2E-04
Cytopathology: Lesson 3 (n=50)	↑2.40% [-4.00, 8.80]	4.6E-01
Cytopathology: Lesson 4 (n=39)	↑15.40% [7.30, 23.50]	6.2E-04
Cytopathology: Lesson 5 (n=57)	↑11.40% [5.40, 17.40]	4.4E-04
Cytopathology: Lesson 6 (n=36)	↑11.10% [3.20, 19.00]	9.3E-03
Cytopathology: Lesson 7 (n=28)	↑13.60% [1.30, 25.80]	3.9E-02
Dermatopathology: Lesson 1 (n=254)	↑3.80% [2.80, 4.80]	3.8E-12
Dermatopathology: Lesson 2 (n=166)	↑6.40% [4.40, 8.50]	6.0E-09
Dermatopathology: Lesson 3 (n=104)	↑12.30% [9.10, 15.60]	3.4E-11
Dermatopathology: Lesson 4 (n=80)	↑0.30% [-3.30, 3.80]	8.9E-01
Dermatopathology: Lesson 5 (n=85)	↑4.70% [1.60, 7.80]	3.5E-03
Gastrointestinal Pathology: Lesson 1 (n=163)	↑9.90% [6.00, 13.80]	1.5E-06
Gastrointestinal Pathology: Lesson 2 (n=117)	↑16.40% [13.20, 19.60]	1.7E-17
Gross Pathology: Lesson 1 (n=563)	↑3.10% [2.30, 3.90]	1.1E-13
Gross Pathology: Lesson 2 (n=391)	↑16.10% [14.00, 18.20]	1.2E-40
Gross Pathology: Lesson 3 (n=390)	↑29.00% [26.40, 31.60]	3.7E-71
Gross Pathology: Lesson 4 (n=323)	↑30.20% [27.20, 33.10]	1.0E-59
Gross Pathology: Lesson 5 (n=311)	↑7.10% [5.20, 9.10]	7.3E-12
Gross Pathology: Lesson 6 (n=277)	↑20.80% [17.60, 23.90]	1.3E-29
Genitourinary Pathology: Lesson 1 (n=93)	↑17.50% [13.80, 21.20]	6.5E-15
Genitourinary Pathology: Lesson 2 (n=84)	↑14.50% [9.80, 19.20]	4.4E-08
Genitourinary Pathology: Lesson 3 (n=63)	↑10.80% [5.30, 16.20]	2.6E-04
Genitourinary Pathology: Lesson 4 (n=64)	↑16.70% [11.20, 22.30]	1.5E-07
Gynecologic Pathology (n=48)	↑10.20% [4.20, 16.20]	1.7E-03
Head and Neck Pathology (n=81)	↑11.60% [7.00, 16.20]	4.6E-06
Hematopathology: Lesson 1 (n=194)	↑19.50% [16.50, 22.60]	6.1E-27
Hematopathology: Lesson 2 (n=93)	↑14.80% [9.60, 20.10]	2.5E-07
Hematopathology: Lesson 3 (n=83)	↑10.20% [7.40, 13.10]	4.3E-10
Hematopathology: Lesson 4 (n=68)	↑9.90% [6.70, 13.00]	6.0E-08
Pediatric Pathology: Lesson 1 (n=105)	↑19.00% [13.70, 24.20]	1.7E-10
Pediatric Pathology: Lesson 2 (n=67)	↑8.10% [2.40, 13.70]	6.7E-03
Pediatric Pathology: Lesson 3 (n=69)	↑18.10% [12.50, 23.80]	2.7E-08
Pulmonary Pathology: Lesson 1 (n=109)	↑12.80% [8.70, 17.00]	2.0E-08
Pulmonary Pathology: Lesson 2 (n=60)	↑21.30% [16.20, 26.50]	3.6E-11
Pulmonary Pathology: Lesson 3 (n=43)	↑15.80% [8.80, 22.80]	7.1E-05
Illustrations of Histology (n=179)	↑14.40% [11.10, 17.70]	3.5E-15
Clinical Microbiology: Lesson 1 (n=122)	↑15.30% [9.80, 20.90]	3.6E-07
Clinical Microbiology: Lesson 2 (n=103)	↑7.40% [2.60, 12.20]	3.2E-03
Hematology (n=248)	↑19.10% [16.40, 21.80]	3.1E-32
Flow Cytometry (n=108)	↑11.10% [5.90, 16.40]	6.6E-05
Coagulation (n=181)	↑11.80% [9.20, 14.40]	8.7E-16
Clinical Chemistry: Pre-analytic* (n=186)	↑16.10% [12.70, 19.60]	1.1E-16
Clinical Chemistry: Analytic (n=133)	↑17.60% [11.30, 23.90]	2.2E-07
Clinical Chemistry: Post-analytic Part 1 (n=67)	↑16.80% [8.40, 25.20]	2.2E-04
Clinical Chemistry: Post-analytic Part 2 (n=64)	↑7.00% [-1.80, 15.90]	1.2E-01
Blood Bank: Cross and Screen (n=207)	↑13.90% [11.30, 16.40]	1.3E-21
Molecular Microbiology: Lesson 1 (n=37)	↑12.20% [3.90, 20.40]	6.5E-03
Molecular Microbiology: Lesson 2 (n=30)	↑12.00% [1.90, 22.10]	2.8E-02
Molecular Microbiology: Lesson 3 (n=32)	↑11.30% [4.30, 18.20]	3.5E-03
AP Total (n=5820)	↑12.98% [16.30, 9.70]	5.5E-14
CP Total (n=1518)	↑14.30% [18.80, 9.80]	1.4E-09
Total (n=7306)	↑13.30% [9.80, 16.80]	1.1E-08

Anatomic Pathology Modules / Clinical Pathology Modules / Grand Means

Change in Score (%)

Figure 2 – 352

Attrition with Successive Addition of Lessons
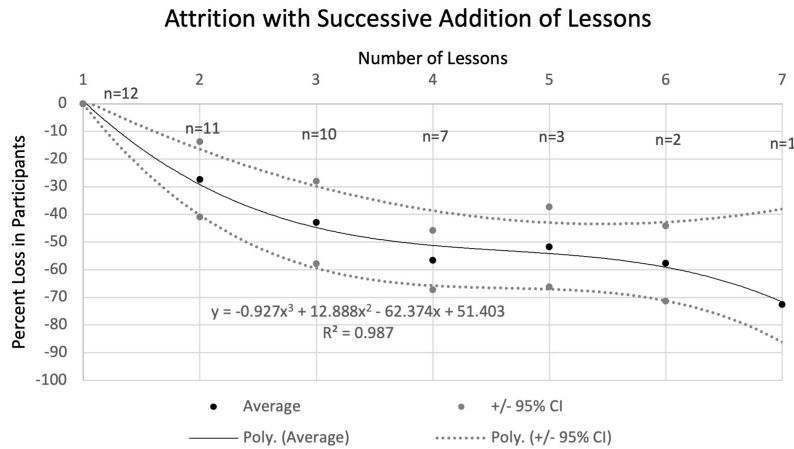

$y = -0.927x^3 + 12.888x^2 - 62.374x + 51.403$
$R^2 = 0.987$

Conclusions: PathElective.com is a free, effective means of enhancing AP/CP training in medical education demonstrated by improvement in scores and high satisfaction survey data. These analyses also offer a unique perspective on the user experience in online courses and could guide the development of future online medical education resources.

353 The 5 Minute Explainer Video: An Effective Approach to Pathology Education and Connections
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Disclosures: Gaurav Sharma: None

Background: In the last decade, online social networks have emerged as an effective and convenient platform for professional networking and education. Using LinkedIn, Twitter, Doximity, and Facebook, pathologists can easily reach out to a global audience and raise the public profile of pathology. Today, most social media content in Pathology is either photographic or textual. Explainer videos convey a complex topic concisely and engagingly using a storyboard, stock images, background audio, and video editing. This work describes the workflow for creating a clinician-oriented five-minute explainer video and serves as a template for any pathologist aspiring to create video-based educational content.

Design: A pathologist board-certified in molecular genetic pathology collated emerging information on mutations discovered in SARS-CoV-2 variants. Sources included open-source variant trackers (www.nextstrain.org), peer-reviewed articles, summaries published in Nature Reviews, and online resources of public health organizations. A synopsis of this data was uploaded to a digital marketplace (www.fiverr.org) to create a voiceover and illustrations. On receipt of the voiceover and illustrations, the pathologist created the explainer video using Camtasia, a video editing software from Techsmith Inc. (Okemos, Michigan). The video's final version was uploaded on the pathologist's LinkedIn profile and his health system's YouTube account.

Results: The explainer video entitled, "Review of Mutations and Pathogenesis of the Delta variant of SARS-CoV-2", covered the basics of COVID-19, binding of ACE2 receptors with the S-protein of SARS-CoV-2, and the effects of four key mutations (D614G, P681R, L452R, and T478K) on receptor binding/immune evasion. It was uploaded on the authors' LinkedIn profile and hospital's YouTube account on 09/10/21. As of 09/26/21, both versions had 1585 views (combined). The LinkedIn version had 802 views from 719 unique viewers, with 91% (644/719) from outside the pathologist's metropolitan area. After watching this video, 26% (190/719) viewers visited the pathologist's LinkedIn profile.

Conclusions: In a world beset by medical misinformation, the explainer video format can provide a positive public platform for pathology education and awareness. With an average viewership of over 100 views/day in the first 14 days of online release, this example demonstrates that explainer videos are an economical, scalable, and global solution for education as well as new professional connections.

354   An Evaluation of the Utility and Efficiency of PathPresenter as a Method of Presenting Digital Surgical Pathology Unknown Conferences

Wayne Thompson[1], Michael Clay[1]
[1]University of Colorado Anschutz Medical Campus, Aurora, CO

Disclosures: Wayne Thompson: None; Michael Clay: None

Background: The Surgical Pathology Unknown Conference (SPUC) is a widely used and key educational tool for training in the field of Pathology. As resident programs grow in number of trainees as well as in size of medical campuses, the standard method of using glass slides for the preparation and presentation of SPUCs is becoming more difficult. The ability to make digital copies of slides resolves several of those difficulties; however, it also creates caveats of its own, such as the necessity for specialized equipment and computer software. There are several commercial platforms that aim to aid in this process, and experience is being gained from their implementation. Although these are potential advancements in educational paradigms, little is known about how the end user (residents) prefer these advancements. Our study is to evaluate the online platform PathPresenter for presenting SPUCs compared to digital image review using base Aperio, versus the traditional glass slide model.

Design: A series of SPUCs using PathPresenter were presented. Following participation, we surveyed the residents in the University of Colorado Pathology residency program regarding their preferences in key categories. These included: likeliness to prepare, access to slides, preparation efficiency, retention, likeliness to review retrospectively, participation, slide visibility and quality during presentation, and the overall flow of the presentation. Answers to the survey questions were given on a scale of 1 to 10 for each of the three methods. Overall preference of method was also given. Comparison of the methods was done using t-test, assuming unequal variances with an alpha value of 0.05.

Results: We received responses to the survey from 16 residents. There was a statistically significant higher preference for PathPresenter over Original Slides in the categories of preparation, access, efficiency, retrospective review, participation, slide visibility and quality, and presentation flow. A higher preference for PathPresenter over Aperio was seen in the categories of access to slides, slide visibility and quality, and presentation flow (Figure 1). For overall preference, 14 residents preferred PathPresenter and 2 had no preference (Figure 2).

Figure 1 - 354

Resident Feedback on PathPresenter as a Mechanism of Surgical Pathology Unknown Conference

	Access to Materials	Likeliness to Prepare	Preparation Efficiency	SPUC Participation	Retention of Learning	Likeliness to Review	Slide Quality	Presentation Flow
Glass Slides	3.1	3.1	3.8	4.3	5.5	1.9	6.9	5.9
Aperio	8.3	6.3	5.9	5.8	5.8	4.3	6.6	5.9
PathPresenter	9.8	7.7	7.6	6.6	6.6	5.4	9.3	9

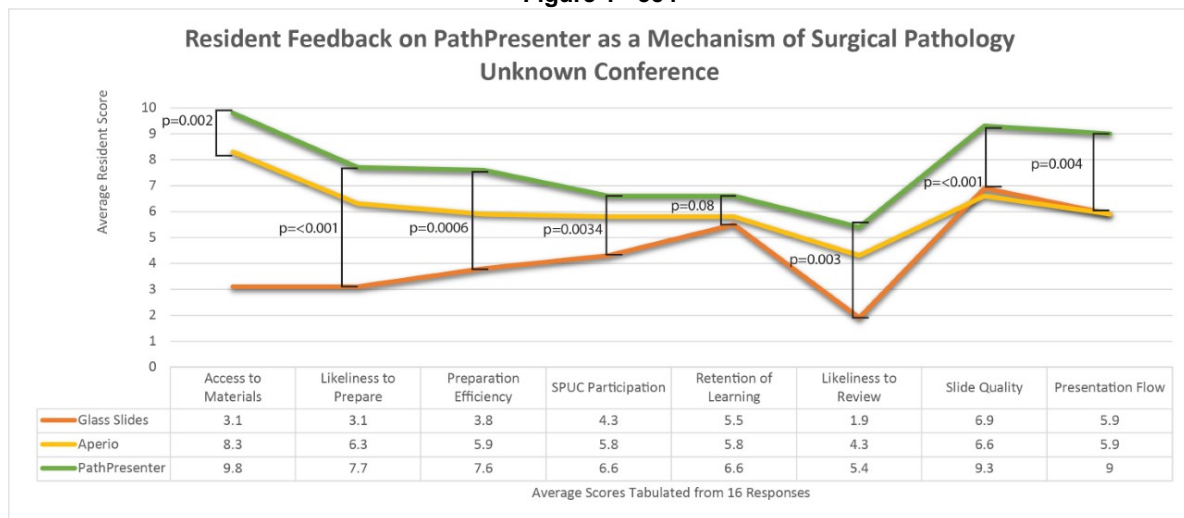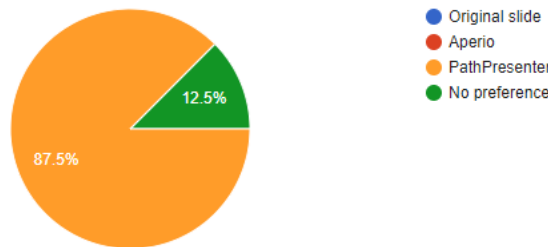Average Scores Tabulated from 16 Responses

Figure 2 – 354

Conclusions: Given the results of this study, if already producing digital slides for surgical pathology unknown conferences, PathPresenter may provide additional utility, including increased quality of experience, better flow of presentation, and overall access to materials.

355 Building a Pathology Learning Community: a 12-month Qualitative Assessment of a Virtual Gross Rounds in Canada

Henry Xie[1], Amy Calovini[2], Brian Chow[3], Carlo Hojilla[2]
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Disclosures: Henry Xie: None; Amy Calovini: None; Brian Chow: None; Carlo Hojilla: None

Background: With COVID-19 restrictions remaining in place for the past year in Ontario, Canada, we have integrated weekly virtual gross rounds (VGR) as a part of regular post-graduate training since May 2020. We used Zoom (Zoom Video Communication, San Jose, CA USA) to livestream our rounds and maintained a steady attendance and interest. In addition to resident trainees, our VGR sessions are now attended by residents, staff, and pathologists' assistants (PA), PA students and medical laboratory technologists at community and academic institutions throughout Canada. We aimed to evaluate whether a virtual platform could maintain an engaging learning community in pathology. Specifically, we sought to identify the key elements and tools within a virtual format, as well as the attitudes of our learners, that were most conducive to virtual learning and building a pathology learning community for residents and PAs.

Design: Surveys were sent to 237 registered participants of VGR at 12 months from the start of VGR. Residents and PA respondents were asked to rate their overall experience and rank the perceived effectiveness of VGR on pathology community building. In addition, survey participants ranked the least and most effective virtual engagement tools used during the sessions.

Results: 78 participants completed the survey, a response rate of 33%. Both residents (n=21) and PAs (n=49) had an overall positive reception of VGR (average score 4.4/5) during this time. The tools which enhanced a sense of learning community were ranked from most to least useful (Table 1). Our participants identified the polls and chats as the most effective ways of engaging with each other. Most participants agreed or strongly agreed that VGR was effective at creating an online learning community as well as building interprofessional connections among residents and PAs (Figure 1 and 2). The availability of archived, edited, and interactive video recordings of the VGR sessions was identified as an important resource for learning.

Table 1: Residents and PAs ranking of tool effectiveness for engaging in a pathology learning community.

	1 (most helpful)	2	3	4	5	6 (least helpful)
Residents	Poll	Chat	Powerpoint	Low stress settings	Annotation tools	Review of archived sessions
PAs	Poll	Chat	Powerpoint	Low stress settings	Review of archived sessions	Annotation tools

Figure 1 - 355

Fig.1 Effect of Virtual Rounds on Learning Community (Residents)

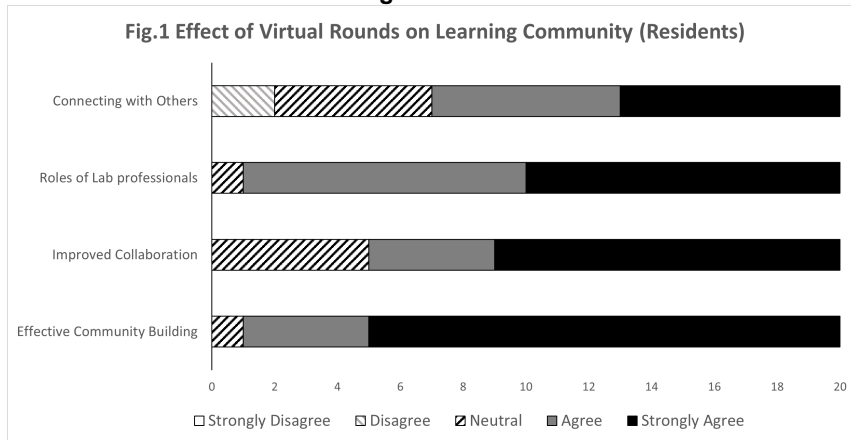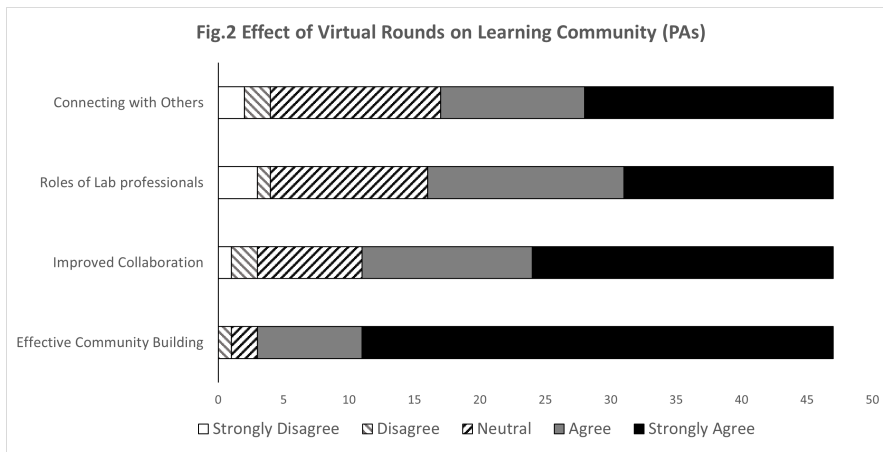**Figure 2 – 355**

Fig.2 Effect of Virtual Rounds on Learning Community (PAs)

Conclusions: We report continued positive perception of virtual gross pathology learning among our residents and PA attendees. Specifically, we highlight the role of virtual learning in building a gross pathology learning community in Canada. We identified the ideal tools and techniques that are most helpful in engaging learners and sustaining an online community.