## VIRTUAL ROOM 1

Faculty Moderator: Tai Hairston
Zoom Link: https://JHUBlueJays.zoom.us/j/7553467293?

### Virtual Paper 1: PulmPEEPs: A Multimodal Digital Platform Advancing Pulmonary & Critical Care Education

**Authors**: Kristina Montemayor, Luke Hedrick, Tom Di Vitantonio, Rupali Sood, Dave Furfaro

**Needs and Objectives**: Trainees in pulmonary and critical care medicine increasingly rely on highquality digital resources, yet existing content is variable in rigor, inconsistently aligned with competency-based education, and difficult to integrate into busy clinical schedules. Learners need concise, evidence-based materials that strengthen clinical reasoning, support knowledge retention, and remain accessible across diverse training environments. PulmPEEPs is one of the first subspecialty platforms intentionally designed to deliver a comprehensive, multimodal curriculum dedicated solely to pulmonary and critical care medicine. PulmPEEPs addresses these needs through a curated, open-access platform featuring guideline reviews, microlearning modules, case-based discussions, and collaborations with national societies. Our objectives are to: (1) deliver reliable, evidence-based subspecialty content; (2) incorporate microlearning and case-based approaches to enhance retention and decision-making; (3) promote equitable access to pulmonary and critical care education; and (4) evaluate learner engagement and perceived educational impact.
**Setting and Participants**: PulmPEEPs is a global digital education platform accessed by medical students, internal medicine residents, fellows, APPs, and practicing clinicians. The platform reaches listeners in 172 countries and serves listeners from community programs, academic medical centers, and international institutions. Content is created by a multidisciplinary team with collaborations with ATS, CHEST, and BMJ Thorax.
**Description**: PulmPEEPs provides multimodal, high-yield educational content through: 1) Podcasts on guidelines, core physiology, and expert perspectives. 2) Microlearning modules offering focused reviews of key topics. 3) Case-based episodes modeling diagnostic reasoning and management frameworks. 4) Integrated visual materials, including infographics and algorithms for rapid clinical reference. Educational strategies emphasize cognitive load reduction and precision-education principles to reach learners with varying experience and needs.
**Evaluation**: Evaluation incorporates analytics and listener feedback. Episodes average 38 minutes, with >70% of listeners completing >75% of each episode, reflecting strong engagement. Monthly listens regularly exceed 10,000, with continued international growth. Early feedback demonstrates high perceived educational value, increased confidence in clinical decision-making, and integration into residency and fellowship curricula.
**Lessons Learned:** Accessible, structured microlearning supports equity and engagement across a wide learner spectrum. Consistent content delivery and collaboration with national societies amplify reach and impact. Involving trainee and multidisciplinary contributors enhances relevance, innovation, and sustainability.

## Virtual Paper 2: A Palliative Care Training Program for the Johns Hopkins Pediatric Residency

**Authors:** Connolly, G, Allen, R, Balmuri, M

**Needs and Objectives:** There are gaps in palliative care training among pediatrics residency education despite its perceived importance. A needs assessment was performed at our institution to determine areas of improvement related to palliative care education. This assessment demonstrated perceived discomfort in topics such as leading a debriefing session after a distressing patient event. As an attempt to address this gap in resident education, a two-part workshop was designed to 1) teach communication strategies for addressing clinical uncertainty with patients and families and 2) identify steps to successfully prepare, lead, and debrief a family meeting. Our goal was to improve resident self-confidence in these topics.
**Setting and Participants:** The workshop was implemented during an hour-long noon conference. Participants included members of the pediatrics residency program at Johns Hopkins Hospital.
**Description:** A residency-wide needs assessment was performed to identify what specific topics might be helpful to cover regarding communicating uncertainty and planning, leading, or debriefing a family meeting. Portions of the workshop were designed to address topics of interest. The first half of the workshop provided an overview of communicating clinical uncertainty (including responding to emotions) followed by a small group discussion about a clinical scenario. The second portion of the workshop included an overview of planning, leading, and debriefing a family meeting; this was also followed by a small group discussion regarding a clinical scenario. Example quotations of how residents might ask questions or phrase responses were provided. A handout summarizing key takeaways with example quotations and resources was provided to serve as a future reference.
**Evaluation**: Pre- and post-surveys were utilized to assess resident confidence and comfort regarding identified learning objectives. Survey results demonstrated an overall improvement in resident comfort and confidence in both communicating clinical uncertainty, as well as leading and debriefing a family meeting after participation in this curated workshop. **Lessons Learned**: Gaps in residency-wide palliative care education, such as communication skills, can be addressed through curated workshops developed with residents' input. Future initiatives will continue to build a longitudinal curriculum aiming to further increase palliative care education among pediatric residents at our institution.

## Virtual Paper 3: Enhancing Confidence in CRNA Preceptors with an Asynchronous Training Module

**Author:** Lepley, BC

**Background**: The nationwide shortage of anesthesia providers has increased emphasis on training programs and clinical preceptors to prepare competent, practice-ready clinicians. Student Registered Nurse Anesthetists (SRNAs) acquire most clinical knowledge through preceptorship; however, the majority of Certified Registered Nurse Anesthetists (CRNAs) receive no formal training in feedback delivery and SRNA evaluation.
**Purpose**: This project evaluated the impact of an asynchronous CRNA preceptor training module on confidence in feedback delivery and SRNA evaluation in the clinical setting.
**Methods**: A pre-/post-survey design assessed self-reported confidence across 24 items related to feedback and evaluation. More than 100 CRNAs were invited to participate. Participants completed a pre-survey and the training module, then precepted at least one SRNA before completing the post-survey. CRNAs also evaluated the module. Thirty-nine valid pre-survey and 28 valid post-survey responses were retained; 24 were matched using a unique identifier. Wilcoxon signed-rank tests were used for matched comparisons, with paired-samples t-tests conducted as supplemental analyses. Internal

consistency reliability was assessed using Cronbach's alpha.
**Results**: In the matched sample (n = 24), feedback confidence significantly increased (Z = −3.08, p = .002, r = .69), as did evaluation confidence (Z = −3.53, p < .001, r = .81). Supplemental paired-samples t-tests demonstrated large (d = 0.70, p = .002) and very large (d = 0.95, p < .001) effect sizes, respectively. Post-module evaluations (n = 28) indicated high satisfaction, with over 90% of participants agreeing that the module was valuable. Among matched participants, 67% were female; most were 30-59 years of age and represented a broad range of experience. Most participants held a master's degree (70.8%), while 29.2% held a doctoral degree. Only 20.8% reported prior formal CRNA preceptor training, consistent with published findings.
**Conclusions**: The asynchronous training module produced statistically and practically meaningful improvements in CRNA confidence in delivering feedback and in SRNA evaluation. Given increasing demands on clinical preceptors and limited access to educator development, this scalable approach offers a practical strategy to support consistent, high-quality clinical education across practice settings.

### Virtual Paper 4: An Extracurricular Dermatology-focused, Case-based Curriculum to Enhance Diagnostic Reasoning and Integrative Clinical Thinking

**Authors:** Madan, V, Smith, RJ

**Background:** Dermatology is underrepresented in undergraduate medical education and typically taught separately from other organ systems. Yet, skin findings frequently serve as early visible signs of systemic disease, making their recognition essential across specialties.
**Hypotheses/Aim:** To address this educational gap, we piloted an extracurricular dermatology-focused, case-based learning curriculum to enhance diagnostic reasoning and integrative clinical thinking. Curriculum objectives include describing lesion morphology, constructing broad differentials, and building hypothesis-driven reasoning.
**Methods:** Each 60-minute session runs co-curricularly with pre-clinical organ system blocks and centers on cutaneous presentations relevant to that system. Sessions follow a structured format: a morphology primer, differential diagnosis discussion, and staged diagnostic reasoning through sequential requests for history, physical exam, and diagnostic tests. Six sessions are planned throughout the academic year. Using the Kirkpatrick Model, we evaluated learner confidence and knowledge gains during four pilot sessions. Learners completed anonymous pre- and post-session surveys assessing confidence across five domains using Likert scales, as well as a four-item knowledge quiz. Survey responses were analyzed using Wilcoxon rank-sum tests, and quiz scores were analyzed using Wilcoxon signed-rank tests. All tests were two-sided with significance set at $p < 0.05$.
**Results:** Nineteen students completed pre-session surveys and fourteen completed post-session surveys. Post-intervention confidence scores were significantly higher across all five domains, including describing dermatologic lesions ($p < 0.001$), targeted history and physical examination ($p < 0.001$), systemic disease correlation ($p = 0.003$), formulation of differential diagnoses ($p < 0.001$), and using the differential diagnosis to guide diagnostic workup ($p < 0.001$). Paired analysis of quiz performance demonstrated a significant improvement in total scores following the intervention ($p = 0.02$). Question-level analysis revealed a significant gain in systemic disease correlation ($p = 0.047$), with trends toward improved lesion description and diagnostic accuracy. Post-session, 90% of learners felt better prepared for future clinical clerkships.
**Conclusion:** A dermatology-centered, case-based curriculum integrated alongside organ system blocks significantly improved learner confidence and demonstrated measurable gains in clinical reasoning. These findings support dermatology as a powerful anchor for interdisciplinary diagnostic education. Future work will expand sessions across additional organ systems and incorporate qualitative feedback to further refine curricular impact.

## Virtual Paper 5: Rote Repetition Versus Deep Learning: Longitudinal Patterns of Anki Use in Medical Students

**Authors:** Ramakrishnan, R, Prem, P, Greeley, DA, Carle Illinois College of Medicine

**Background:** Anki is a spaced-repetition flashcard software used by medical students to promote long-term retention of medical knowledge. Prior studies reveal regular Anki use is associated with improved examination performance during preclinical years (MS1 and MS2), consistent with the desirable difficulty framework. However, excessive reliance on flashcards may favor rote memorization over conceptual understanding, raising concerns about their effectiveness as medical students transition to clinical education (MS3).
**Hypotheses/Aim:** We hypothesized that Anki users would infrequently review unknown cards in-depth due to reliance on passive fluency. We further hypothesized that the perceived utility of Anki would remain similar from MS1 to MS2 but decline from MS2 to MS3 due to shifting priorities.
**Methods:** A longitudinal survey study assessed Anki usage patterns among Carle Illinois College of Medicine students. Anki users completed a 20-item survey consisting of multiple-choice and Likert-scale questions, which evaluated frequency of use, learning strategies when encountering unknown cards, and perceived Anki utility for test performance and content retention. Users then completed the same survey one year later. Responses were summarized using descriptive statistics.
**Results:** Fifteen students fully completed both surveys: 11 consistent users, 2 former users, and 2 never users. Seventy-five percent of users reported using Anki more than four days per week, with average frequency decreasing steadily from MS1 to MS3. Although 66.7% of respondents reported learning a topic at least moderately well before unsuspending related cards, students were significantly more likely to repeatedly cycle unknown cards until answered correctly ($p < 0.001$) and less likely to pause for in-depth study ($p < 0.001$). The median perceived utility of Anki was above neutral during MS1 and MS2 but neutral during MS3. No statistically significant within-subject changes were observed in utility.
**Conclusion:** The reduced use of Anki during clinical training may reflect students' changing preferences for learning via experience. This transition is likely due to ineffective Anki use in preclinicals, where students choose not to fully study unknown Anki topics, diminishing the flashcard's future benefit. A larger sample size and deeper evaluation of external methods and resources MS3s utilize may inform Anki updates that increase its application within clinicals.

## Virtual Paper 6: Longitudinal Clerkship Service Enhances Medical Student Educational Experience

**Authors**: Lee, NJ, Leung, D, Popli, K, Perez Mejias, P, Paul, A

**Background/Hypothesis:** Neurology clerkship structures are not standardized; thus students from different institutions, and even within the same institution, experience a variety of exposures. One common clerkship structure involves students rotating through subspecialty and/or inpatient services, often switching services weekly. Based on student feedback, the Johns Hopkins University School of Medicine introduced a longitudinal neurology clerkship model during the 2021-2022 academic year, which assigned students to a single service for the entire 4-week rotation. We investigated whether the model resulted in significant changes in student-reported experiences.
**Methods**: At the end of each rotation, students were asked to complete questionnaires (Likert scale 1-5) on topics such as self-reported confidence levels, quality of teaching, and educational experiences. Data were collected from 2017 to 2024, where July 2017 to March 2021 were considered *pre-intervention* period (n=519), with a sub-analysis of April 2020 to Mar 2021 for the COVID-19 *peri-pandemic* period (n=90), and April 2021 and onwards were considered *post-intervention* period (n=435). Two-tailed *t-tests* were used for intergroup comparison.

**Results**: Students from the *post-intervention* period reported higher quality of educational experience compared to the *pre-intervention* period (including subgroup analysis of *peri-pandemic* period), most notably in: 1) fairness of assessment (4.50 vs 4.24, p=0.0000); 2) clearness of clerkship objectives (4.63 vs 4.48, p=0.0001); 3) effectiveness of faculty (4.63 vs 4.47, p=0.0006) and resident (4.72 vs 4.56, p=0.0003) teaching; 4) quality of feedback (4.42 vs. 4.24, p=0.0011); 5) quality of overall educational experience (4.40 vs. 4.10, p=0.0000); and 6) increased interest in pursuing neurology for residency (3.70 vs 3.42, p=0.0139). The only category in which the pre-intervention was scored more negatively was in the overall exposure to a variety of patient population and cases (4.44 vs. 4.59, p=0.0025). There was no significant difference between the *pre-intervention* and *peri-pandemic* periods in any of the responses.
**Conclusions**: We found a significant improvement in student-reported educational experiences after the implementation of longitudinal clerkship model. Although students did report seeing a decreased variety of cases, which innately results from rotating in fewer services, this clerkship model is well-received and increased the quality of education for our learners.

## Virtual Paper 7: Student Perceptions and Behavioral Changes in Response to Mid-Clerkship Feedback in Internal Medicine Clerkship

**Authors**: Goldfarb, S, Giorgianni, F, Niranjan-Azadi, A

**Background:** Feedback from clinical preceptors is a foundational component of medical education, with the Liaison Committee for Medical Education requiring that students be provided mid-clerkship formative feedback. However, effectiveness of feedback is influenced by several factors, including preceptor characteristics and communication style, learner receptiveness and response to feedback, and the environment within which the feedback is given.[1] The internal medicine clerkship at Johns Hopkins School of Medicine (JHUSOM) utilizes a mid-clerkship feedback form that students must complete with a preceptor in a feedback session, but the utility and impact of this form on student behaviors are not known.
**Hypotheses/Aim:** We hypothesized that structured mid-clerkship feedback would be perceived as specific and actionable and would be associated with student-reported changes in clinical behaviors.
**Methods:** We conducted a mixed-methods survey study of students enrolled in the internal medicine clerkship at JHUSOM during Fall 2025. Students completed anonymous surveys about their experience with feedback at mid- and end-of-clerkship. Quantitative data were analyzed descriptively, and qualitative responses were analyzed thematically. Data collection is still ongoing, and final results will include additional clerkship cohorts.
**Results:** Among the 19 respondents at mid-clerkship, 13 (68%) students rated the mid-clerkship feedback form as "somewhat" or "very helpful" in guiding their learning, and 17 (89%) students reported being "likely" or "very likely" to change their clinical practice based on feedback. Among the 14 respondents at end-of-clerkship, 7 (50%) reported that feedback resulted in a change in how they practiced medicine "somewhat" or "a lot," citing greater efficiency in writing notes and giving presentations, as well as more independence when creating diagnostic and treatment plans. One common recommendation was for the clerkship to regularly remind preceptors about mandatory feedback sessions or to schedule designated feedback time, as these mandatory sessions are currently student-initiated.
**Conclusion:** Structured mid-clerkship feedback was perceived as helpful and associated with student-reported changes in clinical practice. However, students identified a need for teacher-initiated or pre-scheduled feedback sessions despite the sessions being a mandatory clerkship component, suggesting that students may face unexplored barriers in scheduling these sessions with their preceptors.