VIRTUAL ROOM 2

Faculty Moderator: Alexandra Abbate
Zoom Link: https://jhjhm.zoom.us/j/98808395948?

Virtual Paper 1: Procedural Skills Workshops for Nurse Practitioner Students

Authors: Russell, NG, D'Aoust, RF, Budhathoki, C, Douglass, Ling, CG

Needs and Objectives. Nurse practitioners (NPs) fill the void of primary care provider shortages across the U.S., particularly in under-resourced areas. Therapeutic joint injections and intrauterine device (IUD) insertion and removal are critical skills for these settings, given the commonality of musculoskeletal conditions, and the 2022 *Dobbs v. Jackson* decision resulting in increased demand for reproductive health services, respectively. Nonetheless, these procedures are underutilized in primary care, with a lack of provider knowledge and confidence in performing the procedures playing a key role. NPs perform and bill for procedures and desire increased procedural training prior to graduation, but training on therapeutic joint injections and IUD insertion and removal for NP students in the literature is limited. The objective of these innovative procedural skill workshops was to increase NP student knowledge and confidence in performing therapeutic joint injections and IUD insertion and removal.
Setting and Participants. The setting was an advanced practice nursing program at an internationally leading school of nursing. The participants were NP students.
Description. Developed for NP students in their 4th clinical course, the workshops reflected Kolb's Experiential Learning theory. Participation in the workshops were required for the course, but participation in the surveys was optional. The workshops included didactic content led by a faculty expert in each skill, followed by faculty skill demonstration and student skill practice on high-quality training models. The workshops provided a foundation for therapeutic joint injection and IUD insertion and removal, which will be followed by additional training after graduation as governed by state and practice regulations.
Evaluation. A pretest/posttest design was used for evaluation. Knowledge and skill confidence scores significantly increased for therapeutic joint injection and IUD management after the workshops. Future evaluation of skill competence and mastery is needed.
Lessons Learned. Therapeutic joint injection and IUD management are important skills for NPs in primary care. In person, experiential procedure workshops are effective to increase knowledge and confidence in these skills among NP students. These workshops highlight the importance of providing primary care procedural skill education and training to NP students prior to graduation.

Virtual Paper 2: Assessment of Current Curricula and Practices in Infectious Diseases and Microbiology Undergraduate Medical Education

Authors: McCarthy, ME, Abdoler, EA, Melia, MT,

Background: Recent trends in the curricular structure of undergraduate medical education (UME) have moved away from the traditional model (i.e., two years of basic science education organized by discipline followed by two years of clinical education) towards an integrated, organ-system based approach. Infectious Diseases, traditionally taught in the pre-clerkship years within the disciplines of Microbiology and Pharmacology, is a multi-organ discipline that is less clearly bound by an organ-based curriculum. The shortage of Infectious Diseases specialists has resulted in critical healthcare gaps nationwide, and the Infectious Diseases Society of America (IDSA) has focused significant resources on recruitment and advocacy efforts to bolster the workforce. One key component of the IDSA workforce strategy is the education of our medical trainees. However, there is precious little data on how Infectious Diseases / Microbiology being taught to medical learners.
Aims:
(1) Evaluate the contemporary structure of Infectious Diseases / Microbiology UME curricula.

(2) Investigate the Infectious Diseases / Microbiology course director selection processes across institutions, and survey institutional support of course directors.
(3) The assessment of student satisfaction with Infectious Diseases / Microbiology UME.

Methods: A secure Qualtrics survey was distributed to American allopathic medical school Infectious Diseases / Microbiology course directors who were recruited by the authors via email. Survey questions consisted of multiple-choice and free response prompts. Resultant data was analyzed within Qualtrics and Excel.

Results: 83 course directors were recruited, of which 24 completed the survey. 41% of responses reported a stand-alone course compared to 32% with an integrated organ-based curriculum. Total course hours reported ranged from 16 to 120 hours with a mean of 62 hours. Course director selection processes and experiences were highly variable, as were institutional support including in reported Full-Time-Equivalent (FTE) and educational training for the role. 44% of responses indicated that students were more satisfied with their Infectious Diseases / Microbiology education when compared to other preclinical coursework, compared to 17% who were less satisfied.

Conclusion: Infectious Diseases / Microbiology UME exhibits variable course structures, practices, and course director support across institutions, while student satisfaction is reported as higher compared to other preclinical coursework.

Virtual Paper 3: From Brain to Heart: A Reflection-Based Study of Medical Student Experiences in the Neurology Rotation

Authors: Nair, S, Leung, D, Paul, A

Background: Neurology clerkships routinely expose medical students to chronic, progressive, and often life-altering illnesses, placing substantial emotional, ethical, and cognitive demands on learners. Despite this, structured opportunities to process patient encounters through guided reflection are inconsistently integrated into clinical training. The absence of such opportunities may contribute to learner distress, difficulty engaging with complex patient narratives, and missed opportunities for professional identity formation. Scalable, evidence-informed approaches that foster reflective practice within neurology education are needed to support both learner well-being and humanistic clinical care.

Aim: To design and implement a structured, facilitated reflection seminar embedded within a required neurology clerkship, and to assess its perceived impact on medical students' communication confidence, emotional preparedness, and patient-centered thinking.

Methods: A one-hour, small-group reflection seminar was integrated into a required neurology clerkship at a single academic medical center. Medical students were invited to reflect on a memorable patient encounter using optional prompts adapted from humanistic frameworks such as Tell Me More®. The project employed a mixed-methods design. Qualitative data included voluntary oral reflections, which were audio-recorded and transcribed or documented through detailed field notes, as well as optional anonymous written reflections. Quantitative data were collected via anonymous pre- and post-session surveys using 5-point Likert scales assessing confidence in neurologic patient communication, emotional preparedness, appreciation of patient diversity, perceived value of reflection, and overall clerkship satisfaction.

Results: Across multiple clerkship blocks (anticipated n = 40–80 students by study completion in May 2026), post-session surveys demonstrated improvements in students' self-reported confidence engaging patients with neurologic illness, perceived emotional support during training, and perceived value of reflective practice within the clerkship. Preliminary qualitative rapid thematic analysis based revealed recurring themes including humanizing patients beyond diagnostic labels, grappling with uncertainty and disability, heightened awareness of structural determinants of health, and strengthened peer connection through shared narrative reflection.

Conclusion: Embedding a brief, facilitated reflection seminar within a neurology clerkship is a feasible, low-cost, and adaptable strategy that supports learner well-being, patient-centered thinking, and professional identity formation. This model may be transferable to other emotionally complex clerkships and warrants further longitudinal evaluation to assess sustained educational and professional impact.

Virtual Paper 4: Beyond the Preclinical Bubble: A Phenomenological Study of Physical Exam Learning During the Internal Medicine Clerkship

Authors: Chen, KY, Elias, D, Bertram, A, Landry-Wegener, B

Background: Despite the importance of the physical exam to clinical care, this remains a gap in undergraduate medical training with multiple studies demonstrating insufficient competency in medical students' performance and interpretations of the physical exam. While the preclinical curriculum offers medical students a controlled setting for learning fundamentals, clinical rotations bring new challenges to the context for physical exam learning and limited opportunities for direct observation. It is unclear how students navigate the complexities of a clinical environment and which factors influence how they modify their physical exam learning and practice. In understanding how clerkship students approach learning the physical exam in clinical settings, educators can better support learners to improve their physical exam competency.
Hypotheses/Aim: This study aims to describe how patient characteristics, clinical team dynamics, and other emerging themes influence how medical students adapt their approach to learning and performing the physical exam from the preclinical setting to real-world clinical encounters during their core internal medicine training.
Anticipated Methods: This study will use a phenomenological qualitative design to explore the experience of medical students in adapting their learning to clerkship settings via thematic analysis of semi-structured interviews. Medical student participants will be recruited following enrollment in the Johns Hopkins University School of Medicine Core Clerkship in Internal Medicine. A total of 20-25 semi-structured interviews will be completed over Zoom with audio recording and AI-assisted transcription and analyzed using NVivo 12 software. Two team members will independently code a subset of interviews to establish initial patterns. A consensus coding approach will then be implemented to ensure intercoder agreement prior to independently coding the remainder of interviews. The research team will continue to meet regularly to discuss emerging themes, allowing for iterative refinement to the coding framework, and to ensure coder consistency over time. Additional team members will be present to review the coding process, resolve discrepancies, and ensure that the final set of themes accurately reflects participants' experiences. Descriptive statistics will also be used to summarize participant demographics and clinical backgrounds, including gender, year in medical school, practice setting, and number of completed core rotations, to aid in the interpretation of results.

Virtual Paper 5: Effects of a Grading Policy Change on Medical Student Engagement in a Neurology Clerkship Clinical Case Write-up

Authors: So, R, Paul, A, Leung, D

Background: Assessment structure plays an important role in learner engagement. While formative assessment is intended to promote learning through feedback, reduced accountability may limit participation in required educational activities. The neurology clerkship at our institution transitioned a required clinical write-up from formative (feedback-only) assessment to summative grading. This study evaluates student engagement and performance following this grading policy change.
Hypotheses/Aim: We hypothesize that while topics chosen for write-ups may be less complicated while under a summative grading policy, we do not expect significant changes in medical student engagement following a grading policy change.
Methods: We conducted a retrospective analysis of medical student write-ups completed before implementation of summative grading in the neurology clerkship. Engagement and performance were assessed using a standardized faculty grading rubric across multiple domains: quality of writing, neurologic localization, differential diagnosis, diagnostic investigation, and treatment and management. Each component was scored on a 5-point Likert scale. Descriptive statistics were calculated for rubric scores.
Results: 78 write-ups were evaluated. Mean scores across rubric domains ranged from 3.22 to 4.32. Students demonstrated strong performance in quality of writing, including accurate use of medical terminology (mean ± SD, 4.32 ± 0.78), clarity (4.05 ± 0.79), and organization (3.90 ± 1.01). Performance in neurologic localization (accuracy 4.06 ± 1.02) and differential diagnosis (consistency with history and localization 4.05 ± 0.94; ranking 4.05 ± 1.23; rationale 3.85 ± 1.09) was similarly high. Lower scores were observed in health systems science

(3.42 ± 1.51) and discussion of risks and benefits (3.40 ± 1.52). Write-ups spanned a broad range of neurologic topics, most commonly vascular neurology (38.5%) and neuromuscular disorders (21.8%), with additional representation across epilepsy, movement disorders, headache, and other subspecialties.
Conclusions: Under a formative grading policy, students demonstrated high levels of engagement and performance on a required neurology clerkship write-up across various clinical domains and topics. Next steps will include direct pre–post comparisons of these same rubric domains to assess changes in student engagement and performance following the transition from formative to summative assessment.

Virtual Paper 6:
Evaluation of a Resident Inpatient Curriculum in Oncology (RICO): Interim Analysis

Authors: Walsh, L, Marrone, K

Background: Staying abreast of the rapidly expanding field of oncology presents a challenge to the busy internal medicine resident caring for cancer patients on the wards. The development of a curriculum targeting core oncology topics represents an attractive solution. Guided by results from a formal needs assessment, we developed an asynchronous video-based curriculum aimed at resident-learners, which we call the Resident Inpatient Curriculum in Oncology (RICO). We conducted a formal study to determine whether implementation of RICO enhances the learner experience.
Methods: This is an ongoing prospective interventional study designed to assess the effectiveness of the RICO. Since August 2025, residents rotating on the solid tumor inpatient oncology services at the Johns Hopkins Hospital have been assigned to receive education via the curated RICO or a standard control curriculum. The primary outcomes of knowledge gains, confidence in caring for oncology patients, and rotation satisfaction are assessed via multiple-choice questions and Likert scales using Qualtrics software at the start and conclusion of each rotation. We hypothesize that residents who receive education via RICO will have a superior inpatient oncology experience as compared to those in the control group.
Results: 19 residents were enrolled (10 control, 9 intervention). Knowledge and confidence were assessed pre- and post-rotation and analyzed using mixed-effects models with restricted maximum likelihood estimation. Changes in knowledge over time did not differ significantly between intervention and control groups (group × time interaction, $p = 0.53$). Similarly, changes in confidence from pre- to post-rotation were comparable between groups (group × time interaction, $p = 0.84$). Post-rotation satisfaction, measured on a Likert scale, was also similar between intervention and control participants (Mann–Whitney U test, $p = 0.43$).
Conclusions: In this interim analysis, knowledge, confidence, and satisfaction outcomes were similar between residents exposed to the RICO and those receiving a standard control curriculum. These results are preliminary and currently limited by sample size. A more complete dataset is necessary to conclude whether the RICO curriculum has a positive effect on the solid tumor educational experience, or whether it needs further revision to improve its impact.

Virtual Paper 7: A 3D-Printed Inferior Alveolar Nerve Simulation Model with Piezoelectric Feedback for BSSO Training

Authors: Ren, T, Zhang, Y, Cooney, CM, Zhu, KJ, Soto, E, Redett, RJ, Shakoori, P, Yang, R

Introduction: Injury to the inferior alveolar nerve (IAN) is a well-documented risk of bilateral sagittal split osteotomy (BSSO), resulting in long-term numbness of the chin, drooling, and lip biting in up to 30% of patients. The IAN courses through the mandible, requiring a high degree of spatial awareness that is difficult to acquire without repeated practice. However, current surgical training tools provide limited opportunities for trainees to develop this intuition and practice nerve-sparing techniques. **Hypothesis/Aim:** This study developed and tested a low-cost, high-fidelity 3D-printed mandible model with a pressure sensing (piezoelectric) cable to simulate and detect nerve injury in real-time.
Methods: We created mandible models using high-resolution CT imaging and a resin-based 3D printer (Anycubic PhotoM3 Max), threaded with a piezoelectric cable to replicate the IAN. The cable was attached to a microcontroller board (Arduino Uno R3) which converted pressure differences to changes in voltage. Minor

nerve injury (0.024 V), moderate (0.098 V), and major (0.49V) resulted in green, yellow, and red LED illumination in real time, respectively, while major nerve injury also set off a loud audio alarm. A Python script continuously recorded the degree of nerve injury over the course of the simulation. Model creation costs were calculated to assess affordability.

Results: Bench testing was conducted on 6 nerves. Mean simulation time was 43.46 seconds. The mean time spent in the degree of minor, moderate, and major nerve injury was 0.11 seconds, 0.70 second, and 0.14 seconds, respectively. There were 4/6 nerve transections. The model was successfully constructed at a low recurrent cost of $6.23 per mandible. The microcontroller board had a one-time cost of $33. All software was free. Time for segmentation of the CT scan and model fabrication totaled 25 minutes, while total print time was 14 hours for 4 mandibles.

Conclusion: This piezoelectric-enhanced BSSO model represents a novel approach to IAN preservation training. By providing real-time graded feedback on simulated nerve contact, it has the potential to enhance surgical awareness and improve patient safety. This low-cost simulator has broad applicability to other surgical procedures in which outcomes may be improved through nerve-sparing techniques.