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ABSTRACTS

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ABSTRACTS

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ABSTRACTS

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Meeting abstracts are published as submitted. Some abstracts have been edited only to remove references to tables and graphs.

Papers Session 1

A Novel Simulated Education Curriculum for Placement of Temporary Vascular Shunts

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INTRODUCTION: Vascular injuries are common in combat. Many military surgeons have limited experience in managing vascular trauma. Downrange there are few vascular surgeons and definitive repair is often delayed. An integral part of damage control vascular surgery is placement of temporary vascular shunts. Experience with vascular shunting is variable and proficiency criteria does not exist.

METHODS: Using a pre-recorded video and an original vascular shunt trainer we have developed a novel simulated vascular shunt curriculum. Military attending surgeons (n=10) and residents (n=10) baseline knowledge and procedural skills were evaluated pre and post curriculum implementation. Knowledge skills were evaluated by a standardized test and technical skills were evaluated based on procedural length, 10 key procedural steps, and total blood loss (TBL).

RESULTS: Base line knowledge between cohorts was similarly poor (staff x= 68.94% vs residents x= 60.70%, p=0.271) and significantly improved within each cohort post curriculum (staff x=97.73%, p=0.001, residents x=98.99%, p=0.002). Pre curriculum technical skills were similar between cohorts for procedural length (staff x=647.9sec, residents x=664.3sec, p=0.883) and procedural steps (staff x= 7.4/10.0, residents x=6.4/10.0, p=0.359). Pre curriculum TBL was significantly different between staff and residents (staff x= 451.5cc, residents x=890.0cc, p=0.030). Nearly all areas of technical skills improved post curriculum implementation (staff: procedural length, x= 516.1sec, p= 0.180, procedural steps 9.5/10.0, p= 0.003, TBL x=195cc, p<0.001; residents: procedural length, x= 514.7sec, p= 0.010, procedural steps 10.0/10.0, p=0.003, TBL x= 230cc, p=<0.001). All subjects had improved confidence and increased likelihood to shunt post curriculum implementation.

CONCLUSION: This study demonstrates that implementation of a short simulated vascular shunting curriculum improves military surgeons' knowledge and technical skills and directly improves forward deployed damage control vascular surgery.

Markerless AI-Driven System for Objective Assessment of Surgical Suturing Skills

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INTRODUCTION: Assessment of surgical trainees' skills remains challenging, with traditional methods being subjective and unreliable. Existing motion tracking systems using electromagnetic trackers or physical markers have limitations including signal interference and movement restriction. This study developed and evaluated an artificial intelligence-driven markerless framework for objective assessment of suturing skills to differentiate between expert and novice performance.

METHODS: We evaluated suturing performance using computer vision and AI technologies. Participants performed four simple interrupted sutures on a suturing pad while being recorded by a depth camera. Experts were defined as having ≥50 patient suturing experiences; novices <50 experiences. We used pre-trained deep learning models to detect 21 virtual hand landmarks without requiring physical markers. We analyzed displacement, velocity, acceleration, and temporal metrics across X, Y, Z coordinates. Comprehensive statistical analyses were performed on data and six machine learning algorithms classified expert versus novice performance.

RESULTS: Eleven experts and 11 novices participated in this study. Experts demonstrated significantly larger displacement magnitudes across all spatial directions in both hands compared to novices. Experts exhibited smoother out-of-plane acceleration control and completed tasks with significantly shorter stagnation periods and overall completion times. Machine learning classification achieved high accuracy across all algorithms by distinguishing experts from novices. Feature importance analysis revealed temporal efficiency metrics as top discriminative features for both hands, with hand-specific patterns: left hand classification relied on in-plane displacement metrics while right hand emphasized out-of-plane parameters.

CONCLUSION: This markerless kinematic analysis system successfully distinguished surgical expertise levels with high accuracy. Temporal efficiency metrics emerged as the strongest predictors of suturing expertise, while spatial control patterns showed hand-specific importance. This objective, non-intrusive approach provides quantitative metrics for enhancing surgical training curricula and automated feedback systems.

Teaching Medical Error Disclosure: The Development of a Customized GPT-Based Simulator with Formative Feedback

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INTRODUCTION: Disclosure of a medical error is an essential skill and a core competency for surgical trainees. In many programs, this is formally taught through the use of standardized patients (SPs). Such sessions are resource-intensive, limiting their use. No peer reviewed study has yet evaluated the use of Large Language Model (LLM) based training for medical error disclosure, revealing an actionable gap. We therefore conducted a literature review and developed a low cost, voice interaction enabled "Customized GPT" tool that provides both the opportunity for deliberate practice and feedback.

METHODS: Scopus was searched for the use of LLM based tools for difficult communication in health professions education (e.g., medical error disclosure, end of life discussion, delivering bad news). Insights guided the creation of a Custom GPT (OpenAI ChatGPT o4) with Retrieval-Augmented-Generation (RAG) and led to the development of: (1) a voice enabled Patient Mode and (2) an automated Instructor Mode that delivers itemized feedback using a 25 item error disclosure checklist (19 items on a 3-point scale, six items on a 5-point global rating) with evidence of validity. Iterative prompt engineering, RAG document grounding, including a confirmed case-scenario and human in the loop refinement were completed. The project was IRB approved.

RESULTS: (Preliminary Results) A literature review that revealed no studies using error disclosure scenarios with LLMs confirmed the literature gap. After creation of our Custom GPT, developed without dedicated software engineers, six experts judged the tool to be suitable for training, noting that Patient Mode delivers scenario faithful, emotionally nuanced dialogue, provides automated checklist based feedback, supports voice based interaction, and can be adapted to additional cases and languages. This LLM-based training is being tested against a didactic lecture for medical residents as part of our PGME curriculum in 2025.

CONCLUSION: We are piloting a novel voice enabled, dual mode Custom GPT for medical error disclosure training.

Implementation of a Novel, Proficiency-Based Simulation Curriculum in Minimally Invasive Surgery for Senior Medical Students

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INTRODUCTION: Proficiency-based training on simulators has been shown to translate to the operating room. Early simulation training in minimally invasive surgery allows surgical residents to achieve clinical competence faster and benefit most from their operative experience. However, resident engagement in simulation remains a challenge due to demanding clinical schedules. The goal of this study was to determine the feasibility and effectiveness of a proficiency-based skills curriculum in minimally invasive surgery implemented during the senior year of medical school.

METHODS: A one-month, proficiency-based skills curriculum in laparoscopy, endoscopy, and robotic surgery was developed and implemented for fourth-year medical students. The curriculum consisted of online modules, in-person coaching, and independent practice of select training tasks to expert-derived proficiency standards. Training logs, consisting of repetition number, time to completion, and task-specific metrics, were collected and analyzed. Among students who achieved proficiency, median number of repetitions and training time were calculated.

RESULTS: 12/15 students (80%) achieved proficiency on more than 95% of tasks. Median number of repetitions and training time to proficiency were 86 (range 8-32, by task) and 2 hours 9 minutes for laparoscopy, 45 (range 8-11) and 3 hours 38 minutes for endoscopy, and 202 (range 8-25) and 5 hours 43 minutes for robotic surgery, respectively. Tasks with the lowest proficiency rates were Intracorporeal Knot Tying (60%), Peg Transfer (86%), and Gastroscopy - Case 8 (86%).

CONCLUSION: A proficiency-based skills curriculum in minimally invasive surgery was successfully implemented, with the majority of medical students achieving proficiency in all tasks. The unequal distribution of training time between platforms and lower proficiency rates for some tasks identify a need for curriculum refinement. Nevertheless, implementation of skills training for surgery-bound senior medical students is valuable, with future studies planned to assess its impact on accelerated skill acquisition and preparedness for residency.

Transferring Skills Across Hands: A Randomized Trial of Non-Dominant Hand Training in Laparoscopy

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INTRODUCTION: Early laparoscopic training often reveals a pronounced asymmetry in hand performance, with underdeveloped non-dominant hand (NDH) skills limiting bimanual coordination and slowing early skill acquisition. Although most laparoscopic curricula emphasize two-handed tasks, they rarely incorporate targeted NDH training. Prior studies show that deliberate NDH practice improves NDH-specific performance and may enhance motor control, spatial awareness, and neuromuscular adaptability. However, interventions have not investigated whether incorporating mirrored NDH laparoscopic task training into standard curricula yields similar benefits, or whether these gains transfer to two-handed and dominant-hand tasks, reduce cognitive load, or improve trainee confidence. We aim to evaluate whether adding mirrored NDH task training to a standard laparoscopic curriculum improves performance across non-dominant, dominant, and bimanual tasks, and whether it impacts cognitive load and self-reported confidence among general surgery interns.

METHODS: This single-institution randomized controlled trial enrolls PGY-1 general surgery interns during a 4-week surgical skills rotation. Participants are randomized to receive either the standard laparoscopic curriculum or additional time-targeted NDH tasks (bean drop, pattern cutting, block transfer, Endoloop). Performance is video recorded and assessed at baseline, weekly, and at the end of 4 weeks using timed objective tasks and the MISTELS scoring system by blinded evaluators. Subjective assessments include self-reported confidence (Likert scale) and NASA-TLX cognitive load. Post-study qualitative interviews explore perceived value, difficulty, and skill transfer of NDH training.

RESULTS: Fifteen general surgery interns are scheduled for a 4-week surgical skills rotation from July 2025 to May 2026 with balanced randomization. Fourteen participants report right-hand dominance; one is left-hand dominant. The study is currently in progress.

CONCLUSION: Primary outcomes include improvement in dominant-hand and two-handed task performance. Secondary outcomes include NDH performance, confidence, cognitive load, and qualitative themes. Data will be analyzed using generalized mixed-effects models and thematic analysis.

Papers Session II

Advancing Practical Skills and Improving Confidence in High Acuity, Low-Occurrence (HALO) Operative Trauma Using High-Fidelity Operative Simulation

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INTRODUCTION: Advancing developments of endovascular approaches and subspecialty vascular care have significantly diminished general surgery residents' exposure to essential trauma techniques. This has led to a deficiency in preparedness among residency graduates in handling basic trauma emergencies. The Open Surgical Simulation System (OS3) is a high-fidelity trauma surgery model that allows for skill acquisition through hands-on practice. This study evaluates the effectiveness of our curriculum development process and its impact on training outcomes.

METHODS: A longitudinal analysis of OS3 simulation training was conducted from 2020-2025, encompassing multiple iterations of curriculum refinement based on continuous evaluation and feedback. The curriculum incorporated Kern-guided improvements in instructional design, implementation, and evaluation processes throughout the study period. Training effectiveness was assessed using pre- and post-simulation surveys with 5-point Likert scales measuring self-assessed knowledge, technical skills, and confidence. The simulated procedures included resuscitative thoracotomy (RT), exploratory laparotomy (EXP), splenectomy (SPL), hepatorrhaphy (LIV), small bowel resection (SBR), and retroperitoneal exploration (RPE). Paired t-tests evaluated pre- to post-simulation improvements across the entire curriculum development period.

RESULTS: A total of 938 residents participated throughout the curriculum development period. The OS3 simulation curriculum consistently demonstrated significant improvements in confidence scores across all evaluated procedures ($p<0.001$). Prior completion of ATOM or ASSET courses did not affect baseline confidence levels. The curriculum's effectiveness remained robust throughout the development process, with meaningful confidence gains observed across all trauma procedures, demonstrating the value of systematic curriculum.

CONCLUSION: The systematic development and refinement of the OS3 curriculum using Kern's model effectively improved surgical training outcomes. This simulation-based approach demonstrates consistent effectiveness in building resident confidence across trauma procedures throughout the curriculum evolution process. Our findings support the value of iterative curriculum development in addressing documented gaps in trauma surgery training and highlight the importance of continuous educational improvement.

Confidence Is Key: Knowledge Donor Cadaveric Simulation Unlocks Tube Thoracostomy Proficiency for Surgery Residents

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INTRODUCTION: The rate of complications associated with tube thoracostomy approaches 7% among general surgery residents, with early-career residents facing the greatest challenges due to limited independent clinical exposure. Utilizing our high-fidelity whole-body donor simulation model, known as the Knowledge Donor (KD) Program, we investigated whether intentional, repetitive training improves tube thoracostomy performance across multiple training cohorts.

METHODS: We are conducting a longitudinal study at an ACS-accredited Level I trauma center with a 50-resident general surgery residency. Beginning in 2022, we established a pre-residency KD bootcamp for interns conducted each June, with formal tube thoracostomy procedural timing initiated in 2024. Procedures are proctored by surgical faculty and timed from chest wall betadine application to securing-stitch knot tie. Residents return for periodic KD tube thoracotomy sessions throughout the academic year to evaluate skill retention using consistent proctoring and timing protocols. Semi-structured interviews will be conducted to capture qualitative feedback regarding deliberate, repetitive cadaveric practice influences procedural comfort, confidence, and perceived clinical utility.

RESULTS: Forty-six residents across cohorts performed 112 timed tube thoracostomies in the KD environment spanning 20 lab opportunities averaging 4.4 months between sessions. The mean completion time for the first repetition (n=46) was 300.0 seconds (SD 152.9), improving to 232.0 seconds (SD 94.2) for the second repetition (n=40), a statistically significant reduction ($p<0.001$). Additional repetitions showed a consistent pattern of incremental improvement, with data collection ongoing.

CONCLUSION: Our study data indicates that structured, repetitive KD opportunities improve tube thoracostomy proficiency among general surgery residents. The significant reduction in procedural times underscores measurable skill acquisition, while planned qualitative interviews will aim to explore perceptions of procedural confidence, real world impact on patient care, and suggestions for programmatic improvement. Ongoing data collection is anticipated to provide additional validation of training effectiveness, extended retention outcomes, and qualitative impact on residents' educational experience.

Ballin' On a Budget: Improving Pediatric Emergency Care Through Simulation Training for Testicular Torsion

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INTRODUCTION: Timely recognition of testicular torsion is critical to preventing irreversible damage and ensuring optimal outcomes in pediatric patients. Simulation-based education is effective in high-stakes scenarios and remains underexplored for pediatric urologic emergencies. This study evaluates a novel simulation-based intervention to improve early diagnosis and management of testicular torsion among pediatric healthcare providers.

METHODS: A realistic testicular torsion model was designed by our pediatric simulation center and validated by a pediatric urologist. The model used cost-effective materials, including a stress ball, Styrofoam ball, playdough, plastic wrap, water-based lubricant, and a balloon, to replicate the anatomical and tactile features of a torsed testicle. A clinical simulation scenario involving an adolescent male with abdominal pain and signs of torsion was developed to teach differential diagnosis, genitourinary examination, and application of the Testicular Workup for Ischemia and Suspected Torsion (TWIST) score. Junior residents in the Department of Pediatrics were chosen to participate as part of their simulation education curriculum. A 10-question knowledge test relating to general abdominal pain workup, testicular torsion and TWIST score, was distributed to residents pre- and post-simulation. A post-simulation survey was conducted to assess participant confidence, perceptions of the simulation's effectiveness and educational value. A paired sample t-test compared pre- and post-simulation scores on a ten-question assessment.

RESULTS: Eighteen junior (postgraduate year 1 or 2) residents in pediatric primary care participated. Mean pre-test scores of questions specific to testicular torsion management were 51.7% (±11.5%), improving to 71.1% (±11.8%) post-simulation ($p < 0.001$). Post-simulation surveys indicated high satisfaction, with 97.7% of participants agreeing or strongly agreeing that the training was a valuable learning experience.

CONCLUSION: This testicular torsion simulation model tool effectively increased pediatric trainees' knowledge and diagnostic confidence in recognizing and managing testicular torsion, demonstrating its potential to improve early intervention in time-critical urologic emergencies.

Mi Safe Spinal Sam: Preliminary Evaluation and Durability Test of a Novel Infant Spinal Anesthesia Task Trainer

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INTRODUCTION: In children less than 2 years old, the practice of awake pediatric spinal anesthesia (SA) has resurged. Although simulator models exist for the purpose of teaching neonatal lumbar puncture, no such program or simulator model exists for SA. In response to this need, we created and evaluated preliminary validity of a novel simulator, the MiSafeSpinalSam, designed to support training of the full pediatric SA procedure workflow, from patient positioning and landmark identification to needle insertion and anesthetic administration.

METHODS: We created the full-scale infant MiSafeSpinalSam with skeletal features and a silicon body, and 15 pediatric anesthesiologists independently evaluated it using a 41-item survey Spring, 2025. *Physical attributes, realism of experience, ability, value,* and *relevance* were scored using 4-point rating scales (4.0= highest) and comments captured. Senior author tested the insert's durability by counting pokes to; a) leak from injection site, b) visible injection site needle damage, c) decreased intrathecal "pop," and d) decreased CSF flow. The means, *SD*, 95% CI, comments, and pokes counts were reported.

RESULTS: Participants self-reported an average 9.6±4.8 years' experience and 2.3 ± 2.8 SA monthly cases. Survey means aligned with adequate realism and comments suggested improvement to the model's head (e.g., "Head is heavy" and "could use more flexibility in neck"). *Ability* scores aligned with "Somewhat easy to perform," and *value* ratings (*M*=3.93, *SD*=0.26) aligned with "...great deal of value as a training tool." The poke test indicated 50 pokes until minimal leaking from injection site, decreased intrathecal "pop," and detectible needle damage at injection site, with no decrease in CSF flow at 100 pokes.

CONCLUSION: Preliminary findings indicate MiSafeSpinalSam holds promise for pediatric spinal anesthesia training. Following modifications of the model's head we will expand research to test the generalizability of findings and develop a comprehensive curriculum and competency assessment program.

A High-Fidelity Thoracic Model for Minimally Invasive Cardiac Surgery Training: Aortic Coarctation as a Use Case

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INTRODUCTION: Minimally invasive approaches to congenital cardiac surgery, such as left thoracotomy repair of aortic coarctation, require specific technical skills that are difficult to acquire outside the operating room. Existing simulators often lack anatomical accuracy, do not adequately emulate the texture and responsiveness of real tissues, and fail to constrain movement in a realistic way. We present a novel, cost-effective thoracic simulator designed to replicate the anatomic constraints of a left thoracotomy, developed specifically for procedural training in congenital cardiac surgery.

METHODS: The simulator was constructed using a composite of 2D-printed ABS plastic to model the rib cage and vertebral column, and silicone-based materials to reproduce soft tissues, including all chest wall muscles and skin. The aortic arch and great vessels were embedded within the thoracic cavity to mimic the surgical field encountered during coarctation repair via a minimally invasive approach. The model allows for realistic tissue handling, vessel dissection, and vascular anastomosis under direct vision. It was tested in a training session involving congenital cardiac surgery fellows and staff surgeons.

RESULTS: The simulator provided a stable, reproducible platform for practicing key steps in the repair of aortic coarctation, including limited exposure through the intercostal space, vessel mobilization, and end-to-end anastomosis. Participants reported high realism in terms of anatomical constraints, tissue behavior, and instrument handling. The total material cost was under $100 per unit. Feedback emphasized the model's usefulness in refining fine motor skills and spatial orientation in restricted operative fields.

CONCLUSION: This thoracic simulator offers a realistic, low-cost platform for training in minimally invasive cardiac surgery. Its successful application to aortic coarctation repair suggests potential for broader use in congenital and adult procedures requiring thoracotomy. Further studies are planned to assess its impact on operative performance and to expand its use to endoscopic techniques.

Diffuse Reflectance Spectroscopy as a Novel Tool for Assessing Laparoscopic Surgical Skills

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INTRODUCTION: Minimally invasive surgeries are performed ubiquitously around the world, and there is a need for objective measures of skill assessment for effective training. Established metrics, such as the Global Operative Assessment of Laparoscopic Skills (GOALS), rely on reviewer's expertise and are subject to inter-rater variability. Diffuse reflectance spectroscopy (DRS) is a non-invasive optical technique that discriminates tissue by analyzing the absorption and reflection of light. This study evaluated the potential use of a DRS probe as a quantitative additional tool for assessing laparoscopic skills.

METHODS: Surgical trainees were recruited at St. Mary's Hospital, Imperial NHS Healthcare Trust, London (UK.) and asked to scan three green targets using a DRS probe in a laparoscopic phantom abdominal model. Optical spectra and video footage of each task were recorded. Performance was scored using a simplified GOALS system across three domains: depth perception, bimanual dexterity and efficiency (maximum total score: 15). Spectra were classified into "on target" (green), "off target" (phantom organ) and "idle" (noise). An On:Off Target Ratio (OOTR) was computed and correlated with GOALS scores using linear regression.

RESULTS: A total of 21 participants were recruited in this study, and 3700 spectra were recorded. The median OOTR was 1.63 (IQR: 1.12-1.92) and the mean GOALS score of 10.89 (SD: ±1.83). A significant positive correlation was found between OOTR and GOALS ($R=0.56$, $p=0.02$), suggesting that higher technical performance aligned with more accurate probe targeting.

CONCLUSION: Optical spectroscopy probes such as DRS offer a novel, innovative and objective approach to assessing laparoscopic surgical skills with a strong correlation to established scoring systems. This method holds potential for real-time integration into surgical simulation and training systems. Future studies will explore its application with artificial intelligence algorithms and computer vision for automated feedback.

Meet the Authors Poster Session

Curriculum Development

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #19

Enhancing Intraoperative Communication: A Simulation-Based Relationship-Focused Workshop for Perioperative Staff

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INTRODUCTION: Effective communication is essential in high-stakes surgical environments, yet it is often underemphasized in traditional education. Simulation-based training offers a safe, practical way to bridge the gap between theory and practice. This study evaluates a novel Relationship-Focused Communication Workshop, utilizing simulation, designed to strengthen intraoperative communication skills among perioperative staff, particularly in navigating difficult conversations and delivering peer feedback.

METHODS: The clinical director of perioperative services identified a need for team communication training. A mandatory course was designed around specific scenarios known to cause conflict. Over three weeks, 60-minute sessions were held for staff. Session 1 included an interactive didactic on team dynamics and communication strategies. Sessions 2 and 3 included a brief review of content, followed by simulations of common OR conflicts. Participants completed pre-workshop, post-simulation, and post-workshop surveys using 5-point Likert scales to assess eight target skills. Trend analyses using the Jonckheere-Terpstra test assessed significant changes across sessions.

RESULTS: Forty-four perioperative staff participated in the course. Significant positive trends ($p < 0.025$) were observed across all target skills, including confidence in managing disruptive behavior, use of structured frameworks, and perceived ability to foster psychological safety. For example, median scores for participants' ability to create a psychologically safe space improved from 4 in the pre-survey to 5 in the post-survey ($p=0.01$). Of the 18 participants who graded the course, 83% (n=15) rated the class as either "A" or "A+". On post-workshop surveys, participants commonly stated their intention to maintain a calm and empathic approach to challenging conversations with colleagues in the future.

CONCLUSION: This simulation-based curriculum significantly improved perioperative communication competencies and highlighted the potential of structured, relationship-focused training. Future efforts should aim to expand participation, refine data collection, and explore scalability across institutions to further strengthen team communication and patient safety in the OR.

Poster #18

Building a Robotic Surgery Curriculum in General Surgery Residency: Evidence-Based Framework for Overcoming Barriers and Ensuring Accreditation Council for Graduate Medical Education (ACGME) Compliance

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INTRODUCTION: Robotic surgery utilization in general surgery has increased from 1.8% to 15.1% of all procedures, yet significant gaps persist between clinical practice evolution and educational preparedness. While 70% of residency programs provide formal robotic curricula, implementation effectiveness varies dramatically, with only 47% completion rates at non-structured sites. Despite ACGME requirements for trainee access to current surgical technologies, 43% of residents report dissatisfaction with their experience. This study identifies barriers to robotic training implementation and develops a reproducible institutional framework.

METHODS: A mixed methods evaluation was conducted between May through July 2025 comprised of: (1) literature review (2013–2025) of peer-reviewed publications examining robotic training curricula, simulator technologies, and implementation barriers using PubMed, MEDLINE, and professional society resources; and (2) structured stakeholder interviews. Local infrastructure assessment at a large academic institution (40 residents, PGY 1-5) evaluated simulator access, scheduling constraints, and curricular gaps through interviews with surgical education leadership, simulation center directors, and graduate medical education administration.

RESULTS: Well-structured robotic curricula demonstrate significant improvements in objective performance scores ($p<0.001$) and meaningful reductions in task completion times when proficiency-based training protocols are implemented. Critical implementation barriers include simulator availability, on-site support staff, and universal buy-in. Institutional assessment revealed simulator relocation off-campus, restricted access hours, outdated software, and absence of structured progression tracking. Solutions include 24/7 simulator access, dual console training paradigms, competency-based advancement using validated assessment tools, and faculty development.

CONCLUSION: Effective robotic training requires structured curricula combining simulation training, progressive clinical responsibility, and validated assessment methods. Universal buy-in from faculty and leadership is essential for achieving high compliance and educational effectiveness. Institutions must prioritize simulator accessibility, implement competency-based progression models, and establish comprehensive faculty development to meet ACGME expectations while ensuring patient safety and educational quality.

Poster #2

Confident Cannulation: A Needs Assessment for Intraoperative Cholangiography Training

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INTRODUCTION: All general surgery residents must learn to perform intraoperative cholangiography (IOC) independently as a part of the American Board of Surgery's Gallbladder Disease Entrustable Professional Activities. However, studies have shown that general surgery resident autonomy and readiness for independent practice have been decreasing. This delinquency could be attributed to the decreasing number of IOCs performed in the United States, which could explain the decreased readiness through fewer live training opportunities for surgical residents. Accordingly, there is ample need to supplement surgical training through simulation, but the specific demands and gaps remain unclear. The current study, therefore, includes an in-progress needs assessment to understand general surgery resident confidence in this procedure and how supplemental training opportunities could enhance individual confidence and competence.

METHODS: An anonymous survey will be administered to general surgery residents and attendings at multiple military general surgery residency programs. The survey will gather information on demographics, experience with IOC, and knowledge of IOC. A 5-point Likert scale will be used to evaluate confidence in performing IOC in various settings and with different instruments. Finally, the survey will explore why residents may lack confidence and ways to build confidence.

RESULTS: Data collection is ongoing, and we anticipate full analysis of the dataset by early September. We hypothesize that general surgery residents do not feel completely confident in their ability to perform IOC independently due to a lack of operative experience and desire supplemental training.

CONCLUSION: The completion of this needs assessment is essential for identifying why and to what extent residents lack confidence to perform IOC independently. Ultimately, this assessment will guide the development and implementation of an IOC simulation model and training curriculum that will ensure general surgery residents are graduating with the knowledge and confidence to perform IOC to deliver high-quality patient care.

Poster #12

Exploring the Variety of Simulation Lab Types in FMIGS Programs

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INTRODUCTION: In recent years, the American Association of Gynecologic Laparoscopists (AAGL), the accrediting body for the Fellowship in Minimally Invasive Gynecologic Surgery (FMIGS), has demonstrated interest in obtaining formal subspecialty recognition for Minimally Invasive Gynecologic Surgery (Complex Benign Gynecology). Efforts to gain subspecialty recognition often coincide with a push for increased standardization, including subspecialty-specific simulation training. To promote transparency, AAGL provides a centralized, publicly accessible list of program description forms that detail which simulation lab types are available at each FMIGS program. These lab types include cadaver labs, dry labs, animal labs, and/or robotic labs. As the field transitions toward greater formalization, AAGL can assess which types of simulation labs are most utilized and champion a more standardized simulation training framework across programs.

METHODS: We reviewed the 61 programs listed on AAGL's 2025 accredited programs. Two programs lacked complete forms and were excluded. The remaining 59 program description forms were analyzed to determine the prevalence of different simulation lab types and the 12 unique combinations in which they were offered. Results were summarized using counts and percentages.

RESULTS: Of the 59 programs with complete program descriptions, 37 (62.7%) offered a cadaver lab, 53 (89.8%) offered a dry lab, 26 (44.1%) offered an animal lab, and 49 (83.1%) offered a robotics lab. An analysis of all FMIGS programs shows that the most frequently offered curriculum includes all four lab types (19, 32.2%), followed by two (17, 28.8%), three (16, 27.1%), and one (7, 11.9%) lab type(s).

CONCLUSION: This study highlights significant variation in simulation curriculum across FMIGS programs. To standardize the FMIGS curriculum, clearer guidance is necessary on the types, usage, and frequency of these labs. AAGL's public documentation of simulation training availability may serve as a valuable model for other surgical accrediting organizations aiming to improve curriculum consistency and transparency.

Poster #20

Development of an Ultrasound Curriculum for Military Surgical Residents

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INTRODUCTION: The purpose of this project was to develop an ultrasound curriculum for military surgical residents to enrich their clinical and deployed ultrasound practice. General surgeons are often expected to employ ultrasound to strengthen diagnosis and treatment decisions without having received formal training. Ultrasound training is also paramount for military surgeons because it is often the only imaging adjunct available when deployed to austere contexts.

METHODS: We used Kern's six-step approach to develop the curriculum. Starting with a needs assessment, we identified five high-value topics: basics of ultrasound (e.g., knobology), ultrasound applications for trauma (e.g., EFAST), biliary disease, central line insertion, and hemodynamic monitoring. We collaborated with subject matter experts with prior deployment experience to create goals, learning objectives, and content. Instructional strategies included lectures, case studies, and skills-based simulations using simulated participants. We created a pre- and post-knowledge and skills competency assessment (five-point Likert Scale) to evaluate learners' progress.

RESULTS: Nine residents participated in the pilot (two interns, two PGY2s, three PGY3s, two PGY5s). Residents either strongly (75%) or slightly agreed (25%) that their confidence increased after each session. Likewise, Residents either strongly (75%) or slightly agreed (25%) that the use of standardized patients was helpful to their learning after each session. All residents responded that the instructor created a positive learning environment with each session. The didactics portion of each session limited the hands-on skills portion, given the allotted time for each session.

CONCLUSION: The development of an ultrasound curriculum is feasible. Barriers to development included simulation time and space, and availability of standardized patients. We plan to record and move the didactics online using a flipped classroom strategy, add collaboration scripts, and encourage senior instructors to verbalize their thought processes. The U.S. military will benefit from this curriculum by improving patient care and long-term operational readiness.

Poster #17

Developing and Implementing a Standardized Vascular Surgery Simulation Curriculum for General Surgery Residents

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INTRODUCTION: Simulation-based training (SBT) is a critical adjunct to clinical education, particularly in surgical residency programs. The development of vascular surgery skills is a core component of general surgery training. While literature supports the effectiveness of well-structured SBT, a significant minority of programs utilize a standardized vascular curriculum. Program directors agree that standardization would enhance training efficacy. This study aims to evaluate existing vascular SBT curricula and identify key gaps to inform development of a competency-based vascular simulation curriculum tailored to general surgery residents.

METHODS: A mixed-methods needs assessment was conducted. Review of literature identified existing vascular surgery simulation curricula, focusing on content, structure, learner level, and assessment methods. A focus group with vascular surgery faculty was conducted, followed by surveys of faculty and general surgery residents to assess perceived competency, training gaps, and SBT preferences. Additionally, pre- and post-training self-assessment survey data were collected from 24 residents who participated in our surgical skills curriculum which included specific vascular anastomosis skill assignments.

RESULTS: Literature review highlights widespread need for vascular SBT, particularly for open skills such as patch angioplasty and anastomosis. Our vascular anastomosis component of the skills curriculum demonstrated significant improvement in self-rated competency among 24 residents (mean score increased from 2.46 to 3.50 on a 5-point scale; $p<0.001$). Focus group and survey data further identified key areas of low confidence, gaps in hands-on exposure, and prioritized skills for simulation.

CONCLUSION: This study highlights unmet needs in vascular surgery education for general surgery residents. The significant improvement in resident perceived competency demonstrates potential for structured simulation to address these needs. Our findings support developing a competency-based, standardized vascular simulation curriculum to improve technical skills, promote consistent training across programs, and better prepare residents for clinical practice. Future work will focus on curriculum implementation, assessment validation, and evaluating educational impact.

Poster #15

Implementation of a Longitudinal, Independent Surgical Skills Curriculum Tailored to Resident Needs: Results from the First Year of a Simulation-Based Skills Lab

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INTRODUCTION: Simulation-based technical training is a key component of competency-based surgical education. However, standardized, longitudinal and learner-centered skills curricula remain inconsistently implemented across training programs. To address this gap, we developed an Independent Practice Surgical Skills Curriculum, as part of our comprehensive simulation curriculum, guided by the American College of Surgeons Skills Curriculum and our residency needs assessment.

METHODS: A longitudinal Surgical Skills Curriculum Lab was implemented in July 2024 at a single academic general surgery residency program. Residents were scheduled for two hours per month of protected time for independent practice. Curriculum components included Fundamentals of Laparoscopic Surgery, Xi Simulator Modules, Vascular Anastomosis Skills, Fundamentals of Endoscopic Surgery, and Advanced Open Surgical Skills. Compliance was measured with attendance and submission of completed tasks in each section with periodic pre- and post-assessments. At the end of the academic year, residents completed an anonymous survey evaluating curriculum satisfaction, perceived impact, and suggestions for improvement.

RESULTS: Twenty-one residents (PGY1-5) participated in the first year of the curriculum. Based on end-of-year survey results, 90% of respondents reported that the curriculum improved their technical skills, and 81% felt it enhanced their operative confidence. Protected time for independent practice was rated as one of the most valuable features. Residents appreciated the variety of task complexity across PGY levels and the ability to track their own progress longitudinally. Areas for improvement included increasing faculty feedback opportunities and enhancing simulation task realism.

CONCLUSION: Our first year of implementation demonstrates that a structured, modular, and self-directed surgical skills curriculum with protected simulation time is feasible and well received. Survey feedback will guide refinements to enhance engagement and skill transfer to the operating room. Our model offers a scalable approach to structured skills training that aligns with ACS recommendations and can be tailored to local institutional needs.

Poster #13

Optimizing a Trauma Training Curriculum Ahead of National Scale-Up in Uganda

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INTRODUCTION: Educators have tailored courses emulating Advanced Trauma Life Support (ATLS) to teach initial assessment and stabilization of a trauma patient for resource-limited environments. In Uganda, the Kampala Advanced Trauma Course (KATC), run by Ugandan clinicians since 2007, has trained over 2,000 healthcare providers. To expand the capacity to deliver this simulation-based curriculum, a curriculum review is in order, especially given the limited surgical workforce and need for immediate translation of simulated skills into lifesaving procedures.

METHODS: We initiated Kern's model of curriculum development to appraise the current curriculum through a needs assessment, planning to complete a curricular revision process, and evaluate the modified curriculum. The needs assessment incorporates feedback from intern doctors who recently completed the course and are applying the knowledge in the field, as well as faculty instructors. After updating content, careful consideration will be given to optimal integration of skills simulation sessions, which currently include primary and secondary survey, airway management, needle and tube thoracostomy, venous cutdown, burr holes, and splinting.

RESULTS: Preliminary needs assessment data from 42 intern doctors (response rate 77.8%) indicated that 83.3% found the course very useful. Of the skills sessions, most participants rated primary survey, airway management, and needle/tube thoracostomy as very useful. Narratively, most expressed a desire for more time devoted to skills practice, interprofessional moulage simulation, and a forum for feedback on management of patients during actual resuscitations.

CONCLUSION: Our team will obtain feedback from faculty instructors, as well as review course content for updates. Content will be evaluated to select components amenable to asynchronous delivery, as well as to improve fidelity and integration of skills simulation sessions. Cases will be developed with consultation from local experts to increase engagement of learners.

Poster #16

Utilizing Consumer 3D Printers to Make Low-Cost, High-Fidelity Appendectomy Surgical Models for Trainees

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INTRODUCTION: Simulation models have become an indispensable part of surgical training globally, offering surgical trainees a safe avenue in which to develop their skills and improve patients' outcomes in the operating room. However, the techniques of developing traditional models makes utilizing them cost prohibitive and limits their use. With increased accessibility to consumer 3D-printers and recent advances in flexible filaments such as thermoplastic polyurethane (TPU), 3D-printing present a viable low-cost medium to create realistic soft tissue models.

METHODS: This study investigated the viability of creating accurate low-cost, high-fidelity appendectomy models using a consumer 3D-printer (Neptune 3 Pro). A solid polylactic acid (PLA) pelvis base was designed to simulate the necessary surface anatomy and anatomical context. Subsequently, the abdominal musculature, cecum, appendix and appendicular artery were printed with TPU using varying infill density and wall thickness to replicate the different soft tissue feels. Finally, the peritoneum was recreated using balloons and the subcutaneous layer was simulated using sponges to mimic tissue texture and resistance. Overall, each model used 51g of PLA and 49g of TPU filament with a total cost of €7 per model.

RESULTS: These models were then utilized to train medical students in the clinically relevant anatomical and procedural knowledge necessary to complete an open appendectomy. Initial qualitative feedback indicated these models provided educational value improving students' spatial understanding and procedural skills.

CONCLUSION: These initial findings suggest that 3D-printed models offer an effective alternative for simulation training and maybe especially useful in resource-limited regions. Thus to promote accessibility, these models were uploaded on Thingiverse as part of an open-access project to improve global surgical education. Overall, this study demonstrated that 3D-printed models offer a viable low-cost alternative that are easily accessible and can contribute to global surgical education. Future studies are required to validate the efficacy of these models.

Meet the Authors Poster Session

Learner/Skills Assessments

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #30

Improving Trauma Team Performance Through Structured Trauma Simulation

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INTRODUCTION: Effective trauma resuscitation requires orchestration of interdisciplinary teamwork. While simulation has been utilized to improve team performance during trauma resuscitation, a replicable structure for simulation and tools to measure its success in impacting team performance in trauma resuscitations have been more sparse. This study aims to measure and improve team performance in the initial resuscitation of patients who meet criteria for activation of a trauma team.

METHODS: At our level 1 academic trauma center, a single scenario of a patient arriving pulseless after a gunshot wound to the chest will be simulated weekly for five months. This study has three outcome measures: (1) Pre- and post-simulation, trauma nursing staff attitudes and perceptions assessed using a 10-item survey adapted from the TeamSTEPPS Teamwork Perceptions and Attitudes Questionnaire. (2) Rating of team performance for non-technical skills using items from TeamSTEPPS Team Performance Observation Tool and Trauma Non-Technical Skills scale and time to key clinical decisions during each simulation event. (3) Using the same methodology, team performance and time in and out of the resuscitation bay will be assessed for our highest-level trauma activations one month before and after the simulation period.

RESULTS: The study is designed to evaluate changes in both perceived and observed nontechnical team behaviors. It will also assess improvements in time metrics for decisions and intervention for key clinical actions and overall trauma resuscitation time.

CONCLUSION: Structured simulation will lead to measurable improvements in trauma team performance and resuscitation efficiency. Despite a large number of individuals involved in trauma resuscitations at our institution, with different schedules, we believe that short, but frequent, and consistent simulation will elevate our team's performance. Findings may support broader implementation of simulation-based education and inform future strategies for standardized trauma team training.

Poster #10

Immersive Cardiac Mastery: Comparing 3D-Printed and Augmented Reality Models to Traditional Imaging in Congenital Heart Disease Education

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INTRODUCTION: Adult congenital heart disease (ACHD) presents complex anatomical challenges that are often difficult to conceptualize using traditional 2D imaging. Surgical trainees report difficulties in interpreting this imaging, which may impact their confidence, preparedness, and patient outcomes. This study evaluates whether 3D-printed and augmented reality (AR) cardiac models improve spatial understanding and educational value in ACHD training compared to conventional imaging.

METHODS: Two structured teaching sessions were conducted with medical trainees at various levels of experience. Life-sized 3D-printed and AR models of complex congenital heart defects were created were generated from CT angiography data using segmentation software. Participants interacted with both the immersive models and standard imaging modalities. Following each session, learners rated the educational value and spatial comprehension of each modality on a 5-point Likert scale. Data were analyzed using the Wilcoxon Signed-Rank Test.

RESULTS: Of 86 participants, 43 (50%) completed post-session surveys. In the first session, 70% of respondents reported an improvement in spatial understanding with the immersive models; in the second session, 99.2% agreed. The average educational value rating was 4.96 for the 3D/AR models compared to 3.60 for traditional imaging. The preference for immersive models was statistically significant ($Z=-5.21$, $p< 0.001$, effect size $r=0.79$).

CONCLUSION: Despite a moderate response rate and variability in participant experience, results suggest that 3D-printed and AR models significantly enhance comprehension of complex congenital disease anatomy. These immersive tools demonstrate potential as valuable adjuncts in cardiovascular surgical education. Future sessions will expand the dataset and contribute to the development of an open-access AR digital library with structured modules, supporting improved training outcomes and patient safety.

Poster #28

Proposal for a Robotic Surgery Entrustable Professional Activities (EPA) Assessment

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INTRODUCTION: In 2023, Entrustable Professional Activities (EPAs) were rolled out by the American Board of Surgery to translate competency-based concepts into practical assessments for surgical training. Robotic surgery is utilized in the treatment of common conditions covered by other EPAs, such as appendicitis, cholecystitis, and ventral and inguinal hernia repair, however there are no robotic-specific EPAs. Though many skills are pertinent to the care of patients and completion of an operation irrespective of operative approach, there are unique and quantifiable skills specific to robotic surgery, such as docking, targeting, developing visual haptics and tissue handling, instrument selection, and patient selection that merit evaluation distinct from a given operation or disease process. As such we present a sample robotic EPA assessment to evaluate resident robotic surgery competency in low acuity cases.

METHODS: An EPA was constructed jointly by an experienced robotic surgeon (KLJ) and general surgery resident (JL) modeled after the existing American Board of Surgeons EPAs. Care was taken to include both skills specific to robotic surgery and generalizable contributory skills necessary for each stage of development.

RESULTS: A robotics EPA was created for low acuity general surgery robotic cases and may be reviewed.

CONCLUSION: As robotic surgery becomes an integral part of surgical residency training, assessment tools must keep pace. Ultimately, EPAs will need to be developed for not only common and simple robotic surgeries, but for complex cases where a more advanced technical skill set is required. This EPA template can be used to evaluate robotic skills in low acuity cases and be used as a foundation for a future complex robotic surgery EPA.

Poster #3

Confidence in Treating Complex Pilonidal Disease: A Needs Assessment

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INTRODUCTION: Pilonidal disease disproportionately impacts the military population, occurring almost nineteen times more often than in the civilian population. Whereas complex pilonidal disease is often treated by a colorectal surgeon in a civilian setting, military patients more commonly see a general surgeon, especially when stationed overseas. This lack of specialization creates problems when a general surgeon is not comfortable treating the disease. Consequently, patients may need to travel far distances to receive treatment, which negatively impacts the military financially and degrades mission readiness. During residency, exposure to complex pilonidal disease treatment can be limited, which may make graduating residents uncomfortable in treating the disease as attendings.

METHODS: An anonymous survey will examine several relevant factors in surgical knowledge about pilonidal disease including individual knowledge about types of flap closures, comfort performing the procedures and demographics. The survey will assess attending requirements for performing complex pilonidal disease closures. If surgeons are not comfortable treating the disease, the survey will inquire about how and where their patients were treated. Additional questions will probe possible solutions that might increase confidence among surgical residents. The survey will be administered across multiple military general surgery residency programs focusing on a 5-point Likert scale.

RESULTS: We hypothesize that general surgery residents have limited exposure to flap closures for pilonidal disease, both in and out of the operating room, impacting their confidence performing the procedure independently. Data analysis will focus on response rates for answers given based on the 5-point Likert scale.

CONCLUSION: The results of the needs assessment will assist in forming a didactic and simulation training to increase resident confidence in performing complex pilonidal disease flap closure. An increase in resident confidence means that military members can be treated by a general surgeon in any location in the world without negatively impacting the military mission.

Poster #31

Correlation Between SimNow Performance, Faculty Ratings, and Trainee Self-Assessment in Simulated-Based Robotic Surgery Training

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INTRODUCTION: Simulation-based robotic surgery training has been incorporated across general surgery and surgical subspecialties. However, there is limited evidence to guide the selection of simulation modality in terms of skill development and trainee perception. We hypothesized that SimNow performance would be correlated with wet lab performance, but that trainees would find wet labs more effective for building confidence.

METHODS: General surgery residents performed two similar training tasks: 1) Running suture closure in an ex-vivo animal tissue model using the DaVinci Xi and 2) SimNow Running Suture module. All residents performed both tasks on the same day and order of the tasks was randomized. De-identified videos of residents' wet lab performance were scored independently by two blinded minimally invasive surgeons using the modified Objective Structured Assessment of Technical Skills (mOSAT) tool. SimNow performance metrics, mOSAT scores, and pre-post survey data were then compared.

RESULTS: Thirty-eight residents (PGY-1 to PGY-5) participated. All evaluation metrics increased by training level, although there was greater discrimination within SimNow performance than mOSAT scores. Residents' self-evaluation scores were correlated with both simulator performance ($p<0.001$) and mOSAT scores ($p=0.05$). However, there was no significant correlation observed between SimNow performance and mOSAT score ($r= -0.28$; $p=0.12$). Residents rated the wet lab as more effective for skill development ($p=0.002$). The order in which the labs were performed did not affect performance or perception.

CONCLUSION: SimNow performance was strongly correlated with self-assessment, but not with faculty assessment of wet lab performance. These simulation modalities may measure different constructs and contribute differently to the development of technical skills for robotic surgery. Further research is needed to evaluate the validity evidence of these simulation-based assessments in robotic surgery training and to determine how to best integrate wet and dry lab simulation to maximize the efficiency and depth of skill acquisition.

Poster #29

Assessment and Evaluation of Knowledge and Confidence After Implementation of Modified ACS/APDS Surgical Skills Simulation Curriculum for Incoming Interns

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INTRODUCTION: Substantial variability in knowledge and skills exists among incoming interns. Program directors and objective assessments consistently report that interns demonstrate uneven preparedness in core clinical and procedural competence. Baseline performance can range widely, but simulation-based assessments and bootcamps allow for individualized training, assessment, and achievement of competency before interns begin providing medical care. We implemented a simulation based surgical skills "boot-camp" curriculum which we hypothesized would improve knowledge of procedural skills, decrease starting variability and ensure basic competence for our incoming interns.

METHODS: The curriculum was based on the ACS/Association of Program Directors in Surgery (APDS) surgical skills curriculum, focusing on highly pertinent technical skills including identification of surgical instruments and interventional drains, placement and management of urinary catheters, nasogastric tubes, central lines, chest tubes, and abdominal entry (basics of laparotomy and laparoscopy). To assess knowledge, we administered a pre and posttest that contained 10 multiple choice questions covering theoretical and practical topics covered during the curriculum. As well as a pre and post self-reported confidence questionnaire wherein participants rated their theoretical, practical and teaching confidence for each procedural skill on a Likert scale from 1 to 5.

RESULTS: Twelve incoming surgical interns (6 General Surgery, 4 Urology, and 2 Plastics) completed the training. Their background skill experience varied based on specialty track; with General Surgery interns having performed more central lines, chest tubes and abdominal entries than the incoming Urology and Plastics interns. There was significant improvement in their knowledge based on pre- and post-test scores (median 70% vs 90%, $p<0.001$). Self-assessed confidence in skills increased as well (median 2.5 vs 3.9, $p<0.001$).

CONCLUSION: Incoming surgical interns have a wide range of basic procedural skill experience, and a modified ACS/APDS surgical skills simulation curriculum can be successfully implemented to increase trainee knowledge and confidence prior to formalized training.

Meet the Authors Poster Session

Program Evaluations

Poster #5

Leveraging Scrum Framework for Innovative Simulation-Based Surgical Education: A Retrospective Methods Study

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INTRODUCTION: Scrum, an agile framework formalized in the mid-1990s, organizes complex product development into short, iterative sprints led by cross-functional teams and widely adopted in software engineering. Simulation development in surgery has typically relied on slow, outsourced workflows. In 2022, our institute embedded a lead software engineer and adopted Scrum to foster continuous, bidirectional collaboration among clinicians, educators, and developers. We describe the structure, processes, and early experiences of this model.

METHODS: We conducted a retrospective qualitative appraisal (2022-2025) of three flagship virtual reality projects: Emergency front of neck access, tube thoracostomy, and anaphylaxis management. Data sources included product and sprint backlogs, burndown charts, sprint retrospectives (38 cycles), and artefact audits. Ongoing data collection includes semi-structured interviews and surveys of surgeons, residents, simulation educators, and the software team. Inductive thematic analysis is applied to artefacts and transcripts to identify facilitators, barriers, and perceived educational impact. Descriptive comparisons are being made with pre-2022 outsourced development practices.

RESULTS: Artefact review shows a consistent two-week sprint cadence, transparent backlog reprioritization, and progressive user story refinement. Early interviews highlight three provisional themes: (1) co-location removes translation gaps between clinical intent and software implementation; (2) rapid sprint reviews enable real-time alignment of technical tasks with educational objectives; (3) shared ownership of deliverables supports iterative innovation, such as immediate incorporation of anatomical feedback into 3D printed prototypes. Quantitative metrics such as time from concept to prototype are being compiled for historical comparison.

CONCLUSION: We will complete interview coding, triangulate survey data, and finalize comparative timeline and cost analyses. Findings will inform a replicable Scrum implementation toolkit defining roles, meeting templates, and sample artefacts for simulation centers. By aligning healthcare educators with agile principles, we aim to shorten innovation cycles, enhance training fidelity, and support more responsive, learner centered surgical education.

Meet the Authors Poster Session

Simulator and Medical Device Development

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #43

The Impact of Video Gaming on Laparoscopic Skill Acquisition Among Pre-Clinical UAG Medical Students

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INTRODUCTION: Laparoscopic surgery requires refined psychomotor skills such as fine motor control, depth perception, and hand-eye coordination. As medical education evolves, identifying early predictors of surgical skill acquisition becomes increasingly important. Video gaming has gained attention as a potential contributor to developing these competencies. Prior studies, including those by Datta et al. (2020) and Rosser et al. (2007), have shown a positive correlation between gaming experience and laparoscopic performance.

METHODS: We conducted a single-center, cross-sectional study among pre-clinical medical students at the Universidad Autónoma de Guadalajara (UAG) School of Medicine. Before performing standardized laparoscopic simulation tasks, participants completed a questionnaire regarding their video gaming habits. Based on responses, students were categorized as "gamers" or "non-gamers." Each participant performed three laparoscopic exercises: peg transfer, bead drop, and precision cutting using a laparoscopic simulation kit. Performance was evaluated by task completion time, number of object drops, and cutting accuracy, following guidelines from Fundamentals of Laparoscopic Surgery (The Goodman Education Center at Stanford). Data were manually collected and analyzed in Microsoft Excel, using descriptive statistics and comparative graphs to identify trends between groups.

RESULTS: Gamers demonstrated slightly longer task completion times compared to non-gamers, but with fewer object drops and better cutting accuracy. This suggests greater control and precision among gamers. In contrast, non-gamers often completed tasks faster but with higher error rates and less consistent performance, especially in fine motor tasks like cutting within designated lines.

CONCLUSION: Students with video gaming experience showed improved precision and fewer errors in laparoscopic simulations, despite taking more time to complete tasks. These results support the idea that gaming may discreetly enhance skills relevant to surgical training. Incorporating gamified tools or simulations in medical curricula could help strengthen psychomotor development during early training, potentially benefiting future surgical performance.

Poster #47

AI-Driven Virtual Reality Simulation for Surgeon-Patient Communication Training in Awake Neurosurgical Procedures

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INTRODUCTION: Awake neurological surgery is performed on conscious patients to reduce postoperative neurological deficits through continuous intraoperative assessment of motor function and verbal responses. Despite the critical role of surgeon-patient communication, structured training for managing patients in acute emotional distress remains limited. We developed an artificial intelligence (AI)-driven virtual reality (VR) simulation platform to provide an immersive environment for practicing critical intraoperative communication with awake patients.

METHODS: The simulation was built in Unity with custom 3D medical models (Blender) and a patient avatar with animations (Mixamo). Interaction modalities included spoken and typed inputs. Spoken input was transcribed locally using Whisper (ggml tiny), and typed input was captured via a Unity UI Toolkit text field with a custom C# handler. Both inputs were processed by a compact large language model (LLaMA 3.2 1B) through LLMUnity to generate patient dialogue. A predefined patient role description and cumulative conversation history preserved character fidelity and coherence while constraining outputs to remain concise and emotionally congruent. A dynamic emotional state model governed both verbal and non verbal behaviors, triggering context specific animations (e.g., shrugging, nodding). Patient dialogue was vocalized using Jets text to speech integrated through Unity Sentis.

RESULTS: Combining a persistent patient role description with conversation history eliminated role switching and preserved contextual accuracy across multi turn interactions. The emotional state model linked to animations increased conversational variability, reduced repetition, and enhanced behavioral realism, resulting in more authentic awake surgery simulation.

CONCLUSION: The simulation will be evaluated in a mixed methods study comparing traditional communication training with AI-driven VR simulation. The evaluation will encompass blinded communication competency ratings, self efficacy scores, usability measures, and qualitative assessments of realism, emotional preparedness, and training value. Future work will include custom animation and character development with domain specific language model tuning to further improve simulation fidelity.

Poster #45

Patient Specific 3D Printed Simulation Models for Vascular Surgery Education

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INTRODUCTION: The use of 3D printing patient specific models in surgical education is gaining interest. These models can replicate specific patient scenarios to train surgical residents and assist with open and endovascular case planning. However, there is still no standardized process for the production of these models or their efficacy in vascular training. Our aim of this study was to develop a process to develop 3D printed patient models to practice open vascular surgical procedures and validate them as effective assessment models for residents and other trainees.

METHODS: Patients who previously underwent vascular surgical intervention were selected from a list of recent cases. Their CT Angiograms were uploaded to a DICOM imaging software (i.e., Osirix, Los Angeles, CA)., where a 3D surface model was obtained and 3D printed using a commercially available fused deposition modeling (FDM) printer (i.e., Bambulab, Shenzhen, China). The models were able to produce an anatomically accurate model including vessel size, branch points, depth of structures, and anatomical features to allow completion of each step of the procedure.

RESULTS: The next step in research will be asking surgical trainees to perform an aorto-bifemoral bypass and femoral endarterectomy on the open models. Residents then will be asked to complete a survey of the models to offer feedback on the models' fidelity and perceived educational benefit of the model on a 5-point Likert scale. The trainees' performance for each scenario will be evaluated using a Reznick scale to provide standardized feedback to residents and specific areas for improvement and compared to expert level vascular surgeons.

CONCLUSION: The anticipated conclusion is that these models offered educational benefit to residents.

Poster #4

Evaluating the Validity of a Virtual Reality Simulation for Emergency Front of Neck Training

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INTRODUCTION: Emergency front of neck access (eFONA) is a rare but high-risk procedure, prone to rapid skill decay. Currently, no validated virtual reality (VR) training module exists for eFONA. This study assesses the validity evidence for a novel VR eFONA training module using novice and expert participants.

METHODS: Forty surgical interns(novices) and 25 experts from anesthesiology, emergency medicine, otolaryngology and trauma surgery were voluntarily recruited to participate. Novice completed the VR eFONA module, generating initial validation data. Experts are currently doing the same. Validation measures include subjective surveys assessing face and content validity and objective performance metrics to evaluate construct validity. Additionally, experts completed construct validity assessments to ensure accurate representation of procedural knowledge and steps within the module.

RESULTS: Novice data suggest strong face and content validity, with high levels of realism and usability reported. Initial performance metrics from novices indicate promising procedural familiarity and cognitive load management when using the VR module. Preliminary expert feedback supports the VR simulation's authenticity and usefulness for procedural practice.

CONCLUSION: Ongoing expert evaluations aim to establish construct validity. Future steps include comparative analyses with traditional task trainers and longitudinal skill retention assessments at three-month intervals. User feedback and performance analytics will inform iterative improvements to enhance realism and instructional value. This validation process aims to position this VR eFONA module as the first, high-impact training tool to improve clinical preparedness and patient safety.

Poster #44

How and Why "Fidelity" is Applied in Simulation-Based Learning: A Critical Narrative Review and Roadmap for Future Scholarship and Practice

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INTRODUCTION: Over a decade ago, simulation scholars were asked to reconsider how they used fidelity to describe their simulation-based activities. Concerns raised at the time included inconsistency in definitions, an overemphasis on physical resemblance, a lack of empirical data demonstrating a relationship between greater fidelity and greater learning, and the absence of research clarifying why fidelity may affect learning. How scholars have responded to these concerns remains unclear. A synthesis of research focused on the relationship between fidelity and learning may offer novel insights about promising mechanisms through which fidelity affects learning (e.g., engagement), and methods for studying this relationship.

METHODS: We conducted a critical narrative review to investigate how and why researchers applied fidelity when designing simulation-based learning. Using a systematic, search we identified 12,170 articles and selected 104 for data extraction and critical interpretive analysis.

RESULTS: Most studies (83/104) proposed mechanisms linking fidelity to learning, which we organized into two categories with subcategories: impact on learner's processes (engagement, cognitive load) and designer-expertise alignment (scenario complexity, functional task alignment, expert-processing scaffolding). Most quantitative studies proposed a mechanism (57/68) and assessed a learning outcome (54/68). Fewer measured the mechanism (18/68) or both the mechanism and a learning outcome (14/68), and only four analyzed the relationship between them.

CONCLUSION: Our review highlights the limited but encouraging developments in the examination of simulation fidelity. We offer a roadmap to guide future research and practice that includes promising mechanisms and methods that can further advance simulation science. For scholars studying fidelity, we recommend clearly articulating the expected influence of fidelity on a specific learning outcome (mechanism), how this is achieved (manipulation), and to assess and analyze learning mechanisms and outcomes. For educators, rather than recreating the experiences of experts, we recommend creating experiences that scaffold learners' ability to engage in expert-processing.

Poster #42

Development and Assessment of a Low-Fidelity Aortic Cross-Clamping Simulation Model

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INTRODUCTION: Aortic cross-clamping is a technically demanding procedure performed in expedited trauma, transplant or vascular situations, usually by highly trained surgical fellows or staff surgeons, often precluding resident participation. In an emergency, without attending presence, a resident surgeon may encounter a situation requiring aortic clamping. To address this gap, we developed a mini-curriculum and 3-D hands-on simulation model representing aortic cross-clamping. We hypothesize that this simulation session will improve resident confidence and aortic clamping efficiency.

METHODS: Participants, ranging from medical students to fourth-year residents, attended a simulation session including an anatomical overview and procedural walkthroughs for both supra-celiac and infra-renal aortic clamping. Participants completed a pre-survey, engaged in hands-on simulation practice, then completed a correlated post-survey. Performance metrics included self-reported confidence, procedural knowledge, and recorded clamping times.

RESULTS: Five participants completed matched pre- and post-surveys. Average clamping times decreased from 3.38 minutes to 2.0 minutes, a 41% reduction. All participants reported increased confidence in independently performing and assisting with clamping and agreed the model improved muscle memory and procedural confidence. The model's tactile feedback and intuitive use were consistently rated its strongest features. Participants emphasized the value of hands-on simulation in reinforcing anatomical knowledge and boosting skill acquisition. Participants ranked simulation as the most valuable learning method compared to other formats.

CONCLUSION: We have debuted an aortic cross clamp model for learners to practice supraceliac and infrarenal aortic cross clamp in a low stress environment. Preliminary results of this model demonstrate strong potential in enhancing surgical confidence, efficiency, and understanding. We anticipate expanding access to include chiefs and surgical fellows and expect 5-10 new participants per month. Further iterations will integrate feedback to improve realism and interactivity, with long-term goals of curriculum integration and all surgical residents being able to teach back the steps of aortic cross clamp.

Poster #40

Development of an Aortic Valve Repair Simulator with Functional Verification Using 3D Reconstruction from Transesophageal Echocardiography Images (SIREVA-3D)

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INTRODUCTION: Aortic valve repair is a technically demanding procedure with a steep learning curve, often limited by the lack of affordable, high-fidelity simulators. This project aims to develop a low-cost physical simulator for aortic valve repair using 3D reconstructions derived from transesophageal echocardiography (TEE), enabling functional validation of repair techniques and addressing training gaps in resource-limited settings.

METHODS: The study comprises five phases: (1) acquisition and anonymization of TEE datasets from patients with severe aortic insufficiency, ensuring a range of valvular morphologies; (2) creation of a 3D digital reconstruction platform using segmentation software, generating anatomically accurate models; (3) 3D printing of the aortic valve using biomimetic materials replicating human tissue properties; (4) integration of models into a modular simulation environment with a flow loop system and sensors for real-time performance feedback; (5) evaluation by cardiovascular surgery trainees to assess realism, anatomical fidelity, functional verification and educational utility.

RESULTS: As this project is currently under development, preliminary findings are not yet available. However, it is anticipated that the integration of TEE-derived 3D models and biomechanical replication through advanced printing technologies will result in a realistic and effective simulation platform. Planned simulations and evaluations are expected to provide essential data regarding anatomical accuracy, usability, and educational value. The upcoming phases will focus on the construction of initial prototypes and their validation in educational settings. Metrics to be assessed include repair quality (via simulated flow parameters), operative time, error rates, and user feedback by a third party. These findings will guide refinements in design and support the dissemination of the simulator as a practical training tool.

CONCLUSION: The development of an anatomically precise, low-cost aortic valve repair simulator is both feasible and impactful for surgical education. Expected outcomes include enhanced surgical training and improved patient safety through better procedural preparedness in valve repair.

Poster #46

Simulation-Based Emergency Scenarios to Enhance Surgical Decision-Making in Medical Students

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INTRODUCTION: Simulation-based education is an effective tool for developing surgical skills and clinical reasoning in medical training. This student-led initiative aimed to train early emergency assessment and management through realistic clinical simulation scenarios.

METHODS: The project was carried out by the General Surgery Interest Group at Estácio de Sá University, using the institution's Skills and Simulation Laboratory. Throughout the academic term, students practiced key procedures (such as chest drainage, peripheral and central venous access, orotracheal intubation, paracentesis, cricothyroidotomy, surgical gowning, suturing, and FAST/e-FAST ultrasound) on mannequins and task trainers. At the end of the term, students were divided into small groups and engaged in emergency clinical simulations. Each case presented a critically ill patient scenario, such as suspected pneumothorax, need for airway management, or intra-abdominal bleeding. Teams had 10 minutes to perform the primary evaluation using the XABCDE protocol, determine priorities, and carry out appropriate procedures. Performance was assessed using a structured checklist. After each simulation, teams received immediate feedback and a practical review of key points.

RESULTS: Students showed increased engagement, improved prioritization of emergency interventions, and stronger teamwork. Faculty observed enhanced integration between theoretical knowledge and procedural skills. Checklist scores reflected appropriate decision-making under simulated pressure.

CONCLUSION: The group plan to expand the activity to additional student cohorts and implement formal pre- and post-simulation assessments. The goal is to measure the impact of the simulation on clinical preparedness and long-term retention of emergency management skills.

Poster #41

Development of a Simulation-Based Educational Strategy for Open Inguinal Herniorrhaphy (Lichtenstein Technique) Using a Low-Cost, Non-Biological Simulator

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INTRODUCTION: More than 20 million herniorrhaphies are performed annually, and adequate surgical training is fundamental to minimizing procedure related complications. This underlines the role of simulation programs; however, biological models and high-fidelity simulators are costly and limited. We aimed to design a low-cost simulation model to enhance the learning of the Lichtenstein technique.

METHODS: A low-cost inguinal canal model was built using balloons, vinyl acetate foam, modeling clay, and inexpensive materials. The educational strategy includes prior individual study of relevant anatomy and the Lichtenstein technique by the resident. The practical session involves a diagnostic assessment, identification of materials and instruments by the trainee, and supervised execution of the procedure on the model, followed by a checklist-based assessment and performance feedback. Finally, the trainee completes a survey and provides feedback to the instructor. A pilot implementation of this simulation-based strategy was carried out with expert abdominal wall surgery.

RESULTS: The total cost of the simulator was $16 and required 5 hours to assemble. A step-by-step manual was created to ensure model's reproducibility. This strategy led to the development of evaluation tools, an instructional video, and learning guidelines. Based on the completion of a satisfaction survey, the simulator's realism was rated 4/5. Nevertheless, the surgeon highlighted that the model recreated all key anatomical structures and enabled precise execution of the technique, the simulation room closely resembled an operating room, and the use of skin like material allowed for highly realistic suturing. The support provided by the supervisors was also positively noted.

CONCLUSION: Additional models are being built, and with the support of our hospital's simulation center, the training strategy will be implemented in the surgical residency program starting with second year students. The results of the trainees' and supervisors' assessments and satisfaction surveys will be published.

Poster #1

Development of a Small Bowel Simulator for Diagnostic Laparoscopy

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INTRODUCTION: For patients with small bowel obstruction, those undergoing diagnostic laparoscopy have faster discharge from the hospital, less pain, and lower risk of short-term complications than those undergoing exploratory laparotomy.1-3 However, the procedure can be challenging, especially in the presence of suboptimal port placement, small bowel dilation, and an obstruction obscured by other anatomy.4 Many surgical trainees have few opportunities to master these skills, and current simulators do not train the prerequisite skills. Our objective was to develop a simulator that trains residents in prerequisite skills for diagnostic laparoscopy, with the ultimate goal decreasing the risk of enterotomy and conversion to open laparotomy.

METHODS: We constructed a model of small bowel affixed to a mesentery through an iterative process to replicate appearance and tactile qualities of those encountered in the operating room. A dome was constructed to simulate the size and shape of an insufflated abdomen, with ability to accommodate numerous potential port placements. Working instruments included a simulated laparoscopic camera with angled lens, described previously,5 as well as standard laparoscopic graspers. Junior surgical residents and interns are being recruited for participation from an academic medical center with support of a minimally invasive surgery-trained faculty.

RESULTS: The small bowel model mimicked important qualities, including weight, size, dynamic shape, and elasticity. The length of the bowel, mesentery, and root of the mesentery were measured to approximate that of an average person. We developed a curriculum of four tasks designed to translate to surgical proficiency, with data collection ongoing. This selection, together with their rationale. All tasks will be timed and proficiency values determined.

CONCLUSION: Each task will be piloted and refined with the intent to make them as transferrable to the operation room as possible. We will determine expert, intermediate, novice cohorts and test reliability and validity.

Meet the Authors Poster Session

Teaching Methods

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #50

Robotic Kidney Transplant Simulation: A Robust Training Exercise

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INTRODUCTION: With the advent of robotic and minimally invasive surgery, we are constantly seeing new applications of the technology, and the reach is extending through many specialties. Robotics, as we know it today, started in the early 2000s and just as recently as November 2023, was used for the first time in robotic kidney transplantation. Residents nationwide are going through training and there is still no universal robotics curriculum. This is in large part due to the discrepancy in availability and use of the technology across institutions. Robotic surgery is becoming the mainstay of elective surgical cases and training in this modality is imperative for new surgeons. The robotic kidney transplant is a fertile ground for this training

METHODS: The robotic kidney simulation exercise starts by constructing a kidney using a clay mold and attaching three expired GORE-TEX graft material, colored red, blue, and white, to represent the renal vessels and ureter. Similarly colored GORE-TEX grafts are fastened to a foam board to represent the native iliac vessels, and a tennis ball with a small hole is cut to represent the bladder. A double J stent is also placed in the field. Three bulldog clamps are introduced to the foam padding and the pelvitrainer box is docked with the training instruments.

RESULTS: This was performed as a simulation lab for residents who universally gave positive feedback on the utility of the exercise.

CONCLUSION: This simulation exercise utilizes live instruments and incorporates many modalities of training that will better prepare residents for their inevitable future using the robotic platform.

Poster #49

Want to Play a Game? Gamifying Surgical Simulation: An Escape Room Model for Team-Based Crisis Management

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INTRODUCTION: Surgical didactics has transitioned to a more simulation and case-based focus; gamification allows learners to practice collaboration and active participation in a fun, competitive setting. In a procedure-dominated field, success in general surgery relies on performing in a stressful situation. Gamification, such as escape room simulations, can recreate a stressful environment and utilize the competitive nature of surgical residents. The purpose of this study was to determine the impact of an escape room style activity on the confidence of general surgery residents and medical students in five defined categories.

METHODS: An escape room simulation was created that included 12 stations, including procedural and knowledge-based objectives. Medical students through PGY4 classes were randomly placed into one of three groups to complete an escape room challenge. An anonymous pre-and post-experience survey was given focusing on five main categories: clinical knowledge, procedural skills, teamwork, communication, and crisis management. A T-test was used to determine statistical significance, with $P < 0.05$ deemed significant.

RESULTS: Procedural skills scores improved significantly following the simulation ($p<0.001$). Teamwork scores ($p=0.010$), communication ($p=0.022$), and confidence in crisis management ($p<0.001$) all increased significantly from pre- to post-simulation. Participants showed a moderate increase in confidence in clinical knowledge ($p=0.105$), although the result was not statistically significant. Both procedural skills and crisis management showed a very large effect size ($d=1.46$).

CONCLUSION: Gamification-based learning can be an innovative tool for learning during general surgery residency. An escape room style simulation was adopted to implement development in five main categories necessary for success in a procedural-based residency. Our data suggest strong practical value in using escape-room style simulations to teach hands-on procedural skills and offering essential practice in managing high-stress scenarios. Therefore, escape room style simulation may increase confidence of learning in postgraduate medical education.

Poster #51

Effectiveness of a Laparoscopic Simulation Program in Enhancing Technical Skills in Surgical Residents

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INTRODUCTION: Surgical simulation has been widely demonstrated to enhance technical skills and accelerate the learning curve among surgical residents. In this study, we aimed to evaluate the progression of laparoscopic skills over time through structured simulation-based training.

METHODS: Based on the laparoscopic simulation program: "Care for The Box" developed at our institution in 2015, we evaluated first- and second-year general surgery residents with a baseline measurement and after ten training sessions. Laparoscopic skills evaluated were: Object transfer, precision movement, hand-eye coordination, cutting, and intracorporeal suture.

RESULTS: A total of 11 participants were included. After the simulation program, participants demonstrated significant improvements across all assessed domains:

- The mean number of objects transferred increased from 23.5 ± 11.8 to 33.9 ± 5.5 (p=0.019).
- Precision movements improved from a mean of 2.0 ± 2.9 to 13.6 ± 3.9 (p<0.001).
- Hand-eye coordination tasks completed increased from a mean of 3.7 ± 1.2 to 4.9 ± 0.3 (p=0.005).
- Laparoscopic cutting performance showed a marked improvement, with the percentage of completed cut rising from 68.2% ± 22.8% to 96.0% ± 9.2% (p=0.005).
- Suturing skills also improved. Prior to simulation, only 3 participants (27.3%) were able to complete a laparoscopic knot within a five-minute time frame. After simulation, the median number of knots completed was 1 (IQR: 0-2), with 3 participants unable to complete any knots, 5 completing one knot, and 3 completing two knots (p=0.023).

CONCLUSION: Simulation-based training significantly improves laparoscopic skills in surgical residents. Further research is needed to prove long-term benefit and its translation in the operating room.

Poster #8

From Page to Podcast: Using AI to Convert Surgical Educational Content into Audio Learning Tools

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INTRODUCTION: Surgical trainees often struggle to engage with dense written material amid demanding clinical schedules. While digital text resources are abundant, many learners benefit from auditory reinforcement and mobile access. This study will explore the use of generative artificial intelligence (AI) to convert written surgical education content into high-quality, natural-sounding podcasts, offering a scalable and accessible learning format.

METHODS: A curated selection of surgical education documents—including guidelines, operative summaries, and case-based reviews—will be processed using AI text-to-speech tools, such as neural TTS engines. Audio content will be generated in a modular, podcast-style format (5-10 minutes per episode), incorporating narration, summaries, and quiz-style recaps. A pilot group of surgical residents will be enrolled to test content usability, knowledge retention, and learner satisfaction. Pre- and post-listening quizzes will assess immediate educational value.

RESULTS: We anticipate recruiting 15-20 junior trainees for the pilot. Participants will listen to a set of AI-generated episodes over a two-week period. Surveys and quizzes will evaluate engagement, retention, and preference compared to traditional reading formats. It is expected that most trainees will report higher convenience, with no significant compromise in knowledge acquisition. Usability feedback will inform revisions to tone, pacing, and content segmentation.

CONCLUSION: This study will assess the feasibility of using AI to transform surgical documents into portable, personalized audio learning tools. By leveraging podcast-style formats, this approach could democratize access to surgical knowledge, reduce screen fatigue, and enhance retention through multimodal learning. Future directions will explore content personalization and integration into formal curricula or just-in-time learning platforms.

Meet the Authors Poster Session

Quality Improvement

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #38

Enhancing Palliative Care Communication in Trauma and Surgical ICU Settings: A Systematic Review

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INTRODUCTION: High-quality palliative care in trauma intensive care units is crucial but often hindered by prognostic uncertainty, time constraints, limited provider training, and cultural differences between acute care surgery and palliative care services. In response, the American College of Surgeons Committee on Trauma recommends early goals-of-care discussions for high-risk trauma patients. However, little is known about how these strategies are implemented in practice. We aimed to identify communication strategies in trauma critical care and evaluate their impact on patient and family-centered care.

METHODS: We conducted a literature search of PubMed, Embase, CINAHL, and Web of Science for studies published through October 2024. Inclusion criteria focused on adult trauma or surgical ICU patients and studies addressing palliative care, communication strategies, or goals-of-care discussions. Data from eligible studies were extracted and synthesized qualitatively, with themes identified using grounded theory analysis.

RESULTS: We identified 39 eligible studies. Thematic analysis identified five key themes: communication frameworks, interdisciplinary approaches, communication barriers, provider education, and impact on patient and family satisfaction. Communication frameworks including structured family meetings, use of communication checklists, and decision aids such as the Best Case/Worst Case Scenario tool improved shared decision-making. Several studies emphasized the importance of shared responsibility for patients between palliative care specialists and trauma providers.

CONCLUSION: Evidence suggests that structured communication frameworks and early interdisciplinary involvement improve family satisfaction and patient-centered outcomes. Despite progress, standardized approaches to palliative communication in trauma ICU settings remain a challenge. Future efforts should focus on targeted education and standardized protocols.

Poster #39

A Standardized Burn Resuscitation Checklist to Improve Fluid Management and Evidence Quality: A Tool Informed by Meta-Analysis

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INTRODUCTION: Fluid resuscitation remains the cornerstone of early management in burns >15% TBSA, yet over-resuscitation (fluid creep) is common and associated with adverse outcomes such as abdominal compartment syndrome (ACS), ARDS, and acute kidney injury (AKI). Our recent systematic review and meta-analysis comparing Parkland (4 mL/kg/%) vs. Modified Brooke (2 mL/kg/%) formulas revealed a consistent lack of data standardization across studies, including inconsistencies in outcome definitions, timing, and missing core metrics. We aimed to develop a dual-purpose checklist for burn fluid resuscitation: (1) improving bedside fluid titration and early complication detection, and (2) enabling standardized data collection for future research comparability.

METHODS: We conducted a systematic review and meta-analysis of five studies (n=429 patients) comparing 4 mL/kg/%TBSA and 2 mL/kg/%TBSA protocols. Mortality, AKI, hospital and ICU length of stay, ventilator-free days (VFD), and ACS were examined. Across studies, we found wide variation in definitions (e.g., VFD vs. ventilator days), inconsistent timing of creatinine measurement, and incomplete reporting of albumin use and urine output. These discrepancies reduced statistical power and forced exclusion of data.

RESULTS: We created a standardized paper-based resuscitation checklist, structured into time blocks (i.e., 0h, 4h, 8h, 24h), integrating hourly urine output monitoring, MAP assessment, and early overload signs. A reporting module tracks 24h fluid totals, creatinine (baseline/24h), albumin use, and ventilator support format. This tool is usable at the bedside and designed to align with CONSORT and PRISMA reporting standards. Its purpose is to both reduce fluid-related complications and increase quality of future RCT.

CONCLUSION: Our tool addresses a dual gap in burn care: clinical variability and poor research standardization. Informed by systematic review findings, it enables safer, more individualized fluid therapy and ensures structured, reproducible data collection to support future trials and registries. Implementing this approach may reduce fluid creep while enhancing burn resuscitation research.

Poster #6

Team Training Simulation Improves Emergency Medical Services and Paramedic Confidence in Managing Patients Injured in Motor Vehicle Collisions

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INTRODUCTION: Emergency Medical Services (EMS) and paramedics train rigorously to prepare for the emergencies to which they respond. However, this training is often siloed even within a given department with "fire training" and "medic training" occurring at different times. On any given emergency, the department is divided into several different teams based on a given day's assignment: medic crew, engine crew, ladder crew, incident command. Here, we evaluated a simulation-based education program: a single EMS department was required to respond to a motor vehicle collision and collaborate in teams to effectively medically manage the victim while also performing rescue and extrication.

METHODS: A convenience sample of a single EMS department was selected. Three consecutive days of education were conducted so that all members of the department could participate on their duty day. Three hours of education was divided into two 90-minute simulations, so that each learner could participate in both the medical role and rescue role. The simulations involved placing a high-fidelity mannequin into a vehicle and crushing the vehicle to simulate a collision. The simulation was followed by a structured debrief. The education was evaluated using our standard Return on Investment in Learning. Additional follow-up with the department at 6 months will be performed to evaluate for application of knowledge.

RESULTS: A total of 36 learners participated. One hundred percent of learners agreed or strongly agreed with the statements "this content was relevant to my work," "this education provided me with new knowledge or clarified existing knowledge," and "I intend to use what I learned from this education."

CONCLUSION: Even within a homogenous group of learners, education can become siloed resulting in difficulty with communication, role clarity, and leadership. This education highlights how simulation can be utilized to improve teamwork and break down educational silos.

Poster #36

Trends in Simulation-Based Activities at a Comprehensive Education Institute in an Academic Medical Institution

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INTRODUCTION: Simulation plays a vital role in advancing education by providing deliberate practice, enhancing procedural competence, and fostering team-based performance in controlled, safe environments. An American College of Surgeons Accredited Education Institutes (ACS-AEIs) comprehensive accredited institute that is geographically located in the Midwestern United States serves as a hub for immersive, interprofessional simulation-based learning. However, limited published data exist on how comprehensive simulation centers systematically scale and deliver simulation activities across specialties and training levels. The aim is to analyze trends in simulation-based activities at an ACS-AEI comprehensive accredited simulation center embedded within an academic medical institution. Specifically, we examined how the comprehensive simulation program has evolved over time to meet the needs of a diverse learner population.

METHODS: Using a convergent mixed methods design, we analyzed simulation-based learning activities conducted at a comprehensive simulation center between 2021 and 2025. Internal tracking systems captured learner type, participating departments, simulation modality, and education domain (cognitive, psychomotor, affective, and team training). Descriptive statistics summarized utilization patterns and content analysis of documents (e.g., curricula, departmental websites, and meeting notes) identified themes related to curricular integration and institutional priorities.

RESULTS: Approximately 250 unique courses were delivered: 44% emphasized psychomotor skills (e.g., procedural skills), 41% cognitive learning, 11% team training, and 3% affective learning. Findings are integrated using a joint display to triangulate results and draw inferences across data types. Results suggest broad institutional integration of simulation aligned with ACS-AEI standards and a commitment to innovation in surgical simulation. This model demonstrates sustainable growth and cross-departmental engagement, supporting prior research recommending strategic alignment of simulation with institutional learning goals.

CONCLUSION: This study contributes valuable insights for AEIs seeking to benchmark utilization, optimize simulation curricula, and align activity planning with national standards. Future directions include aligning competency domains with educational outcomes.

Poster #37

When the Rare Becomes Real: Preparing Ambulatory Surgery Centers for Intra-Operative Catastrophes

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INTRODUCTION: Ambulatory Surgical Centers (ASCs) currently focus on training for common emergencies like anaphylaxis or cardiac events, but they critically lack a specific, multifaceted plan for catastrophic intra-operative events such as massive hemorrhage in an under-resourced care environment. While extremely rare, these catastrophic events require seamless coordination of the healthcare system to quickly transport a critically ill patient without definitive hemorrhage control. This quality project addresses this critical gap by developing a novel, multidisciplinary pathway to enhance preparedness for such high-stakes events.

METHODS: Our work-in-progress involves developing an intra-operative catastrophe pathway for our ASC, specifically for massive hemorrhage requiring emergent inter-facility transfer. The pathway includes rapid activation and defined roles across all involved sectors: ASC team initiates the internal alert, attempts initial stabilization, and notifies the Regional Operations Center (ROC). ROC coordinates communication between the ASC and receiving facility, activating transport and surgical teams. Prehospital providers, including both hospital-based critical care transport and local EMS, are mobilized for timely patient transfer. Receiving Emergency Department is alerted through secure messaging to prepare the resuscitation bay. Tertiary care teams, including Acute Care Surgery, Anesthesia, Interventional Radiology, and OR staff, prepare to receive the patient directly in the ED. We hypothesize that post-implementation, ASC staff will self-report increased preparedness for intra-operative emergencies, measured by pre/post simulation surveys.

RESULTS: A key objective is securing comprehensive multidisciplinary buy-in and active engagement from all involved departments and external agencies. This crucial collaboration is directly shaping the pathway's design, identifying and addressing existing communication gaps and logistical bottlenecks, vital for effective cross-institutional coordination.

CONCLUSION: Next steps include high-fidelity simulation training to test the pathway with all stakeholders. Surveys and debriefings will guide iterative refinement. This project aims to offer a replicable model to improve ASC patient safety in high-acuity, low-frequency events.

Meet the Authors Poster Session

Interprofessional Education

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #26

Exploring the Role of Simulation-Based Surgical Education in Preclinical Medical Training

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INTRODUCTION: In preclinical medical education, students interested in surgery often lack exposure to the surgical environment. Early, simulation-based education improves understanding of interdisciplinary teamwork, enhances surgical skills, and boosts confidence while offering potential for comprehensive faculty feedback. While simulation-based education improves safety and collaboration, more research is needed to assess the impact during pre-clinical medical training.

METHODS: On February 8, 2025, a surgical-simulation educational-event was held at Miami Valley Hospital hosting 80 students (17 active participants and 63 observers) from various backgrounds including undergraduate, medical, physician assistant, nursing, and surgical technologist programs. Participants performed simulated cadaveric procedures, while observers rotated through six educational stations. The event emphasized hands-on learning, interdisciplinary teamwork, and operating room (OR) exposure. Surveys were distributed before and after the event gathering both quantitative and qualitative feedback from attendees.

RESULTS: Students showed significant improvements in awareness of surgical career paths ($p<0.001$), understanding of OR roles ($p=0.004$), and teamwork in the OR ($p=0.001$). Confidence in clinical preparedness also increased ($p=0.019$). Post-event, 96% reported gaining new surgical insights and practical skills; 100% felt the event reduced educational barriers. While 71% felt they had sufficient prior OR access, 57% reported it as a limitation in their education. Open-ended responses highlighted hands-on learning and skill-building, OR exposure, leadership and decision-making, humanization of medicine, teamwork and collaboration, and networking and mentorship.

CONCLUSION: Early simulation-based surgical exposure may positively influence career decision-making, boost student confidence, and reduce barriers to OR access in preclinical medical education. This interdisciplinary initiative emphasized the importance of teamwork, communication, and surgical-skill development across diverse fields in healthcare. Feedback revealed strong educational value, emphasizing simulation's role in preparing preclinical students for clinical environments. Future endeavors may benefit from standardized assessments from faculty and enhanced student autonomy. Expanding programs could foster early interest in surgical careers and strengthen interprofessional collaboration.

Poster #25

The Sequential Use of Cadaveric Material for Various Surgical Specialty Trainees

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INTRODUCTION: Cadaver material has been extensively used throughout the history of surgical training. However, the high costs and various coordination challenges associated with cadavers render this option impractical for many surgical residency programs, even within the same institution. To maximize the use of cadaveric material, our institution implemented a sequential use of cadaveric material by Vascular Surgery and Plastic Surgery residency trainees.

METHODS: Anonymous paper questionnaires were distributed to Vascular and Plastic Surgery residents after they completed a cadaver session. We collected data on demographics, program details, and the perceived quality and feasibility of the new session format.

RESULTS: Twelve out the thirteen (92.3%) residents who participated in the sequential cadaver sessions completed the questionnaires. 5 (42%) were Vascular Surgery residents, 7 (58%) - Plastic Surgery trainees. 33.3% were females; mean age 31 (SD=2.8). Eleven participants (91.7%) were completely satisfied with the quality of the cadaver material. No decline in the quality of the cadaver material was reported; three residents (25%) observed an improvement in the cadaver material compared to previous cadaver simulation sessions. None of the participants reported that the sequential use of cadaveric material negatively impacted the simulation session. Severn (58.3%) of participants would prefer to continue sharing cadaver material with other training programs in the future, four (33.3%) did not have a strong opinion about this, and one (9.7%) trainee would prefer not to share cadaver material. Regarding cost efficient, the sequential utilization of cadaveric material facilitated conducting cadaver sessions with two residency programs, utilizing 50% of the typically employed cadaver material and thereby proportionally reducing costs.

CONCLUSION: The sequential use of cadaveric material did not compromise the quality of the simulation session and was well received by the participating residents, while also helping to reduce the cost of the training session.

Poster #23

Stop the Bleed Training: Improving Hemorrhage Control Skills and Highlighting the Need for Global Integration in Medical Education in Colombia

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INTRODUCTION: The Stop the Bleed (STB) Campaign is an international initiative aimed at teaching individuals on how to control life-threatening hemorrhage. This study evaluated the effectiveness of a STB workshop delivered to 917 undergraduate medical students at various universities in Colombia. The primary objective was to train students in essential hemorrhage control techniques to be employed prior to the arrival of professional medical care.

METHODS: A two-hour workshop was conducted, incorporating both theoretical instruction and hands-on training in three hemorrhage control techniques: direct pressure, tourniquet application, and management of bleeding in anatomically complex regions. A pre-workshop survey assessed prior knowledge of STB and tourniquet use. The workshop's effectiveness was implicitly assessed by comparing pre- and post-workshop performance.

RESULTS: Of the 917 participating students, the majority 815 (88.9%) were in V-XII medical years, corresponding to clinical rotations with increased patient interaction in hospital settings. The pre-workshop survey revealed that 773 (84.3%) students were aware of the STB program, and 627 (68.4%) acknowledged familiarity with tourniquets; However, only 108 (15.9%) claimed proficiency in their correct application. Following the workshop, 99.8% reported confidence in applying hemorrhage control techniques, indicating a significant increase in perceived competence.

CONCLUSION: The Stop the Bleed workshop was successfully implemented among a large cohort of Colombian medical students. Although a substantial number reported prior theoretical knowledge, a significant proportion demonstrated the need for practical, hands-on training in the correct application of tourniquets and other hemorrhage control techniques. The workshop significantly enhanced students' technical skills in managing life-threatening bleeding. Notably, a considerable knowledge gap in essential hemorrhage control measures was identified even among students in advanced clinical years. These findings strongly support the mandatory integration of STB training into undergraduate medical curricula, both locally and globally, to enhance the preparedness of future healthcare providers in managing traumatic emergencies.

Poster #27

Development and Pilot Implementation of an In-Situ, Interprofessional Simulation for Airway Emergency

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INTRODUCTION: Interprofessional simulation offers an opportunity for improving teamwork and communication within medical teams. In-situ simulation increases realism within a safe educational environment. To improve operating room team dynamics and event-specific preparedness within our institution, we developed and implemented an in-situ simulation for interprofessional surgical teams using a simulated airway emergency and assessed participants' perceptions of its value.

METHODS: Our team of nurse educators and surgical and anesthesia residents and faculty designed an interprofessional simulation within an operating room focused on an airway emergency, a high-acuity, low-frequency event, and implemented it monthly. Simulation participants included surgical residents; anesthesia residents, attendings, and certified registered nurse anesthetists; registered nurses; and surgical scrub technicians. The simulation was designed to last 10-15 minutes with progression through airway management to ultimately result in placement of a surgical airway on a mannequin model. Post-simulation survey, teaching, and debriefing were designed to assess learner outcomes.

RESULTS: From December 2024 to June 2025, the simulation exercise was performed six times and included 45 total participants. A surgical airway was achieved during all simulation exercises. Of 31 respondents, 26/31 (84%) rated the training as excellent and 5/31 (16%) rated the training as very good. Respondents also rated the session as realistic (24/31 strongly agree) and clinically applicable (30/31 strongly agree). Themes from simulation debriefing and qualitative feedback included simulation realism, facilitation of enhanced teamwork and communication, and improved emergency preparedness. Longitudinal follow-up included a participant reporting increased confidence and knowledge in facilitating a positive patient outcome during an actual airway emergency.

CONCLUSION: We developed an in-situ, interprofessional simulation with goals of improving team dynamics, communication, and event-specific knowledge and skill. The simulation has been implemented successfully with positive participant feedback and has been anecdotally shown to positively impact clinical care.

Poster #9

Empowering Surgical Trainees to Build AI-Powered Simulation Apps: A Novel Approach to Skill Development

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INTRODUCTION: Simulation will continue to play a central role in surgical training, but many existing platforms remain costly, rigid, or poorly adapted to local clinical contexts. With advances in artificial intelligence (AI), there will be new opportunities for trainees to develop their own tailored, low-cost simulation tools. This study will explore the development of an educational model where surgical trainees use AI to design interactive simulation apps.

METHODS: A pilot program will be launched at an academic center, enrolling surgical residents and senior medical students. Participants will attend workshops covering AI fundamentals, app development using no-code platforms, and user interface design. Working in small groups, they will be mentored by surgical faculty and AI specialists as they develop prototype simulation apps. Feasibility will be assessed through participation rates, app functionality, and expert review.

RESULTS: Twelve participants are expected to complete the initial program. Trainees will develop three prototype apps: (1) a visual recognition tool for laparoscopic instruments, (2) a chatbot-guided procedural simulation, and (3) an interactive case-based decision-making tool. Faculty reviewers will evaluate each app for clinical accuracy and usability. It is anticipated that most apps will meet core quality benchmarks. Trainees will complete satisfaction surveys to evaluate the learning experience and their confidence in using AI for surgical education.

CONCLUSION: This pilot will demonstrate the feasibility of a trainee-driven, AI-based simulation development model. The project is expected to show high engagement, innovative output, and strong educational potential. With further refinement and evaluation, this model could reshape surgical simulation by enabling learners to become creators of context-specific, intelligent training tools.

Poster #7

Multidisciplinary Simulation Improves Event Medicine Team Confidence to Respond to Mass Casualty Incidents

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INTRODUCTION: Multidisciplinary simulation-based education has been shown to improve communication, role clarity, and leadership skills. This type of education often takes place before large events (e.g., concerts, sporting events, festivals) and focuses on high-frequency events. However, low-frequency high-risk events are less often reviewed in this format. Additionally, those providing coverage at these events may lack formal training in mass casualty response. Here we evaluated a simulation-based education for an interdisciplinary team that would be providing care for large events including a marathon.

METHODS: Utilizing our standardized Return on Investment in Learning we evaluated a simulation-based education for an event medicine team. The team consisted of sports medicine physicians, emergency medicine residents, athletic trainers, emergency medical services, and disaster management teams. Two hours of education were provided with each hour consisting of a different mass casualty simulation. The simulation lasted 20 minutes and each was followed by a 40-minute structure debrief.

RESULTS: Data will be collected for learner reactions immediately following the education, and after the event (marathon) takes place to evaluate for application of knowledge. More than 50 learners have signed up to participate in the education. We will evaluate the content, method of delivery, and application of knowledge.

CONCLUSION: This education will fill a gap in the literature bridging mass casualty education and event medicine. While this is for a single event, future studies could focus on additional education prior to large events and best practices could be established for teams responsible for delivering care in these settings.

Poster #24

Assessing the Influence of Surgical Simulation Experience in a Medical Pipeline Program

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INTRODUCTION: Pipeline programs are critical for promoting diversity of perspective, identity, and experience in medicine by offering early exposure and mentorship to students from underrepresented backgrounds. Prior studies emphasize the importance of hands-on experiences in building confidence, self-efficacy, and interest in medical careers. This pilot study aims to evaluate the role of surgical simulation-experiences within a medical pipeline program.

METHODS: Student participants in Tulane University's Introduction to the Medical Profession: A Rotation to Empower Students ("IMPRESS") program were surveyed. This is a 6-week experience for first- and second-year college students which includes surgical simulation, clinical rotation exposure, and career mentoring. Students rated eight statements using a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree) assessing the impact of surgical simulation experiences on their interest in medicine and surgery.

RESULTS: Of 12 students surveyed, 83% (n=10) responded. All respondents (100%) agreed that their simulation experiences increased their interest in medicine (90% strongly agree) and surgery (60% strongly agree, 40% Agree). All (100%) reported improved ability to envision themselves as a doctor (80% strongly agree), improved understanding of technical skills (80% strongly agree), and increased interest in exploring different specialties (50% strongly agree, 50% agree). Additionally, 90% felt more connected to a future in healthcare. For all 8 statements the average response was 4.675/5.

CONCLUSION: Survey results described overwhelmingly positive student experiences, with all students reporting increased interest in medicine and surgery. These findings align with existing literature emphasizing experiential learning and the importance of surgical skills exposure in cultivating self-efficacy, confidence, and specialty consideration among underrepresented students. The results of this pilot study support the utility of surgical simulation as a meaningful form of student outreach.

Meet the Authors Poster Session

Patient Safety

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #34

From Intelligence Reflex to Ethically Reflexive Artificial Intelligence (AI) In Surgery

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INTRODUCTION: In 2017, *Intelligence Reflex* was introduced to describe a surgeon's capacity to make rapid, ethically informed decisions during high-stakes scenarios. Published in the *Indian Journal of Neurosciences*, the model linked alpha rhythm desynchronization and orienting reflexes to real-time adaptive cognition. Unlike static IQ scores, Intelligence Reflex represents dynamic performance shaped by habituation, arousal, and neurophysiological feedback. This paper repositions the concept within the paradigm of *Ethically Reflexive AI (ER-AI)*—AI systems that guide intraoperative decisions using ethically annotated datasets, real-time sensing, and reflective prompts. A pilot implementation in laparoscopic cholecystectomy simulation explored how ER-AI can scaffold Intelligence Reflex in practice.

METHODS: Methods included EEG-integrated simulators, ethically tagged datasets, machine learning reward functions based on ethical performance, and metrics like Event-Related Desynchronization Index (ERDI) and Reflex-Ethics Convergence Score (RECS). Real-time AI prompt engines and post-simulation debrief tools were also deployed.

RESULTS: Results showed 87% of trainees paused at critical anatomical zones when guided by ER-AI, compared to 43% in controls. Structure recognition improved by 28%, and near-miss bile duct injuries dropped by 35%. EEG recordings confirmed alpha desynchronization patterns during reflexive actions. Trainees reported improved ethical awareness (92%) and decision confidence (78%).

CONCLUSION: Intelligence Reflex, once a human-only trait, is now operationalized within AI systems that act as ethical co-pilots. ER-AI enhances decision quality and safety while preserving human judgment. This integrated model shifts surgical training from performance-based metrics to ethically grounded, real-time cognitive engagement—laying a foundation for human-AI synergy where reflex meets reflection.

Meet the Authors Poster Session

Faculty Development

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #21

Good Judgment in Action: Enhancing Surgeon Feedback Through Simulation

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INTRODUCTION: Effective intraoperative feedback is a cornerstone of surgical training, but remains inconsistently delivered. Surgeons who never received structured feedback during their own training lack the tools to deliver it effectively. At our institution, low faculty engagement scores on an Accreditation Council for Graduate Medical Education (ACGME) survey prompted a residency-wide needs assessment, which revealed that most attendings provide feedback perceived by residents as ineffective. To address this, we developed a simulation-based faculty development program grounded in the "Debriefing with Good Judgment" model. Our study aims to evaluate whether this structured intervention can improve the quality and consistency of feedback provided by surgical faculty.

METHODS: This single-center study involves general surgery attendings at a mid-sized academic residency. The intervention includes didactic instruction and simulation-based feedback practice. Attendings complete pre-, post-, and three-month follow-up surveys assessing confidence and implementation. Live intraoperative feedback sessions will be observed, with individualized coaching provided. Residents complete parallel surveys to assess changes in feedback quality. Program-level impact will be measured through pre- and post-intervention comparisons of ACGME resident survey data.

RESULTS: Resident evaluations of 42 attendings revealed that few were consistently perceived as delivering effective feedback. Attendings with over 20 years of experience were significantly more likely to be viewed as delivering effective feedback. These faculty trained under hierarchical models with pyramidal structures and unrestricted duty hours, environments that prioritized autonomy over formal feedback. Despite this, they appear to have developed or retained effective feedback skills. Experience may improve intraoperative comfort and cognitive bandwidth, enabling more intentional teaching.

CONCLUSION: The didactic and simulation-based curriculum will launch this fall, followed by live intraoperative coaching sessions after attending-resident debriefings. Three-month follow-up surveys from both attendings and residents will assess retention and application of feedback strategies. ACGME resident survey data will then be re-analyzed to evaluate broader program impact.

Poster #22

Assessing Women's Representation Among Academic Neurosurgical Faculty Nationwide

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INTRODUCTION: Neurosurgery is one of the most competitive surgical subspecialties. Despite the increase in women entering surgical fields, significant gender disparities persist, especially at the faculty level. This affects mentorship, leadership, and visibility to aspiring women surgeons. It is crucial to identify these gaps in diversity to make advances and promote equity in neurosurgery. This study aims to assess the representation of women among faculty in neurosurgical residency programs in the United States (U.S.).

METHODS: Demographic and bibliometric data were collected on neurosurgical faculty across accredited programs by the U.S. Accreditation Council for Graduate Medical Education. Data were evaluated from program websites and the Fellowship and Residency Electronic Interactive Database. The data gathered include faculty name, medical degree, gender, and academic rank. Proportions of faculty ranks were statistically evaluated with Chi-square analysis.

RESULTS: Our team identified 118 neurosurgical programs nationwide, 75 of which were included in this study. A total of 1210 neurosurgical faculty were observed, with only 154 (12.7%) being women. Additionally, 1177 (97.3%) were allopathic physicians and 33 (2.7%) were osteopathic physicians. Only 7 (0.6%) were both women and osteopathic physicians. Of the faculty identified, 389 were full professors (7.5% women), 205 were associate professors (17.6% women), and 351 were assistant professors (17.7% women). Consequently, statistically significant disproportions of gender in each rank ($p < 0.05$) were found.

CONCLUSION: Our findings highlight the persistent underrepresentation of women in neurosurgical faculty. This suggests the need for ongoing efforts in advocating for and supporting women in prestigious leadership positions, such as academic neurosurgery. Increasing women's representation will inspire more women medical students to break down barriers and pursue the field of neurosurgery by providing visible role models and mentorship. A more diverse academic and work environment could positively impact patient care.

Meet the Authors Poster Session

Team Wellness

Poster #52

Utility of Occupational Therapists in Surgical Training to Improve Ergonomics and Reduce Risk of Chronic Pain

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INTRODUCTION: It is no secret that many practicing surgeons experience regular musculoskeletal pain while operating, regardless of specialty or practice. Nearly 90% of practicing surgeons report musculoskeletal pain while operating, and almost two-thirds of them endorse pain that impacts their daily lives outside of work. The use of occupational therapists to educate and train surgeons on techniques and preventative strategies is a relatively new phenomenon. Further, the use of occupational therapists within surgical residencies is uncommon, despite residency being a critical time when trainees form long term habits when it comes to ergonomics. There are several studies demonstrating the utility of coaching residents on good operating posture in teaching sessions. Additionally, new research has recently been published demonstrating improved posture and pain levels when occupational therapists observe residents operating.

METHODS: We conducted a survey of residents at our institution to assess frequency, location and severity of musculoskeletal complaints.

RESULTS: 57% of respondents complained of joint pain at least 3-4 days per week, with at least 62% endorsing neck, shoulder, or back pain. 87% of respondents had neck pain. While 50% rated pain at a 3 or 4, 32% rated their pain at 8 or 9 out of 10. Notably, 87% of respondents said they felt pressure to operate through pain. Finally, 87% were interested in having an occupational therapist provide instructive sessions on ergonomics.

CONCLUSION: Our survey and other studies demonstrate the need for continued education to residents early in their training on proper ergonomics while operating and learning ways to reduce risk for chronic pain during their careers. Recent studies suggest the use of an occupational therapist at training programs would benefit residents in the short term. It remains to be seen if this would have any long-term impact on ergonomics in their future practices.

Meet the Authors Poster Session

Surgical Outcomes

Poster #48

Effectiveness of Negative Pressure Wound Therapy Versus Conventional Dressings in Emergency Abdominal Surgery: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

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INTRODUCTION: In clinical practice, negative pressure wound therapy (NPWT) has gained traction for preventing postoperative issues in demanding operations like emergency laparotomy, especially given the high morbidity from surgical site infections (SSIs). We undertook this systematic review and meta-analysis to assess NPWT's effectiveness against conventional dressings in curbing SSIs and related complications. Drawing from randomized trials, our work offers practical insights for surgical education, such as shaping realistic training scenarios for wound management in urgent cases.

METHODS: We conducted a systematic review and meta-analysis in line with PRISMA guidelines. A thorough search of PubMed, Embase, and Cochrane databases yielded randomized controlled trials (RCTs) that pitted NPWT against conventional dressings in emergency abdominal surgery. SSI served as the primary endpoint, while secondary ones encompassed wound dehiscence, seroma, hematoma, and hospital stay duration. We pooled data with risk ratios (RR) and 95% confidence intervals (CI) using random-effects modeling, chosen to handle anticipated variability across studies.

RESULTS: Our analysis covered eight RCTs with a total of 1,377 patients. Compared to conventional dressings, NPWT markedly diminished the risk of SSI (RR 0.43, 95% CI 0.26-0.73, p=0.002) and wound dehiscence (RR 0.32, 95% CI 0.18-0.58, p=0.0002). We noted a non-significant lean toward lower seroma rates (RR 0.59, 95% CI 0.34-1.01). Overall adverse events showed no clear differences. Heterogeneity stood at moderate levels for SSI (I^2=76%), likely stemming from differences in surgical protocols, but remained low for the rest.

CONCLUSION: NPWT delivers meaningful cuts in postoperative SSI and dehiscence risks following emergency abdominal surgery. This supports its role as a helpful add-on in risky procedures and points to ways it could fit into simulation training; think hands-on modules to build residents' skills in wound care under pressure. Bigger RCTs are needed to sharpen up patient selection, standardize approaches, and check longer-term effects.

Meet the Authors Poster Session

Other

Posters are not advertised in chronological order, as some presenters are presenting across multiple categories.

Poster #11

Developing a Global Cardiovascular Surgery Training Resource: The DeBakey CV Education Model

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INTRODUCTION: The DeBakey CV Education YouTube channel was established to provide free, high-level cardiovascular educational content to a global audience of healthcare professionals and trainees. As digital learning increasingly supplements traditional surgical training, video-based platforms offer scalable, accessible solutions to overcome geographic, financial, and experiential disparities.

METHODS: We conducted a descriptive evaluation of the DeBakey CV Education channel from 2015 to 2025 using YouTube analytics, including both overall platform data and selected playlists. We also describe the full production workflow—from OR video capture to multimedia editing and publication—and analyzed qualitative feedback from vascular surgery faculty regarding educational value and future directions.

RESULTS: Over 10 years, the channel accrued 21.6 million views, 75 million watch minutes, and 127,000+ subscribers across 2,700+ videos. Selected playlists demonstrated high engagement, with average view durations exceeding 4.7 minutes and retention above 55%. The channel reached viewers in over 175 countries, with the United States and India consistently leading in viewership. Notably, India's annual views surged after 2020, surpassing the U.S. in several years and becoming the second-highest contributor to cumulative views. Pakistan, the United Kingdom, and the Philippines also showed steady international engagement. Faculty interviews highlighted the platform's utility in visualizing procedures, supplementing core curricula, and expanding global educational access.

CONCLUSION: The DeBakey CV Education channel exemplifies a scalable, sustainable approach to surgical education. Through structured content creation, editorial review, and global dissemination, the platform supports mentorship and equitable learning across diverse settings. Future directions include interactive formats and validation of educational outcomes.

Poster #32

The AI Surgeon's Eye: Real-Time Feedback on Laparoscopic Knot Tying with Deep Learning

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INTRODUCTION: Intracorporeal knot tying is a core component of the Fundamentals of Laparoscopic Surgery (FLS) and a critical skill for laparoscopic proficiency. Traditional evaluation methods are resource-intensive and subject to inter-rater variability. To address these limitations, we are developing an artificial intelligence (AI) system to provide automated, real-time feedback and scoring based on a validated performance checklist. This tool aims to deliver an objective, scalable solution for surgical training and assessment.

METHODS: This study involves the development and validation of a multi-modal deep learning pipeline for automated skill assessment. High-definition (HD) videos are being collected from surgical trainees across a range of experience levels using a standardized FLS box trainer, upgraded with a high-resolution camera to ensure consistent video quality. Each video is meticulously annotated using an expert-derived checklist evaluating loop formation, instrument handling, knot security, and time to completion. The proposed AI system integrates several cutting-edge components: YOLOv8 for real-time surgical tool detection and tracking; motion-based adaptive frame selection to optimize computational efficiency by analyzing only kinematically relevant frames; X3D convolutional neural networks for robust temporal pattern recognition of surgical actions; and a two-stream architecture incorporating both RGB and optical flow data to enhance motion analysis.

RESULTS: A target dataset of 500 HD videos is currently being collected. To date, 230 videos (46%) have been collected, and 105 (45.7%) have been fully annotated using a structured, expert-derived protocol.

CONCLUSION: Upon dataset completion, the model will be trained using a 70/15/15 split for training, validation, and testing. Performance will be benchmarked against expert scorers using metrics including checklist accuracy (>90%), Intersection over Union (IoU >90%), and Cohen's kappa (>0.85). Usability and real-time feedback quality will also be assessed through trainee evaluations.

Poster #33

Reducing Miscellaneous Cost in an Outpatient Surgery Center

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INTRODUCTION: Medical waste is a significant burden to both the healthcare system and patients in the United States. Some estimates place the value of medical waste between 760-935 billion United States Dollars (USD) annually. We aimed to identify and address a source of waste at an outpatient surgery center that performs approximately 500 operative cases monthly. Anecdotal evidence suggested that there was an inefficiency in the use of cardiac tracing during general anesthesia or monitored care. Specifically, the continuous three-lead EKG pads are often preoperatively placed in the planned operative field, necessitating their removal and reapplication.

METHODS: At this outpatient center, each lead pad placed has a unit cost 0.24 USD. Pre-investigation estimates placed the waste at this outpatient center at a value of approximately 180 USD per month (0.24 USD x 1-2 pads replaced/wasted x 500 cases). To address this, waste-education posters were placed in obvious locations in each operating room (OR) and badges were supplied to CRNAs and nurses responsible for placement of leads in the OR. Fulfillment data was collected for 6 months prior to and 6 months post intervention.

RESULTS: We found that the average monthly reduction in cost after implementation of guided pad placement was 99.51 USD (p=0.074) with projected yearly savings of more than 1000.00 USD. A Cohens d test was performed which demonstrated the large effect size of 0.78 of this cost-effective intervention, despite a p-value that only approached significance.

CONCLUSION: We demonstrated that simple, passive education resulted in cost savings at a moderate-volume surgical center. Similar interventions could be implemented in other facilities where the operative volume is much larger, potentially exhibiting more drastic savings in medical waste due to time savings and better resource utilization.