Nearly all would recommend the application (97%). Eighty-four percent felt increased motivation to study with XR compared to conventional methods, and 94% thought it was an asset for learning anatomy. MR was the second preferred approach to learning anatomy after cadaveric dissection. Pregraduate learners enjoyed the application (5.0 v. 4.7, $p = 0.023$) and felt it was an asset for teaching (5.0 v. 4.5, $p = 0.005$) more than postgraduate learners. Surgical residents felt the device was more comfortable (4.7 v. 3.7, $p = 0.018$) and were more likely to use it for more than 15 minutes (4.8 v. 3.5, $p = 0.01$) than nonsurgical residents. **Conclusion:** We showed the successful development and validation of an MR Thoracic Surgical Anatomy Atlas as a comfortable and desirable modality for learning thoracic anatomy.

Machine learning distinguishes between skilled and less-skilled psychological performance in virtual neurosurgical performance. ***Sharif Natheir, Sommer Christie, Recai Yilmaz, Alexander Winkler-Schwarz, Khalid Bajunaid, Abdulrahman J. Sabbagh, Penny Werthner, Rolando Del Maestro.*** **From the Neurosurgical Simulation and Artificial Intelligence Learning Centre, McGill University, Montreal, Que. (Natheir, Christie, Yilmaz, Winkler-Schwarz, Del Maestro); and the Department of Surgery, College of Medicine, University of Jeddah, Jeddah, Saudi Arabia. Corresponding author: Sharif Natheir; sharifnatheir@gmail.com**

Background: Virtual reality surgical simulators have facilitated surgical education by providing safe training environments. Electroencephalography (EEG) has been used to assess neural activity during surgical performance. Machine learning (ML) has been applied to analyze EEG data split into frequency bands. We hypothesized that ML could distinguish between skilled and less-skilled surgeons based on EEG recordings. **Methods:** Twenty-one participants performed 3 simulated brain tumour resection procedures on the NeuroVR platform (CAE Healthcare, Montreal, Que.) while EEG data were recorded. Participants were divided into less-skilled (medical students and postgraduate year [PGY] 1–3) and skilled (PGY4+) groups. Thirteen EEG frequency band metrics (e.g., alpha, beta, theta:beta ratio) were generated and statistically compared across expertise groups. ML models were trained using these metrics to differentiate between skilled and less-skilled groups. Metrics were arranged in order of importance using model interpretability methods. **Results:** An artificial neural network achieved a testing accuracy of 100% (area under the receiver operating characteristic = 1.0). Model interpretation identified low alpha (8–10 Hz), which is associated with neural efficiency, as the most important metric for classifying expertise, with skilled surgeons exhibiting higher low alpha than those who were less skilled ($p = 0.044$). Furthermore, skilled surgeons displayed significantly lower theta:beta ratios ($p = 0.048$) and significantly higher beta (13–30 Hz, $p = 0.049$), beta1 (15–18 Hz, $p = 0.014$), and beta2 (19–22 Hz, $p = 0.015$), which are associated with technical expertise, attention, memory formation, and anxiety, respectively. **Conclusion:** This novel methodology elucidates the psychological profile of expert surgeons and the relative contribution of each EEG band to expertise, allowing the development of a neurofeedback protocol for surgical training.

A powerful new tool for learning anatomy as a medical student. ***Jonathan Hampshire, Ioana Bratu, Michelle Noga.*** **From the University of Alberta, Edmonton, Alta. (Hampshire, Bratu, Noga); and Stollery Children's Hospital, Edmonton, Alta. (Bratu, Noga). Corrresponding author: Jonathan Hampshire; jdhampsh@ualberta.ca**

Background: In this study we describe a medical student's learning through creating 3D virtual models of abdominal tumours and surrounding structures in pediatric patients using preoperative imaging data. We also relate the experience of this student from first receiving the patient data to finally observing the surgery. **Methods:** The student used 3D segmentation software to highlight and colour-code the tumour and relevant arteries, veins, and abdominal organs from patient imaging data to present the resulting virtual and 3D-printed models to the surgeons and patients preoperatively. **Results:** The student described their knowledge of imaging interpretation as being very limited before the 3D segmenting exercises. The student can now readily identify abdominal structures, predict their locations in space relative to other structures and recognize abnormalities and variations among patients. They also learned how surgeons use imaging and the new models to plan surgeries. They recounted the positive reaction by a patient's family when presented preoperatively with a 3D-printed model of the patient's liver mass and how it facilitated a discussion about the patient's anatomy. The student was then able to observe the resection of the tumour and connect what they saw from the imaging to live patient anatomy. **Conclusion:** Medical students currently rely on anatomical illustrations and cadaveric dissections to learn anatomy. Unfortunately, medical students have limited experience with identifying anatomy from imaging data. Creating 3D virtual models can help students develop an intimate understanding of anatomy and prepare them for medical practice by improving their ability to interpret imaging.

Development and effectiveness of a telementoring approach for neurosurgical simulation training of medical students. ***Ali M. Fazlollahi, Mohamad Bakhaidar, Ahmad Alsayegh, Alexander Winkler-Schwartz, Jason M. Harley, Rolando F. Del Maestro.*** **From the Neurosurgical Simulation and Artificial Intelligence Learning Centre, Montreal, Que. (Fazlollahi, Bakhaidar, Alsayegh, Winkler-Schwartz, Del Maestro); and McGill University, Montreal, Que. (Fazlollahi, Bakhaidar, Alsayegh, Winkler-Schwartz, Harley, Del Maestro). Corresponding author: Ali M. Fazlollahi; ali.fazlollahi@mail.mcgill.ca**

Background: Lack of surgical apprenticeship caused by the COVID-19 pandedmic has limited learners' preparation for residency and may impair their psychomotor competence. Using virtual reality simulation and videotelephony technology, we designed a telementoring opportunity for medical students interested in surgery to receive expert coaching for technical skill acquisition. The following report outlines this innovative approach and investigates its effectiveness. **Methods:** In a 3-week workshop, senior neurosurgery residents were trained to teach brain tumour resection techniques using the Objective Structured Assessment of Technical Skills (OSATS) rating scale and the

Promoting Excellence And Reflective Learning in Simulation (PEARLS) debriefing guide for assessment and feedback, respectively. Medical students were recruited to participate in neurosurgical simulation training. Participants performed 5 tumour resections for practice and 1 complex tumour resection for skill evaluation. The intervention's effectiveness was measured and compared with a no-feedback control grroup using the final resection's blinded OSATS rating in a randomized controlled trial. **Results:** Good interrater reliability (intraclass correlation coefficient = 0.84) was achieved, and the OSATS scale demonstrated good internal consistency ($\alpha = 0.82$). Forty-seven medical students from 4 institutions were randomly assigned to instructor ($n = 23$) and control ($n = 23$) groups. In the instructor group, live on-screen performance of participants was assessed remotely with verbal debriefing provided upon completion of each practice resection. No performance assessment or feedback was provided to the control group. Blinded OSATS assessment showed that instructor feedback significantly enhanced respect for tissue ($p = 0.027$), economy of movement ($p = 0.024$), and instrument handling ($p = 0.012$). **Conclusion:** Residents were engaged in providing effective assessment and feedback in remote-based simulation training for undergraduate medical students.

A team based learning approach to general otolaryngology in undergraduate medical education. ***Fatemeh Ramazani, David Côté.*** **From the University of Alberta, Edmonton, Alta. (Côté); and the University of Calgary, Calgary, Alta. (Ramazani). Corresponding author: Fatemeh Ramazani; framazan@ucalgary.ca**

Background: Otolaryngology – head and neck surgery (Oto-HNS) exposure is known to be deficient in undergraduate medical education (UGME) across Canada despite the fact that 20%–50% of primary care patient concerns are linked to Oto-HNS. Team-based learning (TBL) is a whole-class interactive teaching approach using cooperative learning, real-time feedback, and reciprocal teaching. This approach encourages students to discuss challenging clinical cases in small groups, followed by large class discussions facilitated by a content expert; it allows for immediate application and assimilation of knowledge. These discussions are preceded by directed pre-session review material as well as pre-session Individual readiness assurance (IRAT) and Group readiness assurance (GRAT) tests ensuring that all learners have a baseline understanding of the concepts that will be covered during the session. This study aimed to develop a TBL session designed to provide medical students with an approach to common Oto-HNS presentations in general practice. **Methods:** In phase I, family physicians identified common primary care Oto-HNS presentations, clinical scenarios, and corresponding assessment questions. Content was validated by literature review and consultation with staff otolaryngologists, then reassessed by family physicians for clarity and relevance. Phase II involved piloting the TBL session with 162 medical students, with pre- and post-session questionnaires assessing students' level of comfort with the content covered during the session. **Results:** We developed a 2-hour TBL session that increased students' perceived comfort with approaching common Oto-HNS presentations in primary care. **Conclusion:** TBL is an easily reproducible tool that's proven to help address deficiencies in Oto-HNS competencies at the UGME level.

Student-led surgery interest group outreach for high school mentorship: a diversity driven initiative. ***Lina Elfaki, Lukas Mortensen-Truscott, Sean McKellar, Dan Budiansky, Michael Lee.*** **From the University of Toronto, Toronto, Ont. Corresponding author: Michael Lee; michaelh.lee@mail.utoronto.ca**

Background: Social capital, mentorship, representation, institutional racism, and finances are systemic barriers for underrepresented groups applying to medical school. We can foster high school students' interest for medicine and surgery, but they may be disadvantaged in regards to a host of skills beneficial for a successful medical school application. These inequities are further exacerbated during the pandemic shift to online learning and loss of opportunities. **Methods:** The University of Toronto Surgery Interest Group developed an equity, diversity and inclusivity–focused working group. With the Toronto District School Board, through the Specialist High Skills Major Program (SHSM), we hosted 2 sessions ($n = 45$ students) for schools in racialized and lower socioeconomic status neighbourhoods. We provided interactive sessions on the CanMEDS roles, curriculum vitae development, and scientific literature interpretation. These were small-group scenario-based activities followed by large-group discussions. **Results:** We provided students with a credited session for their SHSM diploma. The interactive teaching of multiple classes located in different areas allowed for informal mentorship and skill-building. These skills are useful for the pursuit of a scientific undergraduate degree as well as for a competitive medical school application. The feedback from the students and teacher organizers were extremely positive, with both groups enjoying the workshops and requesting additional sessions. **Conclusion:** Promoting diversity within the surgical fields begins when students are considering career paths. Medical students preparing for residency should be aware of inequities and equipped to address them. Volunteering at a grassroots level is a privilege for future surgeon leaders and a responsibility in medical education.

Retrospective evaluation of novel case-based teaching series for first year otolaryngology residents. ***Lily Wang, Jessica Henley, Justine Philteos, Alexander Gabinet-Equihua, Garret Horton, Marc Levin, Ahmed Saleem, Eric Monteiro, Vincent Lin, Yvonne Chan, Paolo Campisi.*** **From the University of Toronto, Toronto, Ont. (Wang, Philteos, Gabinet-Equihua, Horton, Levin, Saleem, Monteiro, Lin, Chan, Campisi); Mount Sinai Hospital, Toronto, Ont. (Monteiro); Sunnybrook Health Sciences Centre, Toronto, Ont. (Lin); The Hospital for Sick Children, Toronto, Ont. (Campisi); and St. Michael's Hospital, Toronto, Ont. (Chan). Corresponding author: Lily Wang; lily.wang@mail.utoronto.ca**

Background: First-year resident physicians began training in July 2020 in an environment of decreased clinical case exposure and increased feelings of discomfort because of the COVID-19 pandemic. To improve specialty learning, the University of Toronto Department of Otolaryngology – Head and Neck Surgery piloted a novel virtual case-based teaching intervention for first-year residents. **Methods:** A weekly virtual resident-led case-based discussion series was designed. Six residents and 4 staff otolaryngologists participated. A Likert-type survey administered