Neurosurgery for Medical Students

- Association between Duration of Visual Symptoms and Early Postoperative Visual Outcome Following Pituitary Macroadenoma Surgery
- Biosynthesis of sulfur quantum dots and cerium oxide nanoparticles for bioimaging and reactive oxygen species modulation in Y79 retinoblastoma cancer cells
- Correction to: Transplantation of R-GSIK scaffold with mesenchymal stem cells improves neuroinflammation in a traumatic brain injury model
- Medical Students' Opinions on Women Pursuing a Career in Neurosurgery in Turkiye: A Cross-Sectional Survey at a Single Center
- Stereotactic radiosurgery for optic nerve sheath meningiomas: A comprehensive systematic review and meta-analysis
- Neuroradiological Evaluation of Anatomo-Morphometric Arcuate Fascicle Modifications According to Different Brain Tumor Histotypes: An Italian Multicentric Study
- Predictive Factors and Impact of Delayed Spine Surgery: A Nationwide Retrospective Cohort
- Video gaming facilitates adaptation to surgical exoscopes - a laboratory experiment

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Integrating medical students into the neurosurgical operating room (OR) presents significant pedagogical challenges, compounded by the phenomenon of neurophobia, or aversion to neuroscience. Despite the importance of early neurosurgical exposure, there is a lack of structured educational strategies for undergraduates.

Lawson et al. present twelve targeted strategies to optimize neurosurgical OR education. These include preoperative planning, fostering a positive learning environment, emphasizing technological integration, involving students in decision-making, prioritizing safety, providing regular feedback, facilitating active participation, leveraging teachable moments, managing time constraints, offering follow-up opportunities, emphasizing professionalism, and fostering a learning culture.

Discussion and conclusion: This framework addresses a critical gap in neurosurgical education for undergraduates, tackling neurophobia and enhancing learning experiences. Integrating educational theories with practical insights offers a robust, adaptable approach suitable for various global resource settings. Through continuous evaluation and refinement, these strategies can evolve to meet the dynamic demands of neurosurgical education, preparing students to navigate the complexities of modern neurosurgical practice with confidence and competence [1)]

Neurosurgery is a tertiary specialty, and exposure to medical students is limited. One way to increase engagement and offer experience in neurosurgery is through Student Selected Components (SSC), Special Study Modules (SSM), or independent projects.

The aim of Tiefenbach et al. was to assess the educational value of such projects and evaluate their effectiveness in exposing students to the field.

A survey was designed and distributed to Edinburgh University medical students and alumni who completed a neurosurgical project within the last 5 years. The survey was anonymous and collected responses over a fortnight. The results were analyzed in Microsoft Excel 2020 Software.

Twenty-four respondents completed the survey -42% were students and 58% were junior doctors. Respondents overwhelmingly enjoyed their project (96%) and reported increased interest in neurosurgery (62%). The project helped improve their knowledge of neurosurgical procedures, pathologies, and/or clinical presentations and allowed connections with the local department. On a Likert scale, 37% felt they gained a good insight into the field. Only 33% felt the project was a good "taster" for the specialty. This is reasonable given that 92% of projects focused on data analysis, and none were designed as clinical attachments. A large number of students had their work published (50%) and presented at conferences (55%).

Lack of exposure to neurosurgery at medical school is a known limitation within a busy curriculum. Selected Components/Special Study Modules/independent projects help students learn about certain aspects of neurosurgery and raise their level of interest. A majority of participants either achieved presentation at conferences or published their work. However, the results suggest neurosurgical projects complement but do not replace traditional clinical attachments in providing insight into the craft of this specialty [2)].

Today, medical students typically match into surgical specialties directly out of medical school and need to spend their time learning basic surgical skills and patient care because of the contracted time afforded to them. Formal leadership training has historically been limited to surgical training. Stein et al. set out to delineate the creation, implementation, and perceptions of a leadership program within a surgical residency and provide guideposts for the development of engaged, conscious, and dedicated leaders within the residencies they lead [3)].

Responses were received by 40 competitors (response rate 46.0%). Twenty-four (60.0%) responders intend to pursue a career in either neurosurgery (n=18) or neurology (n=6). This included 10 (25.0%) responders who had successfully entered either neurosurgery (n=9) or neurology (n=1). The performance of these 10 (n=11, 57.0% ± 13.6) was significantly better than the other responders (n=30, 46.5% ± 13.5) (p=0.036). Seventeen (42.5%) responders either included their attendance at NUNC in a post-Foundation job application or intend to.

The National Undergraduate Neuroanatomy Competition provides the opportunity for medical students to demonstrate their interest in neurosurgery. It has the potential to be used as a tool for recognizing medical students suitable for neurosurgery training [4)].

History

Osler created the first residency program for specialty training of physicians, and he was the first to bring medical students out of the lecture hall for bedside clinical training. Historically, medical student education in neurological surgery has generally limited student involvement to assisting in research projects with minimal formal clinical exposure before starting sub-internships and application for the neurosurgery match. Consequently, students have generally had little opportunity to acquire exposure to clinical neurosurgery and attain minimal proficiency [5)].

Neurosurgery seeks to attract the best and brightest medical students; however, there is often a lack of early exposure to the field, among other possible barriers.

South-East Europe (Albania Greece, Serbia, And Turkey)

Aydin AE, Gazioglu N, Tasiou A, Mihaylova S, Salokorpi N, Karampouga M, Broekman ML, Janssen IK, Magnadottir HB, Somma T, Pajaj E, Hernandez Duran S, Vayssiere P, Rodríguez-Hernández A, Lambrianou X, Tsianaka E, Rosseau G, Murphy M. European Medical Students' Views On Neurosurgery, With Emphasis On South-East Europe (Albania Greece, Serbia, And Turkey). World Neurosurg. 2024 Feb 19:S1878-8750(24)00262-6. doi: 10.1016/j.wneu.2024.02.065. Epub ahead of print. PMID: 38382757 [6)]

Germany

Medical students show varying clinical practical skills when entering their final year clinical clerkship, which is the final period to acquire and improve practical skills prior to their residency. Behling et al. developed a one-on-one mentoring program to allow individually tailored teaching of clinical practical skills to support final year students with varying skill sets during their neurosurgical clinical clerkship.

Each participating student (n = 23) was paired with a mentor. At the beginning students were asked about their expectations, teaching preferences, and surgical interests. Regular meetings and evaluations of clinical practice skills were scheduled every 2 weeks together with fixed rotations that could be individually adjusted. The one-on-one meetings and evaluations with the mentor gave each student the chance for individually tailored teaching. After completion of the program, each student evaluated their experience.

The mentoring program was well-received by participating students and acquisition or improvement of clinical practical skills was achieved by most students. A varying practical skill level and interest in the field of surgery was seen.

A neurosurgical one-on-one mentoring program is well received by final year medical students and allows for individually tailored learning of clinical practical skills [7)].

United States

Lubelski et al. sought to identify successful practices that can be implemented to improve medical student recruitment to neurosurgery.

United States neurosurgery residency program directors were surveyed to determine the number of medical student rotators and medical students matching into a neurosurgery residency from their programs between 2010 and 2016. Program directors were asked about the ways their respective institutions integrated medical students into departmental clinical and research activities.

Complete responses were received from 30/110 institutions. Fifty-two percent of the institutions had neurosurgery didactic lectures for 1st- and 2nd-year medical students (MS1/2), and 87% had didactics for MS3/4. Seventy-seven percent of departments had a neurosurgery interest group, which was the most common method used to integrate medical students into the department. Other forms of outreach included formal mentorship programs (53%), lecture series (57%), and neurosurgery anatomy labs (40%). Seventy-three percent of programs provided research opportunities to medical students, and 57% indicated that the schools had a formal research requirement. On average, 3

medical students did a rotation in each neurosurgery department and 1 matched into neurosurgery each year. However, there was substantial variability among programs. Over the 2010-2016 period, the responding institutions matched as many as 4% of the graduating class into neurosurgery per year, whereas others matched 0%-1%. Departments that matched a greater (≥ 1% per year) number of medical students into neurosurgery were significantly more likely to have a neurosurgery interest group and formal research requirements. A greater percentage of high-matching programs had neurosurgery mentorship programs, lecture series, and cadaver training opportunities compared to the other institutions.

In recent decades, the number of applicants to neurosurgery has decreased. A major deterrent may be the delayed exposure of medical students to neurosurgery. Institutions with early preclinical exposure, active neurosurgery interest groups, research opportunities, and strong mentorship recruit and match more students into neurosurgery. Implementing such initiatives on a national level may increase the number of highly qualified medical students pursuing neurosurgery [8].

A medical student training camp was created to improve the preparation of medical students for the involvement in neurological surgery activities and sub-internships.

A 1-day course was held at Weill Cornell Medicine, which consisted of a series of morning lectures, an interactive resident lunch panel, and afternoon hands-on laboratory sessions. Students completed self-assessment questionnaires regarding their confidence in several areas of clinical neurosurgery before the start of the course and again at its end.

A significant increase in self-assessed confidence was observed in all skill areas surveyed. Overall, rising fourth year students who were starting sub-internships in the subsequent weeks reported a substantial increase in their preparedness for the elective rotations in neurosurgery.

The preparation of medical students for clinical neurosurgery can be improved. Single-day courses such as the described training camp are an effective method for improving knowledge and skill gaps in medical students entering neurosurgical careers. Initiatives should be developed, in addition to this annual program, to increase the clinical and research skills throughout medical student education [9].

Canada

Medical students in Canada must make career choices by their final year of medical school. Selection of students for a career in neurosurgery has traditionally been based on marks, reference letters and personal interviews. Studies have shown that marks alone are not accurate predictors of success in medical practice; personal skills and attributes which can best be assessed by reference letters and interviews may be more important. A study was an attempt to assess the importance of, and ability to teach, personal skills and attitudes necessary for successful completion of a neurosurgical training program.

A questionnaire was sent to 185 active members of the Canadian Neurosurgical Society, asking them to give a numerical rating of the importance of 22 personal skills and attributes, and their ability to teach those skills and attributes. They were asked to list any additional skills or attributes considered important, and rate their ability to teach them.

Sixty-six (36%) questionnaires were returned. Honesty, motivation, willingness to learn, ability to problem solve, and ability to handle stress were the five most important characteristics identified. Neurosurgeons thought they could teach problem solving, willingness to consult informed sources, critical thinking, manual dexterity, and communication skills, but honesty, motivation, willingness to learn and ability to handle stress were difficult or impossible to teach.

Honesty, motivation, willingness to learn, problem solving and Stress management are important for success in a neurosurgical career. This information should be transmitted to medical students at “Career Day” venues. Structuring letters of reference and interviews to assess personal skills and attributes will be important, as those that can't be taught should be present before the start of training [10].

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