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Opinion

A Day in the Life of a Surgeon Educator in 2030

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Abstract

Over the past forty years, the integration of technology into medicine has initiated a significant transformation in healthcare. This rapid technological progression is poised to greatly accelerate advancements in surgical education. This opinion piece explores the future of surgical education through a narrative approach, highlighting the major shift towards digitalization in the healthcare sector. It focuses on the integration of artificial intelligence, virtual reality, and interactive digital platforms, which collectively enhance patient care, resident training, and foster global educational collaboration. Central to this evolution are AI-driven clinical assessments, virtual reality simulations for surgical training, and the incorporation of digital media in educational and procedural broadcasting. The dramatic changes in surgical education brought about by these technological advancements are highlighted, emphasizing their role in facilitating ongoing learning and contributing to the worldwide progression of surgical practices and education.

Keywords: Surgical Education, Digitalization, Artificial Intelligence, Virtual Reality, Collaboration

Abbreviations: SE: Surgeon Educator; AI: Artificial Intelligence: VR: Virtual Reality; MMC: Morbidity and Mortality Conference; CEE: Continuous Education in Education

Leveraging Digital Platforms for Surgical Education and Patient Care

Dr. Surgeon Educator (SE) started his Thursday morning by reviewing the "AllSurg" app for inpatient monitoring and teaching updates. AllSurg is a universal app used by surgeons, residents, students, nurses, and adjunct teams. With the proliferation of mobile health apps throughout the years, there's been a significant shift towards digitalization in healthcare [1]. The team dashboard status shows no alerts apart from a note from the thrombo team. This note suggests considering anticoagulation for a post-trauma splenectomy patient. The team's review of literature recommends starting anticoagulation cautiously. Links to evidence for the proposition are highlighted. The resident on the team has a new learning objective from the case—anticoagulation uses in operative trauma patients. The trauma fellow has put forward a proposal to evaluate institutional outcomes of anticoagulation in trauma patients and contrast them with regional and national results. The proposal description is linked to/shared with the department members and research groups in the AllSurg app.

Students have provided input on patient care, producing thorough follow-up notes. Recommendations for new learning objectives based on the post-splenectomy case aim to enhance clinical assessment of patients with bleeding, guided by artificial intelligence (AI) analysis. Harnessing the capabilities of AI not only offers a secure environment for trainees to refine their skills, but it also allows for the analysis of extensive surgical procedure datasets, pinpointing areas of improvement [2]. AllSurg's AI will develop post-learning exercises, with the senior resident overseeing this learning opportunity. Another surgery team has shared a case in AllSurg featuring intriguing findings, inviting all surgery students to contribute their insights.

Dr. SE explores AllSurg's news section to find surgical updates. He notes an upward trend in "New Results from Endoscopic Laser Therapy" in the North American surgical innovation category, while "Nano Testing of Micro-metastasis" is popular globally. These trends are driven by substantial contributions from surgeons and researchers, emphasizing the importance of remaining updated

with surgical innovations for optimal patient care [3]. The "Globalization of surgical education" topic has remained a strong second trend for seven weeks. Several related trends call for the creation of global surgical education programs.

Strategic Agenda for Enhancing Surgical Education and Training

While going through the other AllSurg sections, a reminder pops up to review today's surgery department meeting agenda. A few items that require additional discussion are highlighted.

These items include the following:

a. Preparing surgical cases to participate in the virtual morbidity and mortality conference (MMC) next month. Feedback from last month's MMC and analysis of interactions (synchronous and asynchronous) with recommendations are available to review.

b. Providing recommendations or article choices for the virtual journal-club hosted and moderated by X University. Given that AllSurg trends highlight laser endoscopy, submissions related to this topic, including relevant articles, media, and cutting-edge experiences, are particularly favored.

c. Semi-annual review and analysis of the resident learning experience from the national asynchronous forum. Key topics of focus include the potential necessity (or lack) of moderation, adjusting learning objectives based on the content of the discussions, and the introduction of specific subgroups tailored to distinct learning requirements that merit additional discussion.

d. Reviewing residents' feedback from their learner-based simulation training. Residents created new simulation cases in virtual reality (VR) format that require evaluation. Based on the AI analysis of the resident operative case videos, new operative learning objectives have come out. These objectives are integrated into the latest VR cases. Further adjustment of the VR cases is required to accommodate students' training levels.

e. Updating the information and media network to facilitate sharing operative room video broadcasting to PACU, ICU, and patient's next of kin. Moreover, adding more monitors to the nursing stations, waiting areas, cafeterias, and corridors to broadcast healthcare educational materials.

f. Finalizing the preparation of the Dean's call for inter-college collaborative efforts with the College of Education and the College of Engineering. The dean has recommended meeting with the teams from the College of Education and the College of Engineering. These specialized teams provide educational support, planning and professional development assistance. The collaborative efforts continue to aid education-led technology application to avoid slipping into technology-led education. The role of learning theories and educational needs in leading education has been emphasized.

The current projects of these collaborative efforts include the following:

a. Reviewing the use of AI analysis to evaluate trainees' operative procedures, clinical notes, patient care outcomes, responses to assignments, and participation in regional and national discussion forums. Providing individualized feedback to the trainees through the same application will be discussed and introduced.

b. Revamping the educational curriculum to introduce clinical exposure earlier in medical or premedical school, while beginning subspecialty training after two years of foundational surgical instruction. Students can join structured and supervised clinical experiences according to their educational level and learning objectives.

c. Using situation-based learning approach in addition to problem-based learning to enhance learner competency in evaluating situations and distinguishing normal from abnormal situations (presence of problems).

d. Refining the requirements of the continuous education in education (CEE) for academic surgeons. Shared resources, learning opportunities, and supervision on demand are updated. In addition, more courses and learning objects are offered in cognitive psychology, social psychology, and educational psychology tailored to specific educational needs.

e. Revisiting the recommendation provided by the College of Education to separate evaluation from teaching to enhance participation without being judged.

f. Open discussion to address recently shared ideas, such as optimizing the use of questioning in education, deep learning in surgery, knowledge transfer through non-textual media, preparing or sensitizing receptors for learning, teaching using an imagery thinking approach with an animated infographic, teaching with perception-enhancing motion-picture, experiential cognitive training of surgical skills, distance supervision and feedback for surgical procedures, and lastly the rising call to divide surgical training into smaller modules based on learning domains and tasks.

g. Dr. SE resumes his academic day schedule after finishing his clinical and teaching rounds with residents and students. He has review and reflection to do on his performance in the AllSurg app. This practice not only benefits his training but also serves as a valuable tool for life-long learning [4]. His national recognition is rising for his contribution and role at the national and global levels. He is preparing to present his vision for surgical education in 2100.

Conflict of Interest

The authors declare no potential conflict of interest.

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