Ethical Approaches in General Surgery Residency Training: A Blended Learning Module Trial

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AIM: This study aimed to develop a blended training module focusing on ethical approaches within general surgery residency training and to assess the impact of this training on participants.

METHODS: Based on the literature review and input from both general surgery residents and trainers, 14 topics were identified, and corresponding learning objectives were formulated. The training was conducted through a blended learning module, which encompassed online video presentations alongside face-to-face sessions involving real-life cases. Assessment of the training involved administering test-formatted exams both before and after the training, which assessed the learning objectives of the 14 topics. These exams comprised multiple-choice questions and true/false inquiries based on case-based propositions. Additionally, feedback regarding the training was solicited from the residents.

RESULTS: The study involved 20 general surgery residents. Assessment revealed a statistically significant increase in exam success among the residents after the training ($p<0.001$). Additionally, feedback indicated that the training model was effective.

CONCLUSIONS: Developing a blended learning module that combines online and face-to-face education, supplemented with real-life case studies, and incorporating discussions on ethical dilemmas during face-to-face sessions, along with assessment through exams, will significantly enhance the proficiency of residents in surgical ethics. (J Surg Ed 81:1–9. © 2024 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights are reserved, including those for text and data mining, AI training, and similar technologies.)

KEY WORDS: Blended learning, Medical education, Residency Training, Surgical Ethics

COMPETENCIES: Medical Knowledge, Interpersonal and Communication Skills

INTRODUCTION

Surgery distinguishes itself from other medical disciplines due to several characteristics, including the necessity for swift decision-making based on situational factors, the concept of healing through initial damage, and the direct manipulation of the body. This field is inherently prone to complications, errors, and risks, particularly during procedures conducted under uncertain conditions. Such evolving circumstances demand ethical conduct, fostering an effective and mutually beneficial relationship between the patient and the surgeon, built upon trust.[1] This necessitates that surgeons possess not only surgical proficiency but also moral competence. Consequently, the perception of the surgeon within society is heavily influenced by this relationship. Establishing and maintaining this relationship on a foundation of correctness and reliability facilitates the provision of care that aligns with societal needs on a broader scale.[2] Therefore, surgeons must possess knowledge of surgical ethics and apply this knowledge in their professional practice.

While medical students are introduced to the four basic principles of medical ethics; beneficence, nonmaleficence, autonomy, and justice, during their time in medical school,[3] their understanding of ethical dilemmas typically deepens through exposure to real-world

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situations during clinical rotations. However, this knowledge-based education may require further development in terms of practical approach and decision-making when faced with ethical scenarios encountered in clinical settings.[4] Upon transitioning to residency in surgical specialties after medical school, residents are confronted with the realm of surgical ethics, which presents nuances distinct from general medical ethical principles.[5] Particularly, managing ethical dilemmas arising during surgical procedures differs from managing surgical patients based solely on evidence-based principles. Unlike the management of surgical patients, responses to ethical dilemmas are not solely data-driven, making the approach more complex.[6] Instances such as errors in decision-making, lack of attention, and communication problems—often categorized as nontechnical skills—have been noted to contribute significantly to malpractice lawsuits, underscoring the importance of surgical ethics in addition to technical or knowledge competencies.[7-9] As such, it is imperative for residents to be exposed to the management of situations pertaining to surgical ethics, which are likely to pose frequent challenges in their future professional careers. To enhance retention and understanding, education supplemented with case examples has been deemed more effective in addressing these complexities.[10-12]

Blended learning, characterized by the fusion of traditional face-to-face instruction with asynchronous or synchronous e-learning components, has gained prominence, particularly in health education, owing to its benefits, including the prior acquisition of theoretical knowledge.[13,14] A meta-analysis has revealed the effectiveness of blended learning in enhancing knowledge acquisition within medical education.[15] Time management holds significant importance in the fast-paced field of medicine, which demands continuous education. Blended learning offers a viable solution for delivering essential training amidst hectic schedules that necessitate careful time allocation. Consequently, it serves as a means to save both time and effort in medical education and practice.[16,17]

Based on these findings, it has become evident that surgeons require comprehensive training to enhance both their professional competence and their skills to use surgical ethics effectively in professional practice. As such, this study aimed to develop a blended training module focusing on ethical approaches within general surgery residency training and to assess the impact of this training on participants.

METHOD

The research, which was designed as an interventional education study, was carried out with 20 residents in the Department of General Surgery of Gulhane Faculty of Medicine, at University of Health Sciences. In the study, it was designed as a blended learning module with both online theoretical lecture videos and social media application where questions about the topics could be asked and the section where the topics were discussed face-to-face with real-life cases.

It has been observed that there is a need for a systematic/structured education on "ethical issues" specific to their field of study during the residency for general surgery residents both in our country and the World.[1,18] An education module was designed to overcome this deficiency. In the preparation phase, the topics that should be included in this module were determined by detailed literature review and interviews with residents and medical educators. Two methods were used to determine the topics that general surgery residents may have ethical difficulties during their professional practice. First, a detailed literature search was conducted on the research topic. As a result of this research, the most common 20 basic topics were identified.[1,19-21] Afterwards, three general surgery residents who were in the last year of general surgery residency training, were asked to choose the 10 topics that they had the most difficulty in their daily practice by ranking them.

The 10 topics they chose, in order of most preferred are shown below;

1. Ethical approaches in communication.
2. Ethical approaches in patient examination.
3. Decision making in surgical procedures.
4. Professionalism.
5. Ethical approaches in elective surgical interventions.
6. Informed consent.
7. The role of religion/spirituality in medicine.
8. Supervision.
9. Justice in the use of health services and resources.
10. The importance and basics of ethics in surgical practice.

In addition to the 10 topics above, 4 more topics (Organ transplantation ethics, Documentation issues, Research ethics in surgery, Academic publication ethics) were added to the training program as suggestions of the trainers involved in the study.

In order to prepare the core topics online, the educator group, including medical educators, determined the learning objectives and selected the appropriate academicians to present them. Care was taken to ensure that the academicians were experienced in their servers topics. The scope and method of the study with learning objectives of the topics they would present, were conveyed to the experts. They were also asked to prepare appropriate questions according to the learning objectives to be used in the assessment. Academics were

asked to shoot videos that would be 12 minutes on average by evaluating the topics they would explain according to the effective information delivery time and the planned platform area.[22,23] On average, preparing and shooting the videos took between 4 and 11 hours. Permission documents were obtained for the use of the videos. In order for the video presentations to be uploaded and easily followed by the residents, they were uploaded to "https://lms.gazi.edu.tr/almsp" address in "Gazi University Distance Education Application and Research Center Learning Management System." In this way, residents were provided with 24/7 access to the videos.

A social media platform was created for them to ask questions about these issues.

The "Turkish Medical Association High Honor Board (TMAHHB)" was contacted to provide real-life cases for use in face-to-face education. TMAHHB have consented to our use of cases related to adjudicated events, in compliance with personal data protection regulations. We requested cases related to 14 predetermined topics and received 16 cases in total. From these, we selected 8 cases that best suited our learning objectives. These 8 cases were then modified to fit 11 topics, with adjustments such as changing names and locations to ensure anonymity while preserving the educational goals.

Additionally, educational materials on informed consent, research ethics in surgery, and academic publication ethics were prepared using published articles from the literature.

After the preparation process was completed, the implementation of the study was carried out in May 2022. Prior to the study, residents were called and a pretest (including 20 multiple choice questions) was administered to assess their knowledge on the subjects, which included topics covering the learning objectives of 14 topics. Content validity was established by creating a blueprint that matched the questions developed by academicians with the learning objectives. Each question was thoroughly reviewed by experts in medical education. At least one question was included for each topic. The questions were prepared by the academics who delivered the presentations, aligning with the key learning objectives of each subject. In topics with multiple questions, care was taken to ensure that each question addressed different learning objectives. Afterward, the residents were given a one-week period to watch theoretical videos prepared for distance education on the computer at their convenience. Through the social media group created during the same period, residents were given the opportunity to ask questions about the topics and access educational materials to be used in face-to-face training. Subsequently, they were called for face-to-face education. A post-test, consisting of 20 multiple-choice questions based on the topics covered in the theoretical video presentations, was administered before the face-to-face sessions. Following the post-test, a pretest consisting of 4 cases (20 questions in total) was administered to evaluate case-based topics and assess participants' recall and evaluation levels on the subject prior to the face-to-face training. Each case included 5 questions. The questions in the tests were prepared in the form of propositions and their answers consisted of "true" or "false" options. Using true/false propositions, the formation of phenomena, the sequencing of their causes, and the evaluation of their results were addressed as a cohesive whole. Then, face-to-face training was carried out. One week after the training, the residents were called in to complete the post-test, which included case questions. Face-to-face training was carried out by 2 educators in the clinical classroom of the hospital where the practice was performed. Eight cases, obtained from TMAHHB and reorganized in accordance with ethical guidelines, were used. After each case was presented by educators, a structured discussion was opened. In the structured case discussion, the following questions were used as standard, although there were differences for each case:

"When evaluating the case as a whole, do you find any ethical issues?"
"If you were the first physician to encounter this case, what approach would you take?"
"Is there an ethical issue with the approach to the patient and the practices up to this point in the case?
"When each part of the case is evaluated individually, do you think there is an ethical problem? If so, in which part?"
"Who caused the ethical problem?"
"What approach do you believe could have prevented the ethical issue in this case?"

For the questions above, the answers of all participants were taken one by one and the questions from them were answered. The group discussion continued until the learning objectives were reached. When the questions related to each case were exhausted, it was considered to be sufficient and the group moved on to the next case.

After the cases, the practices covering topics of informed consent, research ethics in surgery and academic publication ethics were started. For the related practices, the training materials were shared with the residents before the face-to-face education, were asked to be read. These practices included various articles selected from the literature and materials that exemplified situations contrary to publication and/or research ethics. A structured discussion process was prepared to work on these materials. Each of the exercises was first

reminded and summarized with a presentation and then opened for group discussion. The session was ended after all the problems related to informed consent and behaviors contrary to research and academic publication ethics were identified by all residents. All the questions of the participants were answered and the question of "what would be the right thing to do?" was discussed.

Finally, a feedback questionnaire, including open-ended questions, was administered to obtain the residents' opinions and evaluations about the education. In the open-ended feedback, in addition to the positive and negative opinions of the residents about this education, the topics and/or suggestions that they wanted to be changed or added were received. In addition, a 5-point Likert-type questionnaire was applied to evaluate the education, including the subject of the education, education material, educators and duration of the education.

Ethics of Research

Ethical approval was obtained for the research from the "Health Sciences University Gülhane Scientific Research Ethics Committee" at the 20th session of December 17, 2020 (Date: 17.12.2020 Meeting No: 2020/20 Project / Decision No: 2020-486).After informing the volunteer residents who took part in the study about the study, a signed "Informed Voluntary Consent Form" was obtained from those who agreed to participate. Permission was obtained from the TMAHHC while the cases were obtained. A confidentiality agreement was signed for the right to use the information in the cases received. The information in the cases received from the TMAHHC was used by changing the place, time and location, and thus identity information was kept confidential. In accordance with the provisions of the confidentiality agreement, subject-based themes were created for each subject in accordance with the learning objectives. The study was carried out on the themes related to the subject and cases.

Statistical Analyses

Statistical analyses were performed with "IBM SPSS for Windows Version 25″. The results for continuous variables were presented as mean ± standard deviation, and for categorical variables, they were summarized as frequency and percentage. Comparison of continuous variables for two dependent groups was performed using paired samples t test. To ensure content validity, it was correlated with the specification table. p value less than 0.05 was considered statistically significant.

RESULTS

In this study, 20 residents (4 female and 16 male) who completed all stages (graduated from medical school and continuing general surgery residency) participated.

Participants first watched 14 videos on core topics. The evaluation of these topics was done with multiple choice questions before and after the training. The comparison of the evaluation results of the test exams is presented in Table 1. In the statistical evaluation, the results were evaluated as statistically significant.

The results of the evaluation tests of the residents before and after the case-based education are presented in Table 2. The results were evaluated as statistically significant (p<,001).

In the evaluation of both the exams of core subjects and case-based exams, greater improvement was observed in the subjects of surgical professionalism, ethical approaches in elective surgical interventions, ethical approaches in communication, supervision, organ transplantation ethics, documentation issues and publication ethics compared to other subjects. The rate of correct answers to questions related to these topics increased after the education.

Evaluation of Education

Residants' opinions about education and educators were evaluated. The first question is related about a need for such training. The 90 % of residents mentioned the need of such a training. The other topics as "*pretraining briefing, blended learning program, duration, content, expectation fulfillment level, diversity of examples and practices, contribution to individual development, presentations, educators' knowledge and mastery of the topics, how educators present the topic and educator communication"* were used to evaluate their opinion about the education and educators on a 5-point Likert scale. Their opinion with 85-95% good and very good.

We wanted to evaluate this study with open-ended feedback by the residents with a few questions. The

TABLE 1. Evaluation of the Core Topics With Multiple Choice Questions Before and After the Education Applied With Online Videos

	N	Mean	Std. Deviation	Std. Error Mean	P
Pre test	20	56,5	9,47295	2,11822	<,001
Post test	20	79	6,99624	1,56441	

TABLE 2. Evaluation of Face-to-Face Case-Based Education With Case-Based True-False Questions Before and After

	N	Mean	Std. Deviation	Std. Error Mean	*p*
Pre test	20	63,5	9,47295	2,11822	<,001
Post test	20	79,5	10,24695	1,56441	

open-ended feedbacks of the residents are presented at Appendixs A.

Based on the data obtained, it can be concluded that the residents had limited knowledge about the topic before the intervention, gained more knowledge afterward, and found the intervention valuable.

DISCUSSION

In this study, we emphasized the significance of not only cultivating surgical expertise but also equipping physicians with the requisite knowledge and skills in ethical principles pertinent to their respective fields. This holistic approach aims to ensure professional competence and fulfillment in contemporary surgical practice. To address this need, we developed a training program intended to serve as a comprehensive guide in this domain. Our study centered on the creation of a blended training module tailored to address ethical dilemmas frequently encountered in daily surgical practice, specifically designed for General Surgery residents. The program's evaluation was subsequently presented. Structured as an educational initiative, the study encompasses blended learning components, including online video resources and a social media platform for communication, alongside face-to-face sessions featuring real-life case studies.

Despite the widespread adoption of blended learning in the medical field, particularly in surgery, its applicability has often lacked robust data support.[16,17, 24,25] This issue is further compounded in surgical clinics, where the heavy workload and unpredictable emergencies may hinder the completion of planned training sessions within the intended timeframe. Consequently, in traditional educational settings, there exists a high probability of residents missing out on these crucial trainings.[16,17] However, the utilization of blended learning methodologies addresses this challenge by offering individuals the flexibility to structure their learning according to their convenience. This approach enables learners to access training materials at their own pace and convenience. Moreover, by allowing residents to familiarize themselves with the subject matter through preclass video content, the subsequent in-class discussions foster a more efficient and effective learning environment. While preclass learning is personalized, the classroom discussions facilitate guided instruction and mentorship.[17,26-28] In our study, we encountered similar challenges during the planning of face-to-face training sessions, primarily stemming from the demanding workload and unforeseeable emergencies. However, when these face-to-face sessions were subsequently conducted with residents who had already been exposed to the concentrated information provided in the preparatory videos, positive effects were observed, as evidenced by the feedback received from the residents. It was noted that residents who had attained a certain level of knowledge through the preparatory materials were better equipped to actively engage in discussions during the face-to-face sessions. A significant improvement in residents' achievement scores were also noted before and after the training in study. This enhancement was corroborated by open-ended feedback, wherein participants expressed that this type of training could serve as a model for various other subjects.

One aspect that residents highlighted was the convenience of being able to revisit core topics and rewatch the videos at their own discretion. This type of study module affords residents the advantage of 24/7 access to essential topics through videos, supplemented by a social media platform for addressing questions. Social media platforms, stemming from advancements in information technology, have revolutionized communication and collaboration in education. This has elevated teaching and learning practices to new heights. Leveraging the expertise of both experienced residents and trainers, social media can facilitate student-centered learning. The integration of social media into blended learning, particularly in higher education settings, holds the potential to transition from traditional classroom learning to asynchronous 24/7 education.[29,30] In the study, a social media platform was established for residents to pose questions 24/7 regarding the asynchronously watched videos, with detailed instructions provided for its utilization. However, it was observed that residents favored asking their questions during face-to-face sessions rather than on the social media platform.

During the preparation of the education program, literature research played a primary role in topic selection, drawing upon existing scholarly sources.[1,19-21] Through this literature review, ethical issues were explored from

various perspectives, with particular emphasis on problems related to decision-making and communication among healthcare providers and patients, as well as within healthcare teams. These issues emerged as the most frequently identified ethical dilemmas. In addition to the topics identified through the literature review, four additional topics were incorporated based on suggestions from trainers. These topics (Organ Transplantation Ethics, Documentation Issues, Research Ethics in Surgery, and Academic Publication Ethics) were deemed essential for a general surgeon's daily practice and were anticipated to be beneficial for their future professional endeavors. As a result, they were included in the training program.

In order to foster effective learning during the educational process, it's imperative for trainers to employ methods that capture residents' attention and encourage their active engagement. In adult education, case-based learning is recognized as one such method.[12,31] This approach is valued for its ability to translate theoretical knowledge into practical application, serving as evidence of critical thinking skills and influencing behavior. Moreover, case-based learning facilitates the attainment of high-level cognitive goals, aligning with Kirkpatrick's 4-step learning hierarchy.[32,33] In our study, we utilized real cases obtained from the TMAHHB with special permission. These cases were reorganized to comply with confidentiality rules. Face-to-face discussions centered around these cases demonstrated the utility of the topics in achieving the intended learning objectives. Notably, the cases covered multiple subjects, allowing for the simultaneous exploration of various learning objectives. Feedback from residents underscored their preference for the case-based study module, indicating its effectiveness and appeal.

In our study's training program, we initially employed a multiple-choice test[34] to assess the cognitive learning domain. Following this, we used case-based true/false exams to objectively evaluate cognitive objectives, ranging from basic knowledge to the highest levels of comprehension. These exams included numerous questions that tested generalizations, comparisons of general ideas, and the evaluation of causes and consequences of events.[35-36] Given that blended learning was utilized in this study, it was considered that this examination method could more effectively measure the achievement of cognitive goals at a high level of comprehension in case-based learning.

Ninety percent of residents believed that such training was necessary and emphasized the importance of addressing this issue during their program. Between 80% and 95% of residents rated the selection of topics as very good or good. They agreed that a blended learning including online and face-to-face sessions was appropriate. The most acclaimed aspects of the program included the engaging visual materials, the active exchange of ideas between trainers and participants, the coverage of ethical issues, the use of case studies, the importance of being prepared for in-person lectures, and the thought-provoking nature of the cases. Although participants suggested that the cases could be discussed in greater depth, discussions continued until it was clear that the learning objectives had been met and no further questions remained. Additional recommendations for improving the training included incorporating live simulations and repeating the sessions with varied and more cases, to ensure continuity. Participants also noted that this type of training helps reduce boredom and is overall highly effective. However, two participants expressed discomfort with witnessing the real-time events in the case studies, particularly the ethical violations that had occurred. Overall, these general feedback indicates that the residents found the training program valuable.

In this study, the aim was to develop a training program capable of fostering professional competence throughout the residency training process, thereby addressing the demands of modern surgery and preempting ethical dilemmas or facilitating their resolution. The intricate relationship between medical ethics and law is particularly pronounced within contemporary medical practices, with surgery exemplifying this interplay. Given that surgical interventions directly impact bodily integrity and necessitate instantaneous decision-making, various uncertainties arise, necessitating ethical considerations in decision-making processes.[1] At this juncture, ethical conduct holds equal importance to medical knowledge. While residents may not encounter certain ethical dilemmas during their formal education, it's crucial to prepare them for such scenarios in their future medical careers. Therefore, offering comprehensive education on these topics, coupled with real case-based studies, is essential for cultivating an ethical approach to patient care. Key issues such as "errors in decision-making" or "communication problems," which frequently feature in malpractice lawsuits stemming from inappropriate and unethical behavior in healthcare delivery, constitute core topics addressed in this study. By addressing these topics comprehensively, residents can better navigate ethical challenges they may encounter in their professional practice.[7] In our study, when residents were asked to identify the most common problems they encountered, the top three issues identified were ethical approaches in communication, routine patient examination, and decision-making. This finding underscores a genuine need for focused attention and training in these areas. It highlights the importance of addressing ethical approaches in communication, ethical patient

examinations, and decision-making skills to navigate complex ethical dilemmas effectively.

As a general evaluation, this study introduces a blended learning module and assesses its effectiveness in addressing ethical problems and solutions encountered by General Surgery residents in their daily practice. The aim is for the content and outcomes of this program to serve as a roadmap, not only for general surgery but also for various specialty trainings. By further refining and discussing the content and results of this program, it is envisioned that valuable insights can be gleaned to inform and enhance ethical education across different medical specialties.

Limitations

The study has several limitations that need to be acknowledged. Firstly, the small number of participants is a significant constraint. Out of 25 residents, only 20 were able to participate in the study, with four individuals unable to take part in all aspects due to various reasons, and one excluded from data analysis due to graduation. This limited sample size may have impacted the generalizability of the evaluation results. The second limitation pertains to the platform used for hosting the online video presentations. Although participants verbally expressed difficulty in viewing these videos on their cell phones, this feedback was not consistently reflected in their open-ended responses. And the final limitation was that the educators who taught the modules were also the ones who prepared the assessment questions for the residents. However, careful attention was given to content validity in the preparation and selection of these questions.

CONCLUSION

This study proposes an "ethical approaches training" that can be integrated into residency programs to enhance both professional competence and legal compliance in modern surgery. Designing a blended learning module incorporating online and face-to-face education enriched with real-life case studies, engaging in face-to-face discussions on ethical dilemmas, and evaluating the training through examinations will significantly enhance residents' understanding of surgical ethics.

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SUPPLEMENTARY INFORMATION

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jsurg.2024.09.010.