

Attending Operating Rooms for Clinical-Years Medical Students: Benefits and Barriers

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Abstract

Background and Aim: Attending operations is part of medical school education. This research studied the benefits and barriers facing students in the operating theaters. It also looked for student, surgeon and environmental factors that could play a role in participants' understanding. The aim was to explore the effect on participants' perception and understanding of surgical techniques to shed light on the obstacles faced, and whether the learning objectives, either in general surgery or sub-surgery courses, can be achieved.

Materials and Methods: This cross-sectional, questionnaire-based study used an electronic questionnaire (Google Forms), and 287 responses were received. Data were then analyzed using SPSS software.

Results: Of the 287 medical students who completed the questionnaire, 83% of those who scrubbed-in confirmed that scrubbing-in and being part of the operating team provided them with a better understanding. Laparoscopic-type surgeries carried a better teaching benefit. Neither the number of students attending the theatre, attendance at previous surgical skills courses, or the future specialty interest of the medical student had a significant correlation with the benefit of attending the operating rooms. Our findings align with those of many other studies, in that the main points are the role of the surgeon, the environment, and the importance of scrubbing-in.

Conclusion: A surgeon who provides good explanations and a student who knows the learning goals before going to the theatre, as well as a friendly environment, were found to achieve the best combination with the best outcome.

Keywords: Barriers, benefits, medical students, operations, surgery, teaching

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INTRODUCTION

Operation room (OR) attendance is part of medical school education worldwide, and is one

of the three essential components of clinical training besides clinics and teaching rounds. Theater-based learning allows students to view surgical knowledge from a different perspective, enabling them to see real human anatomy in addition to the theoretical knowledge they have gathered from books and surgical techniques chapters; they can also experience teamwork and scrubbing-in, as well as be exposed to a new environment with

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unpredictable events and stressors. However, little information was found in the literature regarding the role and importance of OR attendance for medical students.

In our research, we study the benefits and barriers facing students in OR from various viewpoints, including emotional issues such as feeling fear, anxiety and stress, social environmental issues related to gender-specific surgeries, feeling underestimated or unwelcomed by surgical staff, and comparing the experience to other hospitals. We also study logistic/organizational issues, such as the number of students and their ability to visualize the procedure clearly. These two factors are considered in addition to other issues related to the educators and students, such as the surgeon being busy or not providing illustrations, or the students being ill-prepared, having inadequate anatomical knowledge, and being unwilling to specialize in surgical fields. We also compare open versus laparoscopic surgeries from the students' viewpoint.

MATERIALS AND METHODS

Study Design

This cross-sectional study was conducted in October 2020, at Jordan University Hospital (JUH), a teaching tertiary hospital in Amman, the capital of Jordan. The target population was interns and medical students in the fifth and sixth clinical years at Jordan University (JU), School of Medicine. These students either had done or were doing rotations in general surgery or sub-surgery courses and had attended surgeries at JUH.

Data Collection

An electronic questionnaire using Google Forms was distributed to the participants by the research team via e-mails and different social media channels. Two hundred eighty-seven voluntary responders completed a quick, five-

minute, predesigned questionnaire. Participation was entirely voluntary and non-participation had no effect on students' training in the hospital or their evaluation. Data privacy was assured and participants' identities remain anonymous.

Statistical Analysis

Data were extracted from Google Forms and transformed into tables using Google Sheets and Microsoft Excel, after which the data were analyzed using SPSS and a *t*-test.

RESULTS

The results of the statistical analysis are presented in tables, charts, and text.

Table 1. Demographic Analysis

	Category	Number of participants (%)
Gender	Male	95 (33%)
	Female	192 (67%)
Academic year	5 th year	72 (25%)
	6 th year	178 (62%)
	Intern	37 (13%)

According to Table 1, our survey included 287 medical students; almost one-third of the participants were males and two-thirds females. Our responders were from the fifth and sixth years, and intern doctors. There was no association or correlation between gender or academic year in relation to operation understanding (*p*-values 0.667 and 0.316, respectively). However, we found a significant association between participant role in surgeries and the understanding of operations. In other words, around 50% of participants had experienced scrubbing-in for a surgery, and 83% of those who had scrubbed-in confirmed that this and being part of the operating team helped them understand the surgical steps.

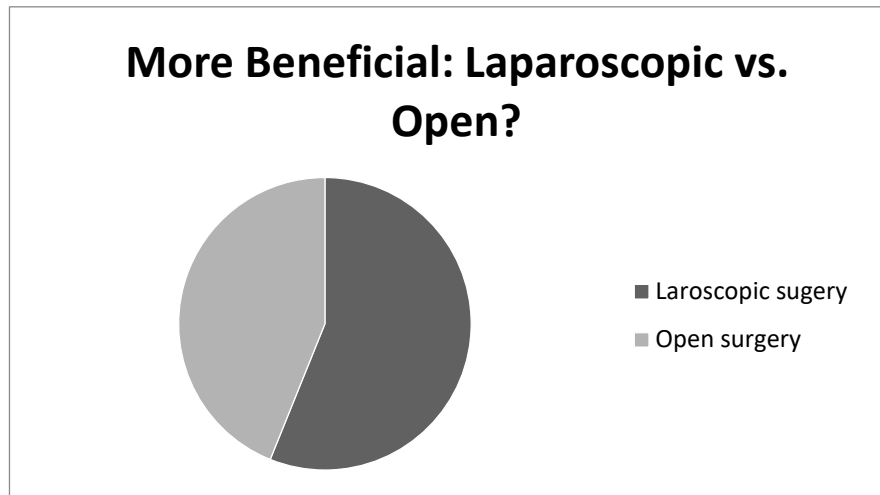


Figure 1. Which is more beneficial: laparoscopic vs. open?

Additionally, we found that the type of surgery (open or laparoscopic) was also significantly associated with a better conception and understanding of operations (p -value 0.001), with the laparoscopic technique being associated with more benefits (Figure 1).

When digging deeper regarding different subspecialties of surgeries, our data showed that thoracic, abdominal, head and neck, ENT, orthopedic, and urology surgeries were all associated with significant p -values, as illustrated in Figure 2 below, reflecting a good understanding.

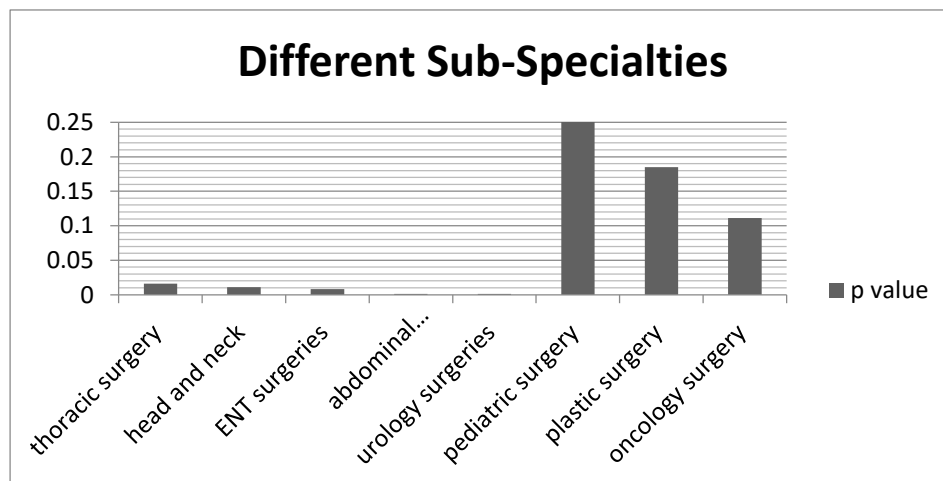


Figure 2. Good understanding of different sub-specialties

The interactive role of the chief surgeon while giving explanations, illustrations and creating an interactive scientific teaching session inside the OR was shown to have a strong correlation with students' better understanding and satisfaction (p -value 0.001).

On the other hand, regarding student factors in the learning process in the OR, we found that knowing the learning goals beforehand and preparing the surgery topic improved student understanding in the OR. It is worth mentioning that the future interest of the students and

having a good anatomical knowledge was not strongly related to a better understanding of surgery details (p -values 0.124 and 0.053, respectively).

Environmental factors were also investigated in our questionnaire, to study their effect on students. For instance, feeling welcomed, facing humiliation and victimization, staff underestimation, not caring about students and being distracted by the theatre environment were all found to have a significant relation (p -values 0.001, 0.002, 0.001, 0.001, and 0.001,

respectively), while the number of students in the OR, having attended previous surgical skills courses, and how participants spent most of their time during the operation had no significant correlation (p -values 0.583, 0.555 and 0.56, respectively).

Finally, feeling stressed and shy during gender-specific surgeries, in addition to being tired, had a significant correlation with lower understanding and satisfaction among the students (0.004, 0.014 and 0.001, respectively).

Table 2. Analysis of the role of surgeon, student and environmental factors

Category	Sub-category	p-value
Surgeon-related	Surgeon explaining	0.001
Student-related	Knowing the learning goals before going to the theatre	0.001
	Having a good anatomical knowledge	0.053
	Preparing the surgery topic	0.001
	Future interest	0.124
	Feeling stressed and anxious	0.004
	Feeling shy during gender-specific surgery	0.014
	Feeling tired	0.001
Environmental-related	Humiliation and victimization	0.002
	Staff underestimation	0.001
	Not caring about students	0.001
	Distraction by the theatre environment	0.001
	Number of students	0.583
	Feeling welcomed	0.001

DISCUSSION

The OR is a unique and new environment for students and it may be considered a stressful and shocking setting for some, especially at first encounter; however, it is a requirement for surgery courses because there are various experiences to be gained and much to learn from theater and surgeries. Nevertheless, there are many barriers facing students which affect their learning and prevent surgeons from playing a positive role. Indeed, our data suggest that several factors influence the teaching and learning process for medical students in the OR. Forty eight percent of our study sample were satisfied with attending operations and stated that it helped them to study surgical courses because of the many factors affecting their experience. Our study suggests that when medical students play an active role in surgeries,

such as through participating or scrubbing-in, this is more beneficial than simply observing; 48% of medical students had scrubbed-in before, and 83% of those who had done so thought it more beneficial to be an active participant in surgeries. This may be due to the direct visualization of the subject, the high chance of being involved in the surgery, and having the ability to ask questions about the operation. In a previous UK study, it was found that the rate of attendance increased more than 50% when students had the opportunity to scrub-in [1].

Our data also indicate that laparoscopic surgeries helped the students understand better, with 56.1% preferring laparoscopic surgeries. This might be related to better visualization with larger, clear images on screen, which overcome the obstacle of having many students in the OR. On the other hand, a study carried

out in 2012 found that medical students felt their learning and understanding were greatest during open procedures because laparoscopic surgeries need some imagination [2].

Authors have emphasized the importance of the surgeon being a positive role model [3]. Schwind concluded in his research that the learning environment in the surgery is more conducive to learning if the surgeon is a positive role model [3]. In our research, the students reported that 57.5% of the surgeons in the JUH did not cooperate with them, and most of the students (59.4%) did not benefit from these surgeries. It may be that the surgeons did not have enough time to explain what was happening, or that some surgeons believe particular surgeries require a higher level of information and detail than undergraduate students need. In all cases, we cannot deny the importance of explaining the surgery to the students, and indeed other members of the team can help the surgeon in this role. Also, the surgeon can explain what is about to happen before proceeding.

When exploring the factors affecting OR benefit, research carried out by Zundel et al. found that students benefitted from knowing the learning objectives since not knowing them led to less knowledge gain [4]. Students who knew both what was expected from them and the learning goals of the surgery had better understanding. The same applied to students preparing themselves by studying the topic before the surgery, as [4] also found a negative impact when students were not informed about upcoming surgeries, as this prevented them from being personally and emotionally prepared. Again, two of the potential barriers facing students are a lack of clear learning objectives, and students being unable to predict which surgeries they will attend; for these reasons, they cannot prepare. Therefore, it would be better to extend the reach of the surgeries schedule so that students are alerted before they attend.

Other factors have also been found to improve learning outcomes. One is clarification of the learning outcomes at the beginning of the course. Research on OR attendance performed

in UK stated that predetermined learning outcomes add relevance and objectiveness to the experience and may also overcome the discrepancy that exists between student and surgeon objectives [5]. In research performed in 2009, it was found that having OR simulations at the beginning improved understanding of theatre etiquette, dynamics, and theater jargon [6].

Emotions in the clinical setting affect the students' ability to concentrate and thus to benefit, especially in such a stressful environment. For example, 48.8% and 51%, respectively, of students felt anxious or tired during surgeries; this had a negative impact on their comprehension and level of benefit from attending the surgery. Major surgeries and those attended after a long day of teaching were strongly associated with lower benefits. In a study of factors affecting medical student learning in the OR [7], 'emotive responses to the OR environment, and experience, directly affected a student's consideration of surgery as a potential career option'. Some students feel shy during gender-specific surgeries, and this had a negative impact on understanding, as could staff underestimating the students' attendance, both of which could have influenced the students' desire to attend the surgeries.

Teaching by humiliation and intimidation in surgery are well-documented barriers. For example, students in a 2012 study reported that 'Scrub nurses sometimes shout at you if you are not practicing OR etiquette', which stresses students and has been previously cited as a reason why students are discouraged from a career in surgery, since a more welcoming environment is preferred [8]. In this regard, feeling welcomed and socially included has been found to be a significant factor, since 41% of participants reported this to be a considerable advantage. Research in the UK suggested that student satisfaction is related to feeling welcome and to team integration, and so this should be practiced by all team members, including nursing staff, residents and surgeons [9]. Another study in UK found that those made to feel welcome were significantly more likely

to have attended $\geq 50\%$ of opportunities to attend OR [1].

Concerning numbers in the OR, while 74.2% of students thought the optimal number was 1–2 only, the number of students was not significant in this study. This finding aligns with that of Schwind [3]. Factors found to be non-significant regarding the students themselves are: gender, academic year, future goals, attendance at previous surgical skills courses, or how they spent most of their time in the OR. Some surgery types, and being unable to visualize the surgical field, were also found to be non-significant in our research.

LIMITATIONS

This qualitative research is not statistically representative and so cannot be generalized; moreover, causality is difficult to investigate in this type of research. Sixty-two percent of participants were sixth year students and only thirteen percent were intern doctors, which may

have affected the results. Further, 57.5% of the surgeons were uncooperative with the students in participants' opinion, but we cannot rely only on their experience without asking and analyzing the surgeons' points of view.

CONCLUSION

From this overview, we can conclude, based on our experience in the School of Medicine in the University of Jordan, and Jordan University Teaching Hospital, that clinical-years medical students' attendance at OR has multiple pros and cons. Being an active part of the working surgical team, attending a laparoscopic surgery with an interactive, illustrative teaching surgeon, and students having basic knowledge and pre-reading about the surgery, are all relevant factors that can improve both understanding of surgeries and student satisfaction and comprehension.

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حضور العمليات الجراحية لطلاب الطب في السنوات السريرية؛ الفوائد والتحديات

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الملخص

الخلفية والهدف: حضور العمليات هو جزء من الخطة التعليمية في كليات الطب. يدرس هذا البحث الفوائد والعوائق التي تواجه الطلاب في غرف العمليات. كما يبحث في العوامل المتعلقة بالطلاب والجراح والعوامل البيئية التي يمكن أن تلعب دوراً في فهم الطلاب. الهدف هو استكشاف تأثير حضور العمليات على إدراك وفهم الطلبة للتقنيات الجراحية لإلقاء الضوء على العقبات التي يواجهونها وما إذا كان بإمكانهم تحقيق أهداف التعلم المرجوة خلال مساق الجراحة العامة أو الجراحات الفرعية.

المواد والطرق: هذه دراسة مقطعية قائمة على الاستبيان، حيث تم توزيع استبيان إلكتروني (Google-form)، وتم تلقي 287 إجابة. ثم تم تحليل البيانات باستخدام برنامج SPSS.

النتائج: من بين 287 طالباً وطالبة من طلاب الطب الذين ملأوا الاستبيان، أكد 83% من أولئك الذين قاموا شاركوا في العمليات الجراحية أن المشاركة وكونهم جزءاً من فريق التشغيل ساعدهم على فهم أفضل. كذلك تبين أن العمليات الجراحية بالمنظار تحمل فائدة تعليمية أفضل من غيرها للطلاب. لم يُظهر عدد الطلاب الذين يحضرون إلى غرف العمليات وحضور دورات المهارات الجراحية السابقة والاهتمام التخصصي المستقبلي لطالب الطب ارتباطاً معنوياً بالإنتاجية المكتسبة من حضور غرف العمليات. تتفق معنا العديد من الأعمال الأدبية السابقة في نقاط رئيسية مثل دور الجراح والبيئة المحيطة وأهمية مشاركة الطالب في العمليات.

الخلاصة: وُجد أن ثلاثية، الجراح الذي يكون معلماً مفسراً جيداً، والطالب الذي يعرف أهداف التعلم قبل الذهاب إلى غرفة العمليات، ووجود بيئة عمل وتعليم ودية، تشكل أفضل تركيبة مع أفضل نتيجة.

الكلمات الدالة: العوائق ، الفوائد ، طالب الطب، العمليات، الجراحة، التدريس.