

Walking the Walk: A Review of Medical Students' Perspective of a Surgical Theatre as the New Classroom

Tamara A. Mallia,¹ Sarah Cuschieri.²

Abstract

Medical school trains eligible students for a medical degree (MD). As part of the clinical years in the MD program, students attend surgical theatre sessions to learn medical concepts from hands-on experience in the theatre. This review aims to provide a comprehensive overview of the role surgical theatre plays in the learning process and clinical experience of medical students. Google Scholar, PubMed and NCBI databases were searched for articles from 1990 to March 2022 using the search terms 'Operating Room' or 'Operating Theatre' or 'Surgical Theatre' and 'Learning', 'Medical Students' and 'Surgeons'. Only articles on medical students' perceptions on their learning experience in the surgical theatre were included. Thirty-four articles were eligible for inclusion. Unpreparedness, anxiety, lack of clear learning outcomes, fear and intimidation were the most common reported experiences by students. These demotivate medical students from attending theatre, along with poor surgical field visibility, resulting in a negative learning experience. Positive experiences during theatre time were more likely to attract students to choose a future surgical career. Limitations include the inclusion of surgical residents' perspectives and the exclusion of other surgical team members' perspectives. Studies included students across different clinical years, and results were primarily based on subjective perceptions. Evidently, the surgical theatre is a great learning opportunity for medical students. However, for this learning environment to be beneficial, students need to be included during surgical discussions and procedures. Additionally, clear learning outcomes need to be present whilst adequately training students prior to their first surgical attendance.

Introduction

Medical school is an opportunity for medical students to acquire new skills and practical competencies. This five-year journey includes being exposed to different specialties, which enables the formation of career preferences.^{1,2} Surgical competence comprises several elements, namely anatomical, physiological and clinical knowledge, technical skill, clinical judgement and professionalism.³ As a result, surgical exposure through surgical rotations is vital in medical education since the operating theatre is rich in educational resources. The operating theatre enables a change in the teaching domain, which in turn, allows for the heightening of the senses. The various stimuli present in a theatre welcome all medical students of any learning style.³ However, current literature not only addresses the benefits of surgical rotations but also its challenges in optimizing medical education.^{3,4}

A medical student's perspective and clinical experience of medical school changes once one steps into the surgical theatre for the first time. The monitors' sounds, the nurses all neatly walking past each other, and the "smell of burning flesh" heighten the senses, making the surgical theatre an unforgettable experience.^{3,5,6} As a result, the surgical theatre has become a

significant teaching tool among medical students whereby surgical conditions and procedures are discussed, observed, and, if possible, participated upon. Thus, the surgical theatre environment can enhance medical student pro-activity for their own learning and knowledge retention. Given the aforementioned stimuli, it targets all forms of senses, enabling all students with different learning styles (visual, auditory, sensory) to find the surgical theatre fruitful.⁵

Medical education, as defined by the General Medical Council (GMC), is there to certify graduates who are able to make effective decisions and function properly in their first year as a physician.⁷ Despite such regulations, studies show that 27.4% of medical students do not believe they will be taught suturing skills by the end of their medical education.^{8,9} The surgical theatre has unfortunately been perceived as a poor "teacher" because first-year doctors do not perform surgical procedures alone. As a result, medical students find this teaching irrelevant to their near future job.^{10,11} Conversely, generic clinical skills are a recommended priority and are a focus point for medical students.^{8,10,12}

This literature review aims to provide a comprehensive overview of the role the surgical theatre plays as part of the learning

¹ Fifth-year Medical Student. Faculty of Medicine and Surgery University of Malta, Msida, Malta

² MD, PhD (Public Health), MFPH (UK), MSc (Diabetes), Pg. Dip (Diabetes), Pg. Cert. (Epidemiology Public Health), MRSPH (UK) Faculty of Medicine and Surgery University of Malta, Msida, Malta.

About the Author: Tamara Attard Mallia is currently a fourth-year medical student at University of Malta, Msida, Malta of a five-year program. She is interested in medical research with special interest pertaining to COVID-19, gender and psychiatry.

Correspondence:

Tamara Attard Mallia.

Address: L-Università ta' Malta Msida, MSD 2080, Malta

Email: tamara.attard-mallia.19@um.edu.mt

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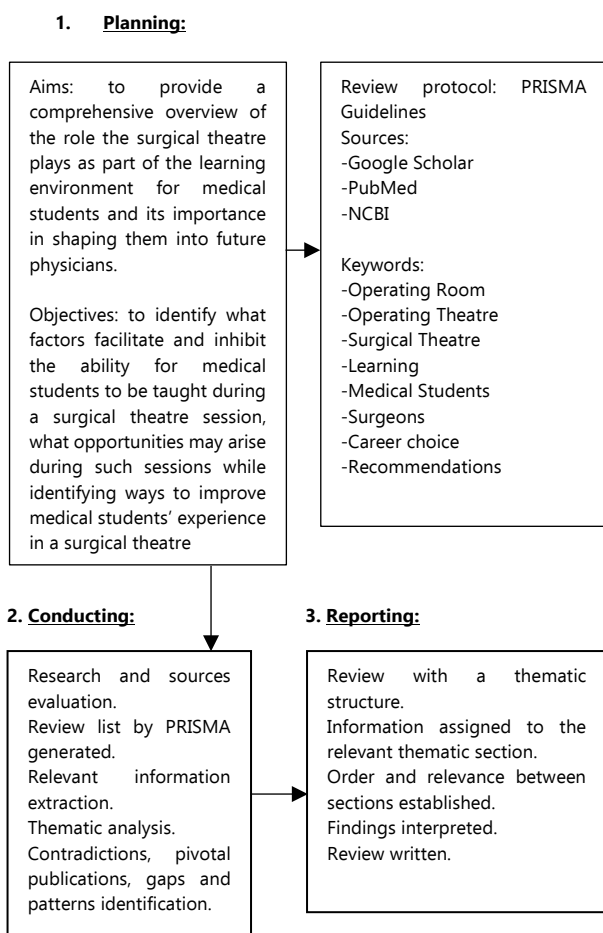
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environment for medical students and its importance in shaping them into future physicians. The objective is to identify what factors facilitate and inhibit the ability of medical students to be taught during a surgical theatre session and what opportunities may arise during such sessions while identifying ways to improve medical students' experience in a surgical theatre.

Methods

A critical narrative analysis was followed by undergoing systematic identification of the articles related to surgical theatre learning by medical students and teaching by surgeons while identifying factors that may facilitate or hinder this interaction.

Figure 1. Study Flow Diagram.



As shown in [Figure 1](#), literature searches were performed through Google Scholar, PubMed and the National Library of Medicine databases. The keywords and terms used included 'Operating Room' or 'Operating Theatre' or 'Surgical Theatre' and 'Learning' and 'Medical Students'. The latter term was switched to 'Surgeons' to assess the surgeons' perspective of medical students learning in the surgical theatre. The 'Career Choice' term was used to assess the effect of the theatre learning experience on medical students when choosing a specialty. The 'Recommendations' term was used to analyze any tips other

medical students or surgeons gave to facilitate learning in the surgical theatre. Screening of papers [1990-2022] was done by both authors during July 2022.

Inclusion criteria included research papers originating from any study design published between 1990 and 2022. The only exception was an early study done in 1908 that paved the way for later studies that confirmed the main results of the study in 1908. Opinion articles written by medical students pertaining to their perspective of surgical rotations were included. Exclusion criteria include papers not written in English, opinion articles from other health care workers' (HCW) perspectives and articles targeting other health care student perspectives. Furthermore, published abstracts without access to the full text were also excluded. Search results identified 508 papers. After duplicate removal and selection according to the aforementioned inclusion and exclusion criteria, 34 articles were included. The article selection process is shown in [Figure 1](#).

Papers included underwent a full thematic analysis. Additionally, data extracted included the year of publication, country of origin, themes identified, research method and results. The themes identified were grouped according to relevance and then integrated to address all themes discussed by the current literature in the most cohesive way possible. These are shown in table 1 in the results section.

Results

Thirty-four papers were included and underwent full-text analysis and thematic review. [Table 1](#) illustrates the themes identified in the articles used.

The Sterility Procedure and the Surgical Experience

Sterility techniques and protocols, namely, environmental cleaning, hand hygiene, pre-operative patient skin preparation, surgical gowning and general techniques of maintaining a sterile field, were described among studies.^{13,14} Additionally, sterility accommodations are available for various religious views to prevent embarrassment due to inadequate preparation.¹⁵

The surgical theatre is perceived as uncomfortable by medical students due to pre-established relationships among surgical team members.¹⁶⁻¹⁸ Additionally, students report fear of contaminating sterile equipment¹⁹ and feeling insecure about their behavior during theatre.^{20,21} Others report fear, anxiety and shame of syncope or protocol violation.²² Other studies report fear of incompetence and insecurity, humiliation and intimidation.^{3,23,24} Evidently, only a minority of medical students reportedly described a positive theatre experience.²⁵ The surgical theatre experience was also perceived as multi-disciplinary.⁵

Medical students were reported to focus more on generic clinical skills^{10,12} and perceived the surgical theatre as a relatively poor "teacher" of medical education.¹⁰ Additionally, medical students report perceiving their medical education as less likely to teach suturing skills.

Table 1. Primary Sources and Summary of Information in the Review of Medical Students' Perspective about Surgical Theatres.

Author	Year	Country	Themes Identified
Yerkes RM. <i>et al</i> ⁶⁰	1908	USA	Students report fear of contaminating sterile equipment especially those unfamiliar to theatre etiquette.
Lewis L. <i>et al</i> ⁶⁷	2000	USA	Recorded surgeries incorporated in tutorials or lecture may aid learning.
Taylor I. ¹¹	2003	UK	Medical students focus on generic clinical skills. Active participation aids visibility during theatre, hence, is to be discussed by the surgeon and students. Topics taught by other staff members will depend on their specialty, this aids students' learning.
Lyon PM. <i>et al</i> ⁶	2003	Australia	Surgical theatre is perceived as uncomfortable due to pre-established relationships between team members.
Lyon PM. ¹⁸	2003	Australia	Surgical theatre is perceived as uncomfortable due to pre-established relationships between team members. Medical students commonly feel unwelcome in theatre. Clear learning objectives are commonly absent. Shifting positions and eating before theatre are preventive of syncope.
Stark P. ³⁶	2003	UK	Longer procedures negatively correlate with medical student attendance.
Schwind CJ. <i>et al</i> ⁸	2004	USA	A positive learning experience is enhanced if the surgeon acts as a positive role model and the staff supportive in teaching medical students.
Agha RA. <i>et al</i> ⁸	2005	UK	The surgical theatre is perceived by students as a poor "teacher" in their medical education. Medical students focus on generic clinical skills.
Fernando N. <i>et al</i> ²	2007	UK	Surgeons' and students' opinions of their learning objectives and what the level of student participation in theatre differ. "Friendliness and approachability" were ranked vital towards a positive learning experience whilst, most students report feeling burdensome in theatre.
Fernando N. <i>et al</i> ⁴	2007	UK	Consultants are unsure of the learning objectives to be covered during theatre. A minority of students describe a positive theatre experience. Unable to visualize the procedure negatively impacted students' learning.
Lupien SJ. <i>et al</i> ⁵	2007	Canada	Anxiety negatively impacts students' performance and learning.
McIntyre TP. <i>et al</i> ⁸	2008	USA	Teleconferencing guarantees visibility and students' learning without disturbing the surgeon's work.
Karle H. ¹	2010	Denmark	Medical degree (MD) program organization.
Wilhelmsson B. ⁴	2012	Sweden	Outdoor environment reinforces learning.
Knight WR. <i>et al</i> ⁷	2013	UK	Surgical theatre is perceived as uncomfortable due to pre-established relationships between team members. Feeling unsafe or awkward prohibits learning. Students cautiously reflect on how worthwhile it is to attend long periods of surgery in comparison to other methods of learning.
Ravindra P. <i>et al</i> ⁷	2013	UK	Students taught by theatre staff found the surgical theatre more beneficial. Teaching should be delegated among all team members. Surgical theatre attendance was reported as poor and mainly hindered by absent learning objectives, absent participation opportunities, insufficient preparation during procedures and feeling unwelcome. Longer procedures negatively correlate with medical student attendance.
Chapman SJ. <i>et al</i> ³²	2013	UK	Students report feeling insecure about their behavior in theatre. Most students report feeling burdensome on theatre staff.
Nagji A. <i>et al</i> ⁴	2013	Canada	Students report feeling insecure about their behavior in theatre. An optional theatre module can positively impact students' learning experience and personal development.
Bowrey DJ. <i>et al</i> ⁹	2014	UK	Anxiety, fear and shame are commonly felt by students in theatre mainly due to concerns of violating theatre protocols or fear of syncope. Students who felt welcome in theatre were more likely to attend and learn.
Stone JP. <i>et al</i> ¹	2015	Canada	Students report fear of seeming incompetent.
Zundel S. <i>et al</i> ³	2015	Germany	Students report feeling insecure about their behavior in theatre. Knowing patients prior to surgery can positively impact learning.
Hartmann EK. ³	2016	Australia	Student's perspective of the first surgical theatre experience. Australian universities introduced a "surgical skills" module to prepare students prior to surgery.
Gaines S. <i>et al</i> ³	2017	USA	Sterility protocols.
Barnum TJ. <i>et al</i> ⁰	2017	USA	A Chicago university organizes orientation days to prepare students prior to theatre. The surgeon should remain updated with academic curricula. The surgeon introducing the students to the staff, aids their multi-disciplinary learning.
O'Neill R. <i>et al</i> ¹	2018	USA	Surgeons' and students' opinions of their learning objectives in theatre differ. A significant number of surgeons and residents report students' presence in theatre as an asset.
Hexter AT. <i>et al</i> ³	2018	UK	A curriculum ensures adequate preparation of students prior to theatre and discussion of relevant topics by surgeons.
Jensen RD. <i>et al</i> ⁶	2018	Germany	Students ought to focus more on learning the surgeon's behavioral attitudes rather than surgical technique.
Croghan SM. <i>et al</i> ⁶	2019	UK	Students' surgical theatre experience: lack of clear learning objectives, fear, anxiety, humiliation, intimidation, lack of participation and visibility hinder their learning experience. The experience is perceived as multi-disciplinary. Burdensome and welcoming environments significantly impact learning. Display units can aid visibility of procedures, enhancing learning. Shorter surgeries may provide more teaching per unit time.
Twigg V. <i>et al</i> ⁶	2020	UK	Medical education is perceived by students as less likely to teach suturing skills.
Kent F. <i>et al</i> ⁰	2021	Scotland	The surgical theatre is perceived by students as a poor "teacher" in their medical education. It is perceived as an uncomfortable environment. Feeling unsafe or awkward prohibits learning. Medical students commonly feel unwelcome in theatre. Clear learning objectives are commonly absent. Participation aids learning during theatre.
Abdelwahab R. <i>et al</i> ⁵	2021	USA	Sterility accommodations for students of various religions to prevent embarrassment due to inadequate preparation.
Hunukumbure AD. <i>et al</i> ⁹	2022	UK	Acquiring knowledge on sterility and theatre etiquette, planning ahead via theatre lists prior to theatre, and follow-up after surgery aid students' learning.
Azevedo Sansoni G. <i>et al</i> ⁵	2022	Italy	Practical knowledge namely, suturing, scrubbing in and good surgical practice enhanced medical students' surgical education.

Preparing Medical Students for Better Surgical Education

Studies report that medical students perceive the theatre as uncomfortable and stimulate feelings of unsafety and awkwardness. As a result, students report feeling inhibited from learning and overall unwelcome.^{11,16-18}

Hartmann EK (2016) reports how Australian universities have introduced a "surgical skills" module to better prepare students prior to surgery.⁵ Notably, a Chicago university was reported to organize orientation days to prepare students for theatre.²⁶

Surgical Theatre Attendance

A study reports how students describe their ongoing reflections about how worthwhile it is to attend long hours of surgery compared to other learning methods.¹⁷ In fact, further studies report longer procedure hours as negatively correlated to medical student attendance at surgical theatres.^{4,27} The former study also reports other attendance hindrances, namely, absent learning objectives, absent participatory opportunities, insufficient preparation prior to procedures and the aforementioned unwelcoming feeling.²⁷

The Perception of Medical Students, Surgeons and Surgical Residents about the Theatre Experience

Various literature reports how surgeons, surgical residents and students have different perspectives.²⁸ Namely, the learning objectives and level of participation in theatre.²⁹ Also, whilst a significant proportion of surgeons and surgical residents perceive students' presence in theatre as an asset,²⁸ a significant proportion of medical students report feeling unwelcome.¹¹

Factors Affecting Surgical Education in Theatre

Various studies report elements that aid learning during surgical theatre, namely, active participation,^{11,12} multi-disciplinary teaching,^{12,27} recorded surgeries incorporated in tutorials or lectures³⁰ or teleconferencing,³¹ clear learning objectives¹⁸ or curricula³² availability, "friendliness and approachability",²⁹ the overall stimulatory environment,⁶ optional theatre modules,²¹ feeling welcome,²² better visibility,¹² adequate preparation prior to surgery,³³ and shorter surgery times.³ Additionally, knowing the patient pre-operatively²⁴ and following up post-operatively³³ were also reported as positive factors in medical education. Conversely, poor procedure visualization,²⁵ anxiety,³⁴ feelings of unsafety or awkwardness,¹⁷ among others aforementioned, were reported as significant inhibitors of learning in theatre sessions.

Students report clear learning objectives are commonly absent^{11,18} and tend to feel burdensome or unwelcome in theatre.²⁹ In fact, literature reports consultants are unsure of the learning objectives to be covered.²⁵ Nonetheless, medical students emphasize how the discussion of relevant topics and surgeons remaining updated to curricula aid their learning during theatre sessions.²⁶ Medical students recommend eating before theatre sessions and shifting positions to prevent syncope.¹⁸ Additionally, surgeons acting as positive role models and

supportive staff members were deemed a positive learning influence during theatre.³⁵ The latter was found to be better facilitated if surgeons introduced the students to the surgical team members.²⁶ In fact, students were recommended to focus more on learning the surgeon's behavioral attitudes rather than surgical technique during theatre sessions.³⁶ Additionally, display units can aid the visibility of procedures.³

Discussion

The Surgical Theatre Experience

On visiting the surgical theatre for the first time, most medical students experience anxiety as they find it challenging to fit into the coordinated teamwork set out by the surgical team.⁵ Upon stepping into the scrubbing room, a new medical student will face a range of specific sterility protocols and procedures they may have never encountered before, which may be daunting.

Sterility is defined as an object free from any microorganisms.³⁷ Sterile techniques are there to reduce the rate of surgical site infections (SSIs), and despite some variations among clinical institutions and situations, all try to maintain an aseptic surgical theatre. Such techniques include environmental cleaning, hand hygiene, pre-operative patient skin preparation, surgical gowning and general techniques of maintaining a sterile field.^{13,14} Generally, every person entering the surgical theatre has to change into scrubs, wear hair caps, change shoes and ensure bareness below the elbow, among other sterility protocols, namely, scrubbing in.^{13,14} Furthermore, accommodations are made for hijab wearers among other religious variations as to maintain sterility without affecting the sterility process.¹⁵

Preparing Medical Students for a Better Teaching Experience

Medical students have frequently reported that the theatre environment is uncomfortable due to the aforementioned etiquette and pre-established relationships between surgical team members.^{11,16-18} Therefore, medical students may feel unsafe or awkward because of the surgical team's attitudes, which might prohibit their learning and surgical interest.^{11,17} In fact, a common theme mentioned by medical students was found to be the feeling of being unwelcome in a theatre.^{11,18}

Ensuring a positive learning experience by attending theatre sessions was attempted by many medical schools. Australian universities introduced a module entitled "surgical skills" as part of their pre-clinical programs with the aim to incorporate theatre experience with medical education. The program teaches medical students how to scrub for a surgical operation whilst it also teaches students the theatre team's various roles. This ensures that medical students acquire knowledge on sterility, scrubbing in and gowning among other theatre etiquette which will enable the students to focus on surgical knowledge acquisition during the actual surgical procedures.^{5,33} Moreover, a Chicago university provides students with orientation days to address topics on theatre etiquette and answers any questions the students may have before attending their first surgery.²⁶ Notably, additional accommodations are made for all religious and cultural attitudes

to prevent embarrassment or humiliation due to inadequate preparation for the surgical theatre protocols.¹⁵

Learning Objectives and Opportunities at the Surgical Theatre

Setting clear learning outcomes by medical schools is vital to emphasizing the importance of teaching in the theatre. However, a study conducted by a New Jersey medical school reveals that learning outcomes for surgeons and medical students differ.²⁸ Namely, surgeons intend to discuss the clinical application of medical conditions, whilst medical students aim to learn surgical skills.^{28,29} A survey noted that surgeons were more inclined to cover the importance of medical decisions and the understanding of pathology during surgical theatre, which contrasted with what medical students were inclined to discuss during this period. Yet, surgeons and medical students identified that anatomy teaching is valuable and should be discussed during surgery.²⁸ Therefore, the establishment of a clear outline of the learning objectives with an official curriculum by medical schools ensures that important and relevant topics are discussed by the surgical team during theatre. This will also provide a guide for medical students and ensures that they are well-prepared before attending a surgical operation.³² Unfortunately, a survey reports that less than half of the surveyed medical students confirmed the presence of clear learning objectives in their curricula.^{11,18} Interestingly, another study noted that consultants are also unsure of the learning objectives that should be covered during theatre sessions.^{10,24}

Furthermore, medical students perceive active participation during surgical theatre sessions as essential to their learning experience.³⁸ This was termed a "hidden curriculum".¹¹ In fact, studies suggest that students should focus more on observing the surgeon's behavioral attitudes when interacting with staff, patients and difficult circumstances as opposed to surgical techniques.³⁶ A survey reveals that medical students' and surgeons' opinions of how much participation should be allowed varies.²⁹ Actively participating or "scrubbing in" allows a better view of the operation and better teaching of practical skills, namely, suturing.¹² Studies recommend that the level of participation is to be discussed whilst setting the learning outcomes between the surgeon and the students. This should also depend on the faculty's curriculum and the surgical case at hand.¹² As a result, it is important for the attending surgeon to remain updated with the academic curricula and choose the right cases for his students both for observation and participation purposes.²⁶

Other studies propose that students acknowledge the surgical theatre as a holistic learning experience, enhancing students' ability to adapt to their expectations and overall satisfaction while attending the surgical theatre.³ On busy theatre days, when the surgeon is unable to attend to students, it would aid if the surgeon was to introduce his students to the surgical team. As a result, students would be more confident to maximize their learning by seeking the teaching provided by the other team members. In fact, studies have outlined how a surgeon portrays that when s/he is unable to teach, the students should ask the other team members to teach them during the surgery.²⁶

Moreover, the teaching contributed by the different staff members will depend on their specialty. Therefore, whilst a scrub nurse can teach the students about surgical instruments and sterility procedures, an anesthetist can teach students about anesthetic choice and intraoperative monitoring.¹² As a result, interprofessional learning is enhanced, and medical students can better appreciate the multi-disciplinary approach taken towards the patient's safety and well-being.^{12,26} In fact, it was reported that students who were taught by theatre staff found the surgical theatre experience more beneficial.²⁷ The same study suggested that teaching should be the responsibility of the whole surgical team. Proper teaching delegation among staff members can provide the students with a more efficient and consistent learning experience.¹²

Attendance at the Surgical Theatre

Studies have recommended that medical student attendance to surgical theatre ought to be mandatory, yet 59% of medical students reported poor attendance, with less than 50% of medical students presented with opportunities to go to the surgical theatre.²⁷ The hindering factors that affect the attendance rate in a surgical theatre were noted to be the lack of clear learning goals, the lack of opportunity for medical students to scrub in, insufficient participation during procedures and feeling unwelcome in theatre. Interestingly, induction sessions prior to the surgical theatre attachments had no effect other than adequately preparing medical students for the surgical theatre. Moreover, receiving negative comments from surgeons did not inhibit attendance but affected their learning experience.²⁷

What impacts learning in the Surgical Theatre?

Various factors contribute to the effectiveness of the surgical theatre as a learning environment. Overall, a positive learning experience is enhanced if the surgeon acts as a positive role model to the students by being friendly and interactive with students and explaining the surgical procedure. The rest of the surgical team is recommended to be helpful and supportive in the medical students' learning experience.³⁵

Emotions and Feelings

Interviews with clinical medical students revealed that negative feelings around the surgical theatre, namely, anxiety, fear and shame were common.²² These commonly originate from students' concerns about violating theatre protocols and fear of syncope.^{5,22} Although shifting positions and eating before theatre prevent episodes of syncope.^{18,22}

Fear is a strong emotional response to actions that can have a detrimental impact on the patient. In the surgical theatre setting, medical students report fear of contaminating sterile equipment especially those unfamiliar to the theatre etiquette, including where to stand during a procedure and which doors are an entrance or an exit into the surgical theatre.^{3,19,32,36} Some students have also noted the fear of seeming incompetent.²³ Insecurity towards the surgical theatre is quite a general emotion, as various studies describe how insecure medical students feel regarding their own behavior in the surgical theatre.^{18,20,21,24} Similar feelings include embarrassment. Naturally, the aforementioned feelings

bring about anxiety which negatively affects medical students' performance and learning.^{3,19,22,34}

Attitudes Towards Medical Students During Theatre

Studies show that students who are made to feel welcome during surgical theatre sessions were more likely to attend theatre while enhancing their opportunities to learn.^{22,27} Yet, it was noted that only 7% of medical students describe a positive, welcoming experience in theatre.²⁵ Despite such studies not emphasizing the factors that define this welcoming environment, another study reports that 74% of medical students rank "friendliness and approachability" as the vital requirements towards positive theatre-based teaching.²⁹ Medical students reported feeling burdensome on the surgical staff.^{20,29} Notably, this feeling may not be mutual as 55% of surgeons and 66% of residents report medical students' presence as an asset.²⁸ Evidently, burdensome and welcoming environments can have a significant impact on learning.³

Visualization and Time Expenditure

Two important factors medical students value include the visibility of the surgical procedure and the time management surgical theatre demands against other learning modalities. It was noted that approximately 30% of students were unable to visualize "most of the operation", which significantly impacted their learning ability.²⁵ Indeed, it was emphasized how helpful display units can be through a head camera worn by the attending surgeon. Visibility is especially problematic in open surgeries since endoscopic procedures or those who use intraoperative imaging, like orthopedics and vascular surgery, may naturally provide adequate visibility. Despite their aid, such accommodations may be restricted due to costs or surgeon preferences. Nonetheless, good visibility can make the surgical theatre more enjoyable, and students tend to feel more welcome.³

Notably, time management is of utmost importance to medical students. Knight et al. (2003) confirmed that students cautiously reflect on how worthwhile it is to attend hours on end of surgeries against other learning modalities.¹⁷ Medical students' main objective throughout medical school is to ensure they pass their exams.³ Therefore, they frequently assess which learning tool is most efficient to reach their goal.^{3,18} In fact, a negative correlation between longer procedures and medical student attendance was established as this was perceived as "absolutely pointless".^{4,27} Another study hypothesized that shorter procedures might provide more teaching per unit time since they are associated with a less stressful environment whereby the student feels more comfortable to learn and the surgeon has plenty of time to teach.³

Alternatively, recorded surgeries incorporated in tutorials or lectures may aid learning.^{3,30} Open communication about whether or not the surgeon will be able to teach anything during surgical theatre time can also help students manage their time effectively.³ More novel interventions include teleconferencing for medical students to see a live procedure from the classroom.³¹ Such a modality will guarantee visibility and teaching without disturbing the surgeon's work.³¹

Recommendations for Better Learning and Teaching

A number of recommendations have been put forward as to how to enhance medical students learning outcomes during surgical theatre sessions. Medical students recommend planning ahead in accordance with the scheduled theatre lists. Knowing the patients prior to the procedure can positively impact learning.^{24,33} In fact, a medical student's personal reflection described not having enough time to prepare before theatre and finding the whole theatre experience "demoralizing." He narrates that not knowing answers to questions left him feeling "stupid", resulting in an overall negative learning experience.³³ Furthermore, following the whole patient journey from pre-operative assessment to the actual procedure and follow-up later on enhances the understanding and learning process for that particular surgery.³³ Hence, preparation is pivotal in the medical students' learning experience. An optional theatre module will enhance the understandability and enjoyability of the surgical experience as students will be able to engage during the sessions while enriching their learning. This also aids in the students' personal growth.²¹

Limitations

Naturally, this review is not short of its own limitations. Firstly, the aim was to identify articles targeting the perception of medical students and surgeons on the surgical theatre as a teaching tool. However, most research available includes medical students' perspectives only. Thus, surgical residents' perspectives were also included. Nonetheless, the surgical theatre is also an effective classroom for other health care students, namely, nursing and anesthesia students. However, including such health care professions was beyond the scope of this review. The studies chosen occurred in different countries and included medical students across different clinical years, resulting in restricted generalizability of perceptions. However, similar results were found across different universities and provide a global relevance. Furthermore, most articles use students' perceptions to measure the learning experience. Nonetheless, this qualitative factor can deem a poor objective measuring tool but seems a realistic aim of attaining what inhibits and facilitates learning.

Conclusion

Medical students experience unpreparedness, anxiety, lack of clear learning outcomes as part of their curricula, fear and intimidation when visiting the surgical theatre. However, there are different factors that can motivate and enhance the learning experience of medical students during a surgical operation, including increased visibility and inclusion during the procedure, among others. Surgical faculties can utilize the multi-disciplinary set-up and healthcare experience to formulate plans that better accommodate medical students on their path to becoming physicians. Additionally, both the faculty and students need to respect each other's perspectives to ensure that a teacher-student relationship is formed. Ultimately, a positive surgical theatre experience is more likely to attract students to choose a surgical career.

Future research is recommended targeting the different learning and teaching quality among different surgical specialties while

considering the different surgical theatre perspectives shared by both students and professionals concerning the integration of inter-professional teaching as part of the healthcare students' learning experience.

Summary – Accelerating Translation

The study entitled "Walking the Walk: A Review of Medical Students' Perspective of a Surgical Theatre as the New Classroom" was conducted at the University of Malta, Msida, Malta. This was authored by Tamara Attard Mallia and Dr Sarah Cuschieri to address the pivotal role the surgical theatre plays in medical and surgical education and the overall clinical experience for medical students. The objective is to identify what factors facilitate and inhibit medical students' learning during a surgical theatre session, and what opportunities may arise when attending such sessions whilst identifying ways to improve medical students' experience based on the readily available literature.

A critical narrative analysis was followed by undergoing systematic identification of the articles related to surgical theatre learning by medical students and teaching by surgeons, while identifying factors that may facilitate or hinder this interaction. Literature searches were performed through Google Scholar, PubMed and NCBI databases. The keywords and terms used included 'Operating Room' or 'Operating Theatre' or 'Surgical Theatre' and 'Learning' and 'Medical Students'. The latter term was switched to 'Surgeons' to assess the surgeons' perspective of medical students learning in the surgical theatre. The 'Career Choice' term was used to assess the effect of the theatre learning experience on medical students when choosing a specialty. The 'Recommendations' term was used to analyze any tips other medical students or surgeons gave to facilitate learning in the surgical theatre. Inclusion criteria included research papers originating from any study design published between 1990 and March 2022. The only exception was an early study done in 1908

that paved the way for later studies that confirmed the main results of the study in 1908. Opinion articles written from other HCW perspectives and articles targeting other health care student perspectives were excluded. Furthermore, published abstracts without access to the full text were also excluded. After careful selection depending on the aforementioned inclusion and exclusion criteria, 34 articles were included.

These articles underwent full-text analysis and thematic review to identify the relevant information provided by every article included in the review. Literature reports that medical students perceive the theatre as uncomfortable and anxiety-provoking due to surgical etiquette and pre-established relationships between the surgical team members. The poor attendance to theatre reported by several studies was mainly due to a lack of clear learning outcomes, opportunities, feeling unwelcome and insufficient preparedness. Medical students experience unpreparedness, anxiety, fear and intimidation when visiting the surgical theatre, all of which inhibit medical education. Factors facilitating learning during surgical theatre sessions include increased visibility, inclusion during the procedure, feeling welcome and previously set learning objectives. A number of recommendations have been put forward as to how to enhance medical students' learning outcomes during surgical theatre sessions. These include planning ahead using theatre lists, assessing the patient pre-operatively and following up post-operatively and sufficient preparation beforehand.

In conclusion, surgical faculties can utilize the multi-disciplinary set-up and healthcare experience to formulate plans that better accommodate medical students on their path to becoming physicians. Additionally, both the faculty and students need to respect each other's perspectives to ensure that a teacher-student relationship is formed. Ultimately, a positive surgical theatre experience is more likely to attract students to choose a surgical career.

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