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GROUNDWORK



Challenges in Learning Procedural Skills: Student Perspectives and Lessons Learned for Curricular Design

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ABSTRACT

Phenomenon: Developing foundational clinical procedural skills is essential to becoming a competent physician. Prior work has shown that medical students and interns lack confidence and competence in these skills. Thus, understanding the student's perspective on why these skills are more difficult to acquire is vital for developing and reforming medical curricula.

Approach: This study explored procedural skills learning experiences of medical students with qualitative methods. Through purposive sampling, 52 medical students from the third, fourth, and final years were selected for inclusion. Data were collected using six audio-recorded, semi-structured focus group discussions. Transcripts were manually coded and analyzed using inductive content analysis. **Findings:** Students provided rich and insightful perspectives regarding their experiences in learning procedural skills that fell into three broad categories: 1) barriers to procedural learning, 2) reasons for learning, and 3) suggestions for better learning outcomes. Students described a range of barriers that stemmed from both patient and clinician interactions. Students were reluctant to make demands for their own benefit during clerkships. The most commonly expressed reason for wanting to learn procedural skills was the desire to be a competent and independent intern. The motivators suggested that students felt empathetic toward interns and visualized a successful internship as a learning goal. Participants suggested peer learning, improved teaching of procedural skills, assessments, and feedback to improve their learning. **Insights:** This study generated valuable information to promote critical reflection on the existing curriculum and pedagogical approaches to procedural skills development. Medical educators need to sensitize the clinical teachers to student perspectives and what students are really learning to make impactful changes to teaching and learning procedural skills. Students' self-advocacy skills and self-directed learning skills need to be developed for them to seek out learning opportunities and to promote life-long learning. Lessons from this study may also apply to curriculum design in general, especially in teaching clinical skills. Empowering the learner and embracing a learner-centered approach to teaching and learning procedural skills will benefit future clinicians and their patients.

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Medical education; procedural skills; medical students; instructional design; learner perspective

Background

Procedural skills are a core component in the health care practice that pans across all medical practitioners, from the novice to the specialist.¹ Traditionally, procedural skills were taught/learned at the bedside in the ward-based clinical attachments following the “see one, do one” approach.² However, practicing invasive procedures on patients without proper training and observation imposed an ethical issue.³ In addition, the quantity and quality of ward-based teaching mainly procedural skills, seemed to have deteriorated primarily due to inadequate supervision by the clinical

teachers, frequent assignment of students to routine activities of limited educational value, and increasing student numbers.⁴ Basic clinical skills acquisition during clerkships occurs in a rather “haphazard” fashion. Frequencies of performance of such skills have been found to differ widely among students.⁵ Although patients are willing to accept trainee involvement in nonprocedural care, they usually are reluctant to allow medical students to perform procedures on them.⁶ The rising emphasis on patient safety over medical students' learning and patients' right to trained care are contributory factors that discourage medical

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students from practicing on patients.⁷ Therefore, the opportunity to develop basic procedural skills in the ward-based setting has become a challenge. When training medical students to become medical professionals, bedside teaching is invaluable and vital and, thus, should be an essential aspect of their training.^{8,9} Despite the apparent merits of bedside teaching, this method of education is declining in medical institutions today, especially in procedural skills.¹⁰

Simulation-based procedural training was eventually integrated into medical curricula to bridge the gap in the educational experience of medical undergraduates to meet the expectations required of a graduating medical officer.^{11,12} It provides a safe and controlled environment for learning procedural skills.^{13,14} Studies have shown simulation-based training to positively affect students regarding procedural skills acquisition,^{15,16} whereas some have shown results to the contrary.^{17,18}

Although the trend is toward simulation-based training in procedural skills, some studies show that clinical attachments are still the primary source of learning such skills.^{4,19–21} It has been found that students rely mainly on residents to learn procedural skills.^{19,22,23} Evidence supports acquiring procedural competency with the use of a multitude of educational resources.²⁴ Medical schools across the world have integrated various methods of procedural instruction into their curricula, including simulation,^{25–28} peer-assisted learning,²⁹ video-based learning,³⁰ small group learning,³¹ inter-professional learning,³² and clerkships.³³

However, researchers observed wide variations in confidence and competence in performing procedural skills among medical students across many medical schools, worldwide. A significant number of US medical graduates report low levels of procedural competence,^{34,35} with studies mirroring these results from across Europe,^{36–38} Canada,^{39,40} Australia,^{33,41} Middle East,^{32,42} and Asia.^{28,29,43} Further, a significant proportion of medical students have not performed basic procedural skills such as venipuncture, intravenous catheter insertion, and arterial blood sampling during their clinical attachments.^{22,23}

The subpar levels of procedural competence among medical students in a background of expansive resources for procedural learning warrants further investigation. Although several investigations have been conducted to improve procedural competence among medical undergraduates, how medical students learn procedural skills during their training in medical schools requires exploration. Medical students' experiences in learning procedural skills have been investigated chiefly through surveys.^{19,40,44,45}

Although surveys provide essential findings concerning medical students' learning experiences (i.e.,

perceived confidence and comfort level in performing procedures), a qualitative approach could better capture the learner experience.⁴⁶ Research has explored medical students' perspectives of effective clinical teachers.^{43,47} Few studies have explored how medical students actually learn procedural skills, although they are limited by inadequate sampling and investigating only a specific aspect of undergraduate training. Valeriano et al. presented findings from a single focus group discussion on how Canadian medical students learned procedural skills.³⁹ Mansoorian and colleagues⁴² explored how Iranian medical students learned procedural skills. However, their exploration was limited only to the learning taking place during the clerkships. Thus, there is need for robust evidence of how medical students learn procedural skills to inform educators and tailor procedural curricula for student needs.

Understanding students' opinions and perception is essential in competency-based curricula where students have increased individual responsibility for attaining their educational objectives.⁴⁸ The uniqueness of different undergraduate medical curricula, available resources, and student characteristics also affect these findings. Therefore, we conducted an exploratory qualitative study to gather medical undergraduates' perspectives on learning procedural skills at an Asian medical school. Our objective was to identify barriers, challenges, and potential areas for change in undergraduate procedural skill training to inform educators in reforming and implementing procedural curricula.

Methods

Study design

We adopted a constructivist approach with the understanding that meaning is constructed through dialogue between the researcher and the researched.⁴⁹ Our intention was to understand the student participants' subjective reality and experiences⁵⁰ concerning procedural learning. Semi-structured focus group discussions enabled an in-depth exploration of challenges and difficulties with procedural training in their educational program and the freedom to consider different issues,⁵¹ as the discussions were co-constructed by researcher and participant.⁵²

Context of the study

Asian medical schools have colonial roots and a long history of education shaped by British, North American, or French medical education systems.⁵³ Sri Lanka, the setting for this study, is a south Asian island nation with

its' medical education influenced by the British.⁵⁴ Unlike the extensive private medical school systems in the rest of Asia,⁵⁵ all medical schools in Sri Lanka are affiliated with public universities. Admission to all public universities in Sri Lanka is based on local G.C.E. A-level results. Most of these universities also undertake a quota of international students based on the results of a foreign examination deemed equivalent to the G.C.E. (Advanced Level) Examination of Sri Lanka.⁵⁶ Eleven government-funded universities that provide undergraduate medical education, including the Faculty of Medicine, University of Kelaniya, where this study was conducted, have undergone curricula reforms to shift away from traditional didactic methods, advocating for student-centered teaching-learning approaches.⁵⁴ However, most of these changes are more focused on delivering the taught curriculum, with minimal attention to teaching/learning methods used during clinical training.

The undergraduate medical curricula of universities in Sri Lanka, including where we conducted this study, comprise 5 years in duration. The medical course is divided into the 2-year pre-clinical phase; the 2-year para-clinical phase; and a 1-year clinical phase. The pre-clinical phase included no clinical contact and was focused on teaching basic sciences. The para-clinical phase focus was on teaching applied sciences. These students also participated in half-day clinical rotations in General Medicine, General Surgery, Pediatrics, Gynecology and Obstetrics, Psychiatry, and related subspecialties in the affiliated state teaching hospitals. The final year (clinical phase) was entirely dedicated to clinical rotations in General Medicine, General Surgery, Pediatrics, Gynecology and Obstetrics, and Psychiatry. Each clinical rotation was between years 3-5 and is 4-8 week long, with students 'attached' to one or more consultants in the ward/unit during this period.

At the time of the study, most medical schools offered some procedural skills training during this pre-clinical phase in the skills laboratories using moullage and simulation. The students undergoing clerkships were provided a logbook with a list of procedures they must observe or perform during clerkships. The students were expected to achieve the required procedural competency by observation, legitimate peripheral participation,⁵⁷ and practicing procedures on actual patients. A single clerkship group (years 3-5) at the institution where we conducted this study consisted of 30-40 students. Recently, the Faculty had provided skills laboratory sessions on a few procedures for pre-clinical students. A single skills laboratory group would consist about 60 students. Although these practical classes were mandatory, the procedural skills taught were not formally assessed.

Participants

The study population comprised the third and fourth-year (para-clinical phase) and final-year (clinical phase) medical students from the Faculty of Medicine, University of Kelaniya, Sri Lanka. We employed purposive sampling. After obtaining ethics approval from the ethics review committee of the University of Kelaniya (reference number P233/11/2019), we shared general information about the study with potential participants through student representatives and clerkship monitors. We verbally informed those who contacted a research assistant and volunteered to join the study and *via* the information sheet and consent forms of the voluntary nature of participation, their right to refuse to participate or answer any specific questions and to withdraw from the focus group discussions at any time. Potential participants met with a trained research assistant to provide their details. Students were eligible for inclusion in the study if they had undergone both simulation-based procedural skills training and clinical clerkships. To ensure maximal variation sampling, we recruited student volunteers of different gender and ethnic groups, including students from the foreign quota and students undergoing clerkships in different specialties. The recruited students met with a research assistant to hand over the consent forms and learned the time and venue of the focus group discussions.

Data collection

After obtaining ethics approval, we conducted informal interviews with medical students. These discussions helped to identify the most appropriate method of data collection, to develop data collection instruments (interview guides), and to address some of the challenges in participant recruitment. Focus group discussions were chosen as the preferred data collection method over interviews because students indicated that their peers might volunteer for group discussions and be more comfortable sharing stories about their learning experiences within familiar groups rather than alone with an academic staff member.

We conducted focus-group discussions in English using a semi-structured interview guide, which explored how medical students learn procedural skills. We also explored challenges and factors facilitating procedural skills learning. In addition, we investigated their expectations and ideas for learning procedural skills. We provide the Interview Guide in the [Supplemental Appendix](#). The open-ended questions served to guide, but not constrain, the interview. We encouraged the

participants to describe their learning experiences. We emboldened them to react to each other's opinions and generate new ideas from different points of view. We arranged and conducted focus group discussions, commencing with the first responders, until data saturation indicated a sufficient number had been completed.⁵⁸ We conducted six focus group discussions between July and October 2020 (two focus group discussions transpired for students from each academic year: e.g., two focus groups for third-year students).

The principal investigator (PI), an academic staff member with a Master's degree in medical education, conducted all the focus group discussions. Although she was known to many participants, her teaching of the participants' year groups was limited, and she was not involved in their assessments. Each focus group consisted of seven - nine students. Each focus group discussion lasted 1 to 1.5h and was held at the Faculty of Medicine, University of Kelaniya. With the consent of the students, we audio-taped the discussions for later transcription. We informed participants that their identities would remain confidential and views and opinions would be anonymized. Participants were allocated a pseudonym used in all reporting. We removed all identifiable features during transcription. Participants were informed that the interviews constituted part of a research project, and the findings might be published and used to improve medical education.

Data analysis

Data analysis coincided with the focus group discussions allowing the researchers to gather information until data saturation. We gave participants a pseudonym to maintain cultural appropriacy, used in all reporting. We removed all identifying features during transcription. We transcribed the focus group discussions verbatim and analyzed them using inductive content analysis.⁵⁹ Initially, we read and re-read the transcripts to familiarize ourselves with the data. Subsequently, we coded each transcript into broad content categories. Using a sentence-by-sentence process, we manually coded each transcript and sorted the talk into categories and subcategories.

All transcripts were coded by K.K. An open coding scheme was used for the initial interviews. P.G. and T.S. coded a subset to confirm the coding scheme. After achieving consensus among the authors, this coding frame was used to code the remaining transcripts. The PI applied this coding to the transcripts. P.G. and T.S. compared the coding for consistency to ensure a common language. We identified commonalities and differences across all interviews before re-grouping the codes into three broad categories. This process of

categorization involved several rounds of discussion between all authors. We compared interpretations and discussed them between all authors until there were no discrepancies. The authors reached a consensus regarding verbatim remarks selected to highlight the relevant sub-categories arising from the analysis.

Trustworthiness

To enhance the credibility of the research, member checking on the accuracy of transcriptions was done. K.K. undertook all focus group discussions as part of a research project for a postgraduate qualification. She has contributed to several qualitative studies and has had training in conducting focus group interviews. All transcripts were coded by K.K. However, P.G. and T.S. coded a subset of the transcripts to confirm the coding scheme. We discussed the developed categories and subcategories with a coauthor (PG), an experienced qualitative researcher. These were then discussed with another co-researcher (T.S.) an outsider to the research setting. Both authors discussed and resolved any disagreements regarding coding or developing categories. All four authors discussed our own biases to become aware of and be transparent about our individual perspectives, personal feelings, and preconceptions and consider these critically concerning the research being conducted.⁶⁰

To contribute to the dependability of the data, we kept a reflexivity diary to reflect on the process and K.K.'s role and influence on this study.⁶¹ We did this because K.K. is a clinical skills instructor involved in skills laboratory training for pre-clinical medical students. We were cognizant, therefore, that K.K. may have a propensity to seek the positive elements of the data especially regarding skills laboratory training. In the focus group discussions, K.K. encouraged participants to express both their positive and negative perceptions and we consciously sought divergent opinions within the data during analysis. K.K. emphasized to participants that whatever they mentioned in this study would not affect them in any way in their clinical training and assessments. To further improve the validity of the findings, all coauthors cross-checked the analysis of all six transcripts.

Results

Participant characteristics

Of the 60 third, fourth, and fifth-year medical students invited to the focus group discussions, 52 participated. Thirty-five were females. Forty-four were

Sinhalese which is the largest ethnic group in Sri Lanka. There were 18 third-year, 17 fourth-year, and 17 fifth-year medical students. Each focus group consisted of seven to nine participants, from a single academic year. The sixth focus group yielded no new information, so we conducted no additional focus group discussions.

Below we describe three categories developed from the data: barriers to procedural learning, reasons for learning procedural skills, and suggestions for better learning outcomes. Quotes from the focus group discussions with students given below are labeled as follows: (Participant pseudonym, Year of Study)

Barriers to procedural learning

The participants stated a range of barriers they faced in learning procedural skills. Many of them experienced several barriers to learning. We categorized the barriers into three subcategories: 1) “not my main task,” 2) patient vulnerability, and 3) opportunistic learning.

“Not my main task”

Almost all participants described receiving no teaching in procedural skills during clerkships as a significant barrier to learning skills. Discussions revealed that participants often found the lack of teaching demotivated them to learn procedural skills. It appeared to students as if the teaching of procedures was perceived by clinical teachers as limited to the third year. However, most of the ward consultants and doctors did not take responsibility for teaching, even during the third year of study. Although students valued the intern house officer’s (HOs) involvement in teaching procedural skills, they noted its inadequacy, stating the lack of teaching in general.

They [clinical teachers] wouldn’t even teach us procedures... clearly assuming that we have already done it in the 3rd year. But most of the time we haven’t done that. (Yohan, Y5)

House officers when they have time and they’re doing a procedure, they’ll show us how to do it. But not everybody [HOs] have the time. (Kaveen, Y4)

As an educational tool and a mandatory requirement for progressing through the academic years, the student logbook has not been efficient for students. They felt the lack of monitoring of the student’s performance in the clinical setting means they could complete the logbook without necessarily “doing anything.”

Most of the time what we do is we get a signature from a SHO [Senior House Officer] or HO [House Officer]. It shows we did something even without doing it. (Harshani, Y3)

Lack of assessments and feedback on procedures meant less enthusiasm for learning procedural skills. Although skills laboratory classes were mandatory, they did not have any impact on their assessments, and therefore, their main focus had become getting marked for attendance. Students identified a few specific skills that were commonly assessed during OSCE in the para-clinical and clinical phases of education and appeared to practice only such skills. The students stated that procedural skills taught during the pre-clinical period were not assessed at all.

Procedures are not given in assessments, maybe except for CPR and speculum examination. If they are not assessed, obviously we are not going to bother about it. (Zengpo, Y5)

Participants described the lack of priority given to practical skills discouraged them from learning procedural skills. The focus of clerkships was on completing clinical histories, the ability to recall factual information, or eliciting clinical signs. The students were required to complete “any number of histories” during the day, and students felt they “didn’t have enough time” to practice procedures. Students explained that although they were expected to complete the logbooks’ requirements truthfully, the lack of priority given to the procedural aspects made them “skive off” of things they perceived as “not important.”

Most days specially in the casualty, we have to complete like 10 histories no matter how insignificant the presenting complaint is...there’s simply no time for anything else. It just drives everything else out of you mind. (Ruchira, Y4)

We almost always found teachers to be interested in teaching the theoretical and practical aspects of what will be asked in the exams. They felt the clinical teachers were unconcerned about the students developing procedural skills. Students felt that preparing for the exam was the ultimate goal of clerkships. Students perceived what the consultants did not teach as “not important” and, therefore, not worth their time.

We are like rushed to complete the history and examination. Basically, they [Clinical teachers] usually ask for histories or examination findings or like get a long case or a short case like that. I mean since no one is asking about what we have been doing in the wards, like whether we did procedures or anything, it’s like... it’s not the most important thing, it is? (Ameen, Y5)

Consultants are exam oriented. We also want to get through the exam. If procedures are not assessed at the exam, we don't also pay much attention to it. I mean, I know it's important. But we have more important things to do. (Samanthi, Y5)

The students perceived learning procedures as a secondary task during clerkships. The lack of interest shown by clinical teachers in procedural learning made the students feel that time used for learning procedures was "a waste of time," that could be put to better use in taking histories or learning physical examinations.

I definitely don't want to waste my time doing venipunctures or whatever. I mean, there's really no time to do any of it anyway...what with taking this many histories and stuff. (Kushan, Y4)

Patient vulnerability

Some third-year and few fourth-year student participants indicated that although they wanted to practice procedural skills during their clinical clerkships, fear of causing patient harm prevented them from practicing procedures on actual patients. Participants specifically described attempting intravenous cannulation and Foley catheter insertion, where they felt they could not proceed with the task due to causing pain to the patient. An additional burden that weighed upon many students' consciences was the consequences of applying the wrong techniques. They felt that having no prior exposure or practice in a particular procedure meant they would not perform it correctly. Therefore, they felt the patient would inevitably be harmed if they proceeded to perform a procedure on the patient. Thus, these students held back on attempting procedures at the bedside. As a result, they became less confident in performing procedures on patients and felt dissatisfied with relying on patient encounters to learn procedural skills.

I think in cannulation... We never get it right the first time. And then, almost always the patient gets a hematoma. So they [nurses] have to redo it which is a lot of pain...It's so much faster if they do it, right? (Suhana, Y4)

I was just scared to approach to the patient and whether this person get hurt or experience pain. I mean I am not at all confident I'll do the right thing you know and I'll be like oh my god, what do I do, what have I done! if I double puncture the vein! (Nimal, Y3)

However, we noted that fear of patient harm was not described as a barrier to learning by the majority of third year students. Further, this concern receded

as years progressed, as this student tried to articulate below:

Well... I mean... we are here to learn right? I mean if we don't learn these stuff they [patients] will be... at risk.after all right?...when we go out? I mean. like we went through so much to get here. (Umeshi, Y4)

"Opportunistic learning"

Participants viewed the opportunistic nature of learning procedural skills during clerkships as a major barrier. They learned procedures mainly by observing nursing officers or other healthcare professionals perform procedures on patients. This learning through observation occurred when the students had completed the clinical histories and physical examinations of all the patients the student was allocated. Large student numbers within a single clerkship group contributed to the opportunistic nature of learning procedural skills.

We would usually get to see someone doing a procedure just once. There is a lot of us in a group and when all of us are gathered around, it really becomes difficult to see properly. It's in our hands to push through and make sure we get a view of what is even happening. And we can't ask them [HO or nurse] to do it again anyway. (Avinash, Y3)

The opportunistic nature of learning procedural skills also extended to clinical skills laboratory training. We perceived large student numbers as a barrier to learning procedural skills during clinical skills practice sessions. Many students stated that the number of skills laboratory practical classes did not cater to the large student numbers in a single academic year. Students recognized that the lack of resources within the skills laboratories further limited their learning. Although students desired to learn procedural skills in the skills laboratory, many stated that they had issues with accessibility to the laboratory and inadequate and poor quality instruments.

There is a lot of students like 50 or 60 in a class and we can't really do anything with such a lot of people. And there are only very few classes and not enough time to practice. (Ravishani, Y3)

We went to a catheterization practical. Two of the dummies were broken as in the catheter didn't go in. There was only one working dummy but there was 30 something students. And we had only an hour. (Mohammad, Y3)

We found students learned from the practices they observed in the clinical setting. They described instances where they observed procedures being

performed exclusively by other healthcare professionals. Students explained that although they were expected to perform some of these procedures as stated in the logbooks, interns did not perform several procedures listed during their everyday clinical practice. They elaborated that nursing officers routinely perform venipuncture, intravenous cannulation, female catheterization, wound dressing, injections, and suture removal. In addition, they stated that midwives were routinely performing vaccinations. They observed only the anesthesiology staff performing intravenous cannulation in the theater. Students discussed that they needed to be prepared for an internship, and thus, they were not required to be competent at such procedures.

We never see an HO performing a venipuncture... SHOs do not do any procedures at all. Where does it come handy? What is the use of learning it? (Akash, Y4)

It's like all those things, you get to learn when you need them you know...like IV cannulation... If I get to anesthesiology later, I'll probably get enough chances to learn it... A lot of the things in the logbook are not much use to an intern anyway. (Rinchen, Y4)

Reasons for learning procedural skills

Almost all students expressed at least one reason for learning procedural skills. These were categorized into 1) "be a good performer," 2) "something expected," and 3) accommodating patients.

"Be a good performer"

"Be a good performer" characterizes a common intrinsic motivator for learning procedural skills. Most fourth- and final-year students felt the need to be good performers motivated them to learn procedural skills. Students identified a doctor who is competent in performing procedures as a desirable goal for the future. It was vital for them to be successful in their internship, and the success aligned with competence and a "sense of achievement". For some students, the ability to carry out the perceived intern duties meant working independently and confidently. They described learning procedural skills during the clerkships as means of improving their confidence.

I want to be able to do what is required of me... without having to beg someone else like a registrar to get things done. If you are not competent people walk all over you. So yeah, I try to learn what I can so I will do it right. (Fatima, Y5)

Students stated they were interested in learning "what doctors do," especially after starting clerkships. This interest closely followed the need to perform well during the undergraduate period and afterward. They mentioned it would be nice to know and perform as a doctor does, and thus, were keen to start learning things that made them feel inclusive in the medical community. However, the enthusiasm associated with learning procedural skills waned as the years progressed. Mainly the third-year students stated interest as a motivator for learning procedural skills.

It's like when we started the clinicals, there was so much to learn it was overwhelming. But at the same time you get the feeling that you have to like...do stuff. Like try to be one of them you know. I mean you feel pretty miniscule you kind of want to prove that you can do something... That's what made me really kind of at least try my hand at stuff. (Sudesh, Y3)

Most students expressed that "hands-on" learning experiences received in the skills laboratory before starting clerkships motivated them to learn more because they felt it enabled them to identify and learn from their mistakes. Clear instructions on how to do a particular procedure built their desire to attempt a procedure. They felt more in control of what they could do and knew the correct techniques to perform better.

Obviously skills lab classes helped. We can learn and mistakes can be corrected. First attempts might go wrong for us, so we can correct ourselves by doing these at practical classes. It sort of make you going when you get to a patient really (Rizana, Y3)

"Something expected"

"Something expected," as the words suggest, encompasses the perceived utility of specific skills during their carrier as a reason for learning certain skills. Some students expressed wanting to learn procedural skills because they realized some procedures were useful for interns. Some students said that they observed several procedures being performed by interns, although those were not listed in the logbooks. Some students mentioned that they would grab any opportunity that came across them to do procedures they witnessed intern house officers performing. The students visualized interns as a goal of learning and appeared to be driven by the work of an intern house officer.

I saw HO putting implants. It was a routine thing in the postnatal unit for them. It was not listed in the logbook. But they do it. I'm like those are the things

you've got to learn you know...because it will be useful for me to work as an intern. (Kelum, Y4)

Most students mentioned that they perform procedures during clerkships because it is a requirement in the logbook, although they “could get away with it.” They stated that if an opportunity arises, they would learn procedures since they might “need to know” how to do it.

I suppose I try to do something coz you've got to do it...says so in the logbook. that you have to do cannulation or injections or whatever. (Nazreen, Y3)

Accommodating patients

Almost all students agreed that patients were willing to undergo procedures by medical students and that it encouraged them to perform. Despite internal struggles associated with self-doubt and possible patient discomfort in their attempts to perform procedures, students persevered in the face of willing patients.

Even if you mess up, the patient will be like ‘no, it's okay, it's fine’. So even if I'm kind of super worried in my head thinking I'm going to mess up, like them saying it's okay get me going. (Ruwani, Y4)

Some students discussed how “willing patients” encouraged them to perform procedures, especially with regard to different genders. As this male student elaborated, they never faced difficulties performing procedures such as speculum examinations or repairing episiotomies in the Gynecology and Obstetrics wards due to being “male.” They were almost always never asked to leave the room except in a few instances where Muslim women were concerned, and if they approached a patient with a chaperone, they almost always could perform procedures. Both male and female students identified this accommodating nature of the patients belonging to the opposite sex as a strong motivator for learning. However, as the years progressed, the students of both genders felt less discomfort in intimate procedures of the opposite sex and expressed a more “professional” manner of thinking.

First time I went for a speculum examination, I was... God! so nervous...I thought all sorts of things. mostly how the patient wouldn't like a guy examining her. But it turned out okay. (Hashan, Y3)

I guess I was a bit uncomfortable...like when I had to do a male catheterization for the first time. It was at the ETU [Emergency Treatment Unit]. But I'm kind of not thinking about that now,you know...I guess it doesn't cross my mind anyhow. I mean...like it's something I have to do anyway so...yeah (Maheshi, Y5)

Suggestions for better learning outcomes

The third category points to the students' suggestions for improved learning of procedural skills, revealing two subcategories: 1) systematic teaching and 2) peer-practiced learning.

Systematic teaching

All students expressed a desire to be taught procedural skills purposefully during the initial years of the medical program. They viewed that being taught procedural skills would encourage their own learning in the clinical setting. Many participants desired increased skills laboratory time for teaching and practice during both the pre-clinical years and the para-clinical phase of education. They framed their desire in planned and organized teaching.

It's just that, you know, I suppose we want more actual teaching of how to do what... the correct technique. It would be very different from just looking at someone do something and try to repeat whatever you saw you know. (Rajiv, Y3)

All students proposed breaking down the existing large practical groups into smaller groups to solve large student numbers identified as a significant barrier to learning. However, when asked, they appeared reluctant to advocate for themselves during clerkships. Students expressed their desire for the faculty to be involved in their teaching activities during the clerkships. They felt they would be perceived as “being out of line” if they approached the ward consultants or interns requesting demonstrations of a procedure for multiple groups. Students empathized with the interns and nursing officers, whom they identified as primary teachers, stating that such requests would be hardly possible given their already heavy workload. They also felt they would be perceived as “needy” and looked at “unfavorably” if students came with demands for their own benefit.

It definitely has to be in smaller groups. much much smaller... I mean, these labs can't even hold this many of us. (Yomal, Y3)

NO! I can't go and say ‘could you demonstrate twice?’ No no, they (interns) are already strained... I mean they wouldn't have time. (Sayuri, Y4)

It should come from the faculty I think. I mean we don't talk like that you know with Sirs and Madams [consultants]. NEVER. Most of them don't care about us anyway. X never lets us go to the labour room even! Imagine what would happen if we went and said something like that. They'd think we are crossing the line or something. (Lahiru, Y4)

For some students, it was important to acquire additional learning material to help self-study. They suggested further guidance in the form of study guides and videos in addition to providing ample clinical skills laboratory time. This suggestion came almost exclusively from third-year medical students.

It would be nice to have a study guide, which we can refer to before we come for practicals. If videos can be uploaded to LMS [Learning Management System] before the practicals, we know what to do when we come to the practicals, rather than coming blank minded. (Shakeema, Y3)

Students across all years identified the importance of implementing a mechanism for monitoring their work during clerkships. The students pointed out that if there were a mechanism to monitor the work, they would be motivated to complete the requirements stated in the logbooks, regardless of how important they felt it was or was not. This was to ensure they paid attention to learning procedural skills, which would otherwise have gone unattended due to the efforts channeled to acquire skills considered more “important” by students.

I think we would do a better job of it, I guess...if there was some way of checking whether we actually do these things. Because like... they [consultants] make it like it's not really important so we don't bother doing procedures you know...but if someone actually checked, we'd probably at least try a bit you know?. (Sampath, Y4)

Most students expressed a desire for some form of procedural skills assessment. They viewed the information on their skills as power. As this student pointed out, they felt evaluations of their performance would enable them to correct their mistakes and motivate them to perform better. They felt they would exert more effort into learning procedures if the skills were assessed. Most third-year students desired regular summative assessments during the pre-clinical and para-clinical phases of education. In contrast, a few fourth-year and most fifth-year students felt assessments of the procedural skills would further burden their already heavy workload. They desired feedback as a way of arming them with information on their procedural performance. This was to ensure that they accessed important information about their performance and were not overburdened by the strain of further assessments.

I think that if there was any assessment at all on procedures we would probably do more than what we do now... there is no assessments even on the skill lab practicals so I mean we don't think of it or do it after

the practical is over. If they gave an OSCE or something at least at the end of the year....we would learn coz the scores matter. (Janidu, Y3)

I'm not sure whether we want more assessments that count directly on the final... that's too much. They let us know it's not as important as the theory or the disease parts you know? What I mean is...like.... if there was some form of... I don't know...something that doesn't count for the bar exam or the final... like a report that says what we did well or wrong...something like that...so like I know what I need to improve. (Subhashini, Y5)

Most third-year students expressed a desire for peer-practiced learning. Students perceived peer-practiced learning as enabling a smooth transition from the pre-clinical phase to the clerkships. They discussed that transitioning from the skills lab to actual patients should be smooth and not feel like “being thrown into the deep end all at once.” They felt the opportunity to practice procedural skills on peers after learning the skill at the skills lab on mannequins before having to practice on patients would be helpful to perform a procedure on an actual patient. The students assumed their peers or near peers would have undergone similar experiences and difficulties during the transition to clerkships. They viewed shared experiences as power and discussed the possibility of the peers or near peers being more empathetic with them as they try to learn procedures. In addition, they described that the “almost real” nature of performing a procedure on a peer would enable better performance on an actual patient.

I think it would be great if we could practice on each other. I mean we go through the same stuff isn't it? So I feel that I definitely would be okay if my friends practiced on me...it would help a lot to actually approach a patient. because although we practice on a dummy, it's very different when it is a patient. (Raj, Y3)

Discussion

Medical educators have focused on teaching and learning procedural skills for many years.⁶² Nevertheless, students and clinicians continue to struggle with this area of medicine. We sought to understand student perspectives on learning procedural skills and to delve more deeply into existing challenges and barriers, which shed light not only on teaching approach or style but also on what is fundamental to curriculum design. The findings from this study represent many issues central to curriculum design, especially regarding critical issues in planning curricula for procedural skills teaching and assisting

educators in providing a learner-centered approach to future curriculum revisions.⁶³

The results of the study showed that students experienced significant and multiple barriers to learning procedural skills. Students felt they needed to be more adequately prepared to perform procedures on actual patients. The student's primary method of learning procedural skills was observation. We found that the students mostly observed non-medical healthcare professionals performing procedures in the clinical setting. The students were left questioning the techniques observed in such instances. Although inter-professional education is generally well received in the west,⁶⁴ our study revealed findings to the contrary. Most Asian countries including Sri Lanka strive for educational excellence, with success framed as achieving the highest educational goals. Therefore, hierarchical structures in relation to education are prevalent in the healthcare systems throughout the region and in Sri Lanka. These societal values may have reinforced negative beliefs about the value of learning from non-medical health professionals. It is also possible that the student's reluctance to learn from non-medical health professionals might stem from an underdeveloped professional identity.⁶⁵ We suggest that learning through observation of other healthcare professionals caused students to question the accuracy of techniques leading to confusion and low confidence in performing procedures on patients. These ideas appear to be linked, forming a vicious cycle that prevents students from learning procedural skills within the clinical setting.

We found that students perceived learning procedures mainly as a waste of time. This finding connects directly with the student's perception of their clinical teachers' attitudes to procedural training. Clinical teachers are a crucial aspect of medical student learning in whom students see role models.⁶⁶ The student's perception of the clinical teachers affects their learning.⁴⁷ In our study students felt the clinical teachers ignored the development of their procedural skills. Studies show that students value clinical teachers who teach and facilitate learning and monitor their activities.^{67,68} The third and fourth-year medical students in Sri Lanka train mainly in tertiary care hospitals where the clinicians are employed not by the medical schools but by the Ministry of Health.⁶⁹ Currently Sri Lanka has a ratio of 3.56 physicians for 1000 population, a phenomenal shortage according to the WHO thresholds.^{70,71} These clinicians (extended faculty) become teachers to medical students on the job, while already heavily overworked by the large amounts of patients admitted to these hospitals, and supervising postgraduate trainees.⁷² Clinicians may expect medical students as adults, to

have the maturity to take responsibility for their learning. Evidence suggests time constraints, devaluing of teaching, and erosion of teaching ethics and skills lead to reduced attempts by clinical teachers to teach students,⁷³ which would be applicable to our setting as well. Rewarding educational productivity of the extended faculty,⁷⁴ and collaboration between hospital and faculty administrators to overcome system barriers could overcome these issues.

Our study participants noted that the clinical teachers were "exam-oriented" and prioritized teaching what would be required for the examinations and assessments. Being 'exam-oriented' is rarely found in western literature. The students also considered learning to get through the examinations the highest priority. This is not too surprising a finding because Asian students have been found to strive for success and to be ranked among the top achievers in examinations.⁷⁵ Failing in a high-stakes exam such as the final Bachelor of Medicine and Bachelor of Surgery (MBBS) exam will delay one's progression to the next stage of their career such as admission to a postgraduate training program. In a small country like Sri Lanka, where it is perceived to have few opportunities of starting afresh, it is not surprising that so much emphasis is placed on doing well in exams. Hence, students regarded learning procedural skills as a secondary duty and tried to learn these skills based on personal interest and not as a central professional task, although performing procedures is identified as a main professional duty of physicians.⁴³

Unease about patient vulnerability was another important barrier to performing procedures in the clinical setting among a few third-year medical students. Although the healthcare system in Sri Lanka has both private and public hospitals, all hospitals where medical students train are government funded institutions that provide free healthcare to the general public. Thus, the majority of patients that are treated in these hospitals are mostly of low socio-economic backgrounds and are unable to afford private healthcare. In medical practice, perceptions of patients based on a 'moral economy' of 'values, behavioral norms, and ethical assumptions' matter greatly in doctor-patient interactions and decisions about their care.⁷⁶ Evidence shows that clinician's perceptions of patients stem from social stereotypes, understandings of patient's character, and disparities in access to health care.^{77,78} Medical students have shown prejudice in interactions with 'poor' patients with recommendations for sensitizing students and increasing student interactions with such patients.^{79,80} For all the students of this study, interacting with disadvantaged patients

was the usual practice. We propose that at least some of the students in our study were sensitized to the socially disadvantaged through their daily work. It is possible that they expressed a sense of duty to minimize harm to those who are underserved. This is an area worth exploring in further studies. We also observed that most third-year students and all fourth and final-year students did not identify patient vulnerability as a barrier to learning. We noted a sense of self-entitlement and a propensity to use patients for their learning. This is beyond the scope of this paper and we highlight the importance of future research to explore this issue.

Students in this study identified the opportunistic nature of procedural skills learning to be a barrier to effective learning. We found that the opportunistic nature of procedural skills learning was present both within the skills laboratory and the clinical setting. Large student numbers in a single group within the skills laboratory learning sessions meant that students had to compete for “hands-on” practice from the available resources. Similarly, large groups and few demonstrations of procedures added to the opportunistic nature of procedural skills acquisition in the clinical setting. The students had to compete to observe procedural demonstrations since such demonstrations were a rarity in the clinical setting. The impact of student numbers on effective learning has been investigated before⁸¹ with recommendations for small group teaching/learning activities to promote skill acquisition,^{24,31} a solution all students of this study suggested as a method of improving procedural learning. However, large groups appear to be an universal ongoing logistical issue in clinical training.^{4,67,81–84}

Despite the many barriers to learning procedural skills, the students in this study also identified motivators for learning. Motivation is identified as an essential driver of clinical learning.⁸⁵ The desire to be a “good performer” as a medical student and, in the foreseeable future, as an intern motivated them to learn procedural skills. The students empathized with the interns and desired to learn what was valuable to complete the internship successfully. Students visualized a confident, competent intern who ideally can perform independently. They learned from observing the interactions of interns within the clinical environment. This is in line with published literature, with evidence supporting that medical students perceive interns as important role models in their education.^{86,87}

The students of this study also perceived being a good performer as an enabler for being inclusive in the medical community. The traditional hierarchical structures pervade almost all systems in Sri Lanka,

including healthcare (discussed above) and education due to students feeling condescension. The desire of learners to belong to a professional community is reported in many studies.^{88,89} Therefore it seems unsurprising that students felt they need to prove they are competent enough to belong to the medical community. A recent study by Fredholm et al.⁹⁰ explores the impact of belonging to communities of practice in medical education with implications on forming professional identity in medical students, a finding resonating with the results of our study.

We found that logbook requirements, although mostly neglected, also made students learn. However, it was seen as “something expected,” and the students tried to fulfill the requirements grudgingly. For some participants, interest in learning procedural skills was a reason to fulfill requirements in the logbook. Third-year students showed a higher enthusiasm to learn procedural skills than others. These students also desired additional learning materials like study guides and videos. Important to note is that this interest to learn waned as the years progressed, with fifth (final) year students expressing much less enthusiasm to learn procedures out of interest compared to third-year students. This may be because the students exerted more effort to learn for the final examination, which was the ultimate goal for all students. The receding interest in learning procedural skills is also reflected in final-year students’ comments concerning implementing assessments on procedural skills. The majority of final-year students did not feel the addition of assessments would motivate them to learn, which points to increasing stress and burnout among medical students with advancing academic years.⁹¹

An interesting finding of this study was the “accommodating patients.” We found that patients in this context were willing to be subjected to a procedural performance by medical students, and students did not encounter barriers in obtaining consent. Instead, the students in this study felt the willingness of patients to participate in their education as a motivator. This finding appears to be in contrast with the results of other studies, where students have had difficulties obtaining patient consent.^{39,42} However, it is important to note that some students of this study were in a midst of a dilemma. They were reluctant to perform due to causing harm to the patient (discussed above through patient vulnerability) but are motivated to practice by willing patients. Inevitably, students do have to perform procedures on actual patients at some point in time. However, the anxiety and distress caused by this dilemma can be minimized by improving their confidence and competence in

correct techniques that can be achieved by practicing in a simulated environment.⁹² Further assistance could be provided by supervision of skill performance by clinical teachers that is reported to provide learners with a sense of assurance.⁶⁷

Specifically, Valeriano et al.³⁹ reported difficulties obtaining consent from patients of the opposite sex. Patients also have shown discomfort in being under the care of healthcare workers of the opposite sex.⁹³ However, in our study, the students reported more accommodating patients. We suggest that the issue here is not obtaining consent but self-discomfort in encountering a patient of the opposite gender for an intimate procedure.⁹⁴⁻⁹⁶ Although studies show female medical students were more uncomfortable with male patients than vice versa,⁹⁷ we did not observe a similar pattern. Moreover, we noted a decline in the discomfort shown by students of both genders with opposite-gender patient encounters as the years progressed. It is possible that students may have acclimatized to gender-related issues as they build their professional identity.⁹⁸⁻¹⁰⁰ However, male participants of this study described experiences to the contrary, in a few encounters with women of Muslim ethnicity, a finding also reported in other studies.¹⁰¹ Muslim women are known to be sensitive to getting exposed in front of males.¹⁰² Muslims constitute 9.7% of the Sri Lankan population,¹⁰³ therefore, these encounters are not the most frequent, imposing few limitations to medical student education in the local context.

Unsurprisingly, most students felt the opportunity to perform procedures at the skills laboratory, especially during the pre-clinical phase of education motivated them to learn procedures in the clinical setting. Improved confidence and the assurance of having mastered the technical aspects motivated the students to perform procedures on actual patients. Their suggestion to increase the skills laboratory exposure, with planned and organized teaching, also reflects the desire for learning and improving learning opportunities for effective learning. The impact of skills laboratory training on procedural skills acquisition is well known.¹⁰⁴ Pre-clerkship procedural training is highly recommended to improve procedural competence among medical students, which has seen procedural curricula integrated into the core curricula.^{25,105}

The suggestions made by students for improved procedural learning embody the collective drive for learning procedural skills. Students of this study expressed a desire for systematic teaching of procedural skills both within the skills laboratory and at the bedside. Sri Lankan students are used to being 'spoon-fed'

factual information from their primary education onwards. Even the tertiary education at medical schools is no different, with large amounts of facts taught in lectures around highly structured timetables from the first to fourth year of the undergraduate programs. This leaves little opportunity for the development of self-directed learning (SDL) with students using the few SDL hours to mostly relax or pass time until another teaching activity comes along. Therefore, it is unsurprising that students expect a similar trend in clerkships as well. The teaching of procedural skills is essential for students to learn correct techniques, communication skills, and professionalism.⁶ It is equally important to develop learning skills in students. The responsibility of medical schools lies not only in producing medical graduates but also in promoting individuals who are prepared for life-long learning.¹⁰⁶ Therefore, we highlight the importance of facilitating student's self-directed learning skills in addition to providing multimodal instruction in procedural training to maximize the learner's benefit.

Although the students in our study expressed a desire for smaller subgroups in the clinical setting, they expected the faculty to be involved in carrying out such changes within the clerkship groups. Students showed a great degree of discomfort in advocating for their learning. Although it is expected that the responsibility to seek out learning opportunities lies with the students during clerkships,¹⁰⁷ students were not prepared to advocate for their learning needs. The idea of self-advocacy during clerkship is an ongoing debate, with students and clerkship directors not seeing eye-to-eye.^{4,108-110}

The students in our study identified lack of assessments demotivated them to learn and suggested evaluations in the form of assessments and feedback of procedural skills to overcome this barrier. Students in early clinical training appeared enthusiastic about summative assessments, although students in later years of the undergraduate program opted for feedback on procedural skills. They mostly tried to learn the few procedures they knew were routinely assessed. Teaching and assessment have been identified as integral to learner skill development,¹¹¹⁻¹¹³ as is feedback that provides the learner with information to improve one's self.¹¹⁴ In similar studies, students have expressed dissatisfaction with having theory-based evaluations failing to assess their practical abilities.⁴² Similarly, Canadian medical students reported difficulties in obtaining feedback on procedural performance by faculty as significant challenges in learning procedures.³⁹ Timely assessments were reported as vital for improving the competence and confidence

of students. In their study, the students identified the lack of a mechanism for obtaining timely assessments on procedural competence as a primary barrier.

The participants suggested implementing a monitoring mechanism for the clerkship work. They felt completing the logbook was not monitored and they were able to “get away with” completing the logbooks without performing the required tasks. Consultants signed the student logbooks at the end of the clinical rotation if the students had obtained signatures for various items in it. We suggest that students interpreted completing logbook requirements as obtaining signatures. Signed logbook lists at the end of appointment meant the students had completed the assigned tasks. Logbooks, as a mode of enforcing adult learning,^{114,115} appear to have significant drawbacks in this context. Students felt they would perform better if the clinicians supervised them during the clerkships rather than looked for a completed (signed) logbook at the end of the clerkship. Adequate supervision of procedural training during clinical attachments has improved satisfaction and trust among learners, which has motivated students to learn.¹¹⁶ However, hard-copy logbooks may not be helpful for this purpose. Previous research on monitoring clerkships through logbooks showed that collecting, evaluating, and analyzing logbook data at the end of a clinical rotation is difficult and would not facilitate providing timely feedback.¹¹⁷ Electronic logbooks have overcome many of these obstacles.¹¹⁸ Electronic logbooks enable proper monitoring and analysis of student learning while permitting modification of the teaching and learning activities during the clerkship accordingly.¹¹⁹

Students in the third year of study also expressed an affinity for peer-practiced learning. The students identified the gap in transferring training from the skill lab to the clinical setting, which was also observed by Coberly et al.¹²⁰ The students felt that learning with and from peers would enable a smoother transition to clinical practice. Students interpreted that shared experiences in relation to learning during clerkships would encourage each other to offer for peer-practiced learning opportunities, a finding resonating with the psychology of peer teaching.¹²¹ Literature supports the use of peers for effective practical skills learning.^{122–124} In our study, only the third-year students opted for peer-practiced learning. This may insinuate the need to adapt to a new (clinical) environment, a challenge faced exclusively by students with no prior clinical exposure, and comfort in learning with peers instead of clinicians or other healthcare professionals.^{125–127}

Implications for practice

Recognizing the barriers, motivations, and thinking behind students’ expectations for procedural learning is vital for reforming procedural curricula in undergraduate medical education. Doing so allows medical and clinical teachers to develop a more informed understanding of what students might benefit from within the current context and to address issues related to procedural training to deliver more effective learning opportunities. The findings of this study are relevant to those involved in curriculum design, as they highlight what motivates students to learn in the face of many significant barriers and challenges students face in learning procedural skills.

The continued struggle of medical educators to provide procedural training and students’ struggle to achieve desired competency in procedural skills¹⁰⁷ reflect the need to identify the students’ perspectives to cater to their needs. Our claim is that there is a sound reason to comply with students’ expectations for procedural learning. However, there are also commonly cited reasons for why procedural learning is what it is today: mostly opportunistic, teaching limited to skills laboratories, largely dependent on clerkships with minimal supervision and, inadequate assessments. A key reason is the limited physical and human resources to deliver comprehensive procedural training to medical students.¹⁰⁷ Another is that most clinicians believe in the power of internship as an important learning opportunity.^{108,128} The argument is that interns will learn what is required during the internship. Although valid, we suggest that it is not an overriding reason to deny offering maximum learning opportunities for medical students to achieve procedural competency.

To this end, we highlight the importance of harnessing student motivations and removing possible barriers in their education to achieve maximum learning potential. Creating more teaching and learning opportunities in the clinical setting with active supervision of the student activities during clerkships by clinical teachers is vital. Clinical teachers’ attitudes toward student learning are crucial in promoting a student-friendly environment. Thus, clinical teachers and clerkship directors must be informed and educated about the barriers students face during clerkships to create solutions. Students in this study valued procedural evaluations and feedback on their performance. Implementing formative and summative assessments and a mechanism for timely feedback will also encourage student learning. Electronic logbooks,¹¹⁹ standard workplace-based assessments (WBA),¹²⁹ Entrustable Professional Activities based WBA using

entrustment-supervision scales,¹³⁰ end-of-clerkship OSCE,¹³¹ and clerkship portfolios¹³² have shown effectiveness in promoting effective learning amongst students.

Students of this study valued improved teaching at the skills laboratory. We suggest that teaching in the skills laboratory should be available for pre-clinical students and students in their clerkships. Skills laboratory teaching could be made more effective by providing quality resources and ample time for deliberate practice¹³³ fortified by end-of-term and end-of-year OSCE. Another suggestion made by the students was peer-practiced learning which has been shown to improve student learning in procedural skills.¹³⁴ However, the availability of appropriate facilities and resources to safely conduct procedures have been commonly identified as challenges in peer-practiced learning, with recommendations for risk assessments and the presence of a supervising clinician during the delivery of this method of education.¹²⁴

Our focus group participants desired smaller groups within the skills laboratories and the clerkships. However, students were reluctant to be responsible for their learning, especially in the clinical setting. We argue that it is important for medical students to develop an aptitude for self-advocacy. Medical educators need to pay increased attention to developing medical students' skills of self-advocacy prior to beginning their clerkship training. This would encourage learners to identify learning gaps and to seek opportunities to fulfill such gaps that would ultimately prepare learners for continued medical education and life-long learning.¹⁰⁶

Limitations

This study presents novel and valuable information regarding medical students' experiences of learning procedural skills, but some limitations are recognized. Focus group discussions were conducted in English, the second language of most participants. Although English is used throughout undergraduate training, participants may have felt more comfortable speaking their first language for discussion. A single researcher primarily conducted the data analysis; however, two coauthors analyzed a subset of data, and the research team discussed the results. We focused on the student experience of learning procedural skills in this study. Although prior work has focused on the teachers' perspectives,¹⁹ we did not explore the views of clinical teachers in this study, which may provide additional insights into the findings presented here.

Conclusion

The findings of this study highlight the importance of reforming procedural curricula in undergraduate medical education with approaches to make teaching and learning more learner-centered. Promoting a learner-centered approach to procedural teaching and learning will benefit all stakeholders, especially future physicians and their patients. However, curriculum change alone is not sufficient. Medical educators need to ensure that faculty, clinical, and medical teachers are sensitized to student needs and supported in developing and implementing teaching and learning activities. This study also identifies the importance of culture in seeking evidence to inform educational initiatives. It is crucial that medical educators listen to students' accounts of what they are really learning¹³⁵ to provide adequate learning opportunities for all learners. The implications of this study are not unique to simply procedural training but broadly transferable to other areas of medical education. Thus, we emphasize the contribution of student perspectives on curriculum design that can be applied across all areas of medical education.

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Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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