

**ORIGINAL ARTICLE**

**Title:** Evaluation of Student Expectations and Clinical Competence Skills  
Performance during Surgery Clerkship Program: A Comprehensive Study

**Authors:** Syarif, Irwin Aras, Suryani As'ad, Nasrudin Andi Mappaware, Budu, Irfan  
Sugianto, Agussalim Bukhari, Ahmad Taufik Fadillah, Ichlas Nanang

**Submitted Date:** 10-07-2023

**Accepted Date:** 14-10-2023

**Please cite this article as:** Syarif, Aras I, As'ad S, Mappaware NA, Budu, Sugianto I et al. Evaluation of student expectations and clinical competence skills performance during surgery clerkship program: a comprehensive study. Education in Medicine Journal (early view).

This is a provisional PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article.

ARTICLE INFO

Submitted: 10-07-2023  
Accepted: 14-10-2023

# Evaluation of Student Expectations and Clinical Competence Skills Performance during Surgery Clerkship Program: A Comprehensive Study

Syarif<sup>1,2</sup>, Irwin Aras<sup>1,3</sup>, Suryani As'ad<sup>1,4</sup>, Nasrudin Andi Mappaware<sup>1,5</sup>, Budu<sup>1,6</sup>, Irfan Sugianto<sup>1,7</sup>, Agussalim Bukhari<sup>1,4</sup>, Ahmad Taufik Fadillah<sup>8</sup>, Ichlas Nanang<sup>9</sup>

<sup>1</sup>Department of Medical Education, Faculty of Medicine, Hasanuddin University, Makassar, INDONESIA

<sup>2</sup>Department of Surgery, Faculty of Medicine, Hasanuddin University, Makassar, INDONESIA

<sup>3</sup>Department of Public Health, Faculty of Medicine, Hasanuddin University, Makassar, INDONESIA

<sup>4</sup>Department of Clinical Nutrition, Faculty of Medicine, Hasanuddin University, Makassar, INDONESIA

<sup>5</sup>Department of Obstetrics and Gynaecology, Faculty of Medicine, Hasanuddin University, Makassar, INDONESIA

<sup>6</sup>Department of Ophthalmology, Faculty of Medicine, Hasanuddin University, Makassar, INDONESIA

<sup>7</sup>Faculty of Dentistry, Hasanuddin University, Makassar, INDONESIA

<sup>8</sup>Faculty of Medicine, Hasanuddin University, Makassar, INDONESIA

<sup>9</sup>Department of Psychology, Faculty of Medicine, Hasanuddin University, Makassar, INDONESIA

**To cite this article:** Syarif, Aras I, As'ad S, Mappaware NA, Budu, Sugianto I et al. Evaluation of student expectations and clinical competence skills performance during surgery clerkship program: a comprehensive study. *Education in Medicine Journal* (early view).

## ABSTRACT

The existence of a good clerkship system and quality lecturers will undoubtedly enhance the medical students' knowledge and skills that align with their competencies. This study aimed to evaluate the achievement of surgical competence based on the expectations of students following clinical clerkships in the surgical department. This study included medical students who participated in a clinical clerkship in the surgical department using a mixed method with a sequential explanatory design as a quantitative approach. Pre- and post-tests were also used to assess changes in student knowledge, qualitative results were obtained from focus group discussions (FGD), and standardized questionnaires were used to assess student skills expectations and achievements. The results showed a significant increase in students' knowledge after participating in a clinical clerkship, with a mean difference of 3.94 (10.67). However, only three of the skills met students' expectations during clinical clerkship. This was attributed to a lack of opportunities to practice the skills that students had acquired, the presence of too many students, limited time, and a shortage of practical placements in regional hospitals. Most students perceived the majority of lecturers as nurturing and proficient. However, some lecturers are often occupied with their commitment, resulting in infrequent student interactions. The clinical clerkship system for the surgical department at Hasanuddin University Faculty of Medicine effectively enhanced student knowledge, but it needs to be improved to meet their skill expectations.

**Keywords:**

**CORRESPONDING**

Syarif, Department of Medical Education, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia

Email: syarifbakri@hotmail.com

## INTRODUCTION

Medical education comprises several stages. The initial stage was to train students in the classroom and then proceed to the clinical clerkship stage in a teaching hospital (1). In the United States, medical education usually lasts four years, and the first- and second-year students take classes, and the following two years are clinical clerkship, including surgery (2). Meanwhile, in Indonesia, according to Indonesian medical professional education standards issued by the Indonesian Medical Council (IMC) in 2012, the stages of medical education in Indonesia are generally divided into two: the academic stage for ~3–4 years then the clinical stage for approximately 2 years (3, 4).

During the clinical clerkship stage, each institution must own five major departments, one of which is the general surgery department (3). Clinical clerkship at a surgical station is a medical student's first exposure to the basics of surgical education. Medical students enter surgical clinic clerkships with stereotypes and the expectation of skills that can be learned during clinical clerkship in the surgical department (5, 6).

Based on the *Standar Kompetensi Dokter Indonesia* (SKDI) issued in 2012, several clinical competencies and skills must be mastered by medical students from diagnosis to management (7). However, to achieve these competencies, each institution is given the authority to regulate the systems and methods applied to clinical clerkships in the surgical department. This is caused due to the absence of a standardized program for clinical clerkship processes in the surgical department. Therefore, a study related to the education system for clinical clerkship in the surgical department will serve as evaluation material for each institution, and the evaluation results will form the basis for the development of a clinical clerkship system, especially in the surgical department, to produce good and professional quality doctors.

This study evaluates the achievement of surgical competence based on student expectations in the surgical department of the medical profession. Furthermore, this study will evaluate students' expectations and assessments of the education system and academic staff in the surgical department.

## METHODS

### Study Design and Subjects

We conducted a mixed-method study, using quantitative and qualitative measurements, between February and May 2023 at the Department of Surgery, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia. Total sampling was used to determine the sample size of the medical student population participating in the surgical clerkship between February and May 2023. We included students who had participated in the clerkship process for ten weeks and were willing to participate in the study. Students who committed ethical violations during their clerkship were excluded from the study.

Quantitative data were collected in two phases. The first phase was conducted by filling out a questionnaire to assess the expectations of students during the clerkship process. The second phase was conducted after the students had attended the clerkship process for ten weeks. Medical students were requested to fill out a questionnaire to assess skills acquired during the surgical clerkship as well as academic lecturers (surgeons). Qualitative data collection through focus group discussions (FGD) was conducted in week 9 of the clerkship process. Participants for the FGD were selected using purposive sampling to ensure representation.

## Study Instruments and Procedure

We used an informed consent form to request written consent from participants. The participants were then asked to fill out an identity questionnaire based on their identification, such as an identity card or a student card.

Furthermore, a questionnaire was used to assess students' expectations encompassing various skills aligned with doctors' competency standards. Each participant provided a rating indicating their level of expectation for these skills. The questionnaire was also used to assess students' final achievements after participating in a clinical clerkship program in the surgical department. Another questionnaire was used to provide an overview of student stereotypes towards academic lecturers (surgeons). It contained several statements related to the nature of surgeons, and students were asked to rate "strongly agree" to "strongly disagree" (Likert scale). The results of the questionnaire were reviewed in the form of numerical data at each point.

Multiple-choice questions were given before and after attending clinical clerkships to assess the level of knowledge of pre and post-students attending clinical clerkships. The pre- and post-test values were reported in the form of numerical data.

## Statistical Analyses

The collected quantitative data were analyzed using Statistical Package for the Social Sciences (SPSS) program. Paired t-tests or Wilcoxon tests were used to compare paired data. The results of the data analysis were then presented in tabular form and combined with several models of existing variables accompanied by explanations.

In the qualitative phase, all the answers to the questionnaire were recorded, typed, and written in the form of interview transcripts. Subsequently, the transcripts were meticulously reviewed, with careful attention given to every word to comprehend and process their content, and they were systematically categorized based on similarities. The qualitative data were analyzed using a thematic framework. It was performed in several steps: transcription, recognition, coding, and development of a framework, as well as mapping and interpreting the data. A set of codes was then organized into categories to facilitate data management and create new data structures useful for answering the study questions. The data are presented in the form of narratives and frameworks (8).

## RESULTS

### Quantitative Analyses

A total of 136 medical students participated in the clinical clerkship program in the surgery department and agreed to participate in this study. The sample consisted of 29.41% men and 70.59% women, with an average age of 23.41, as shown in Table 1.

The 10 skills were prepared according to the competency standards of Indonesian doctors (SKDI). Students were asked to rate their expectations on a scale of 1–7 to, with the higher score denoting a greater expectation. The results showed that student expectations were more inclined towards suturing skills, active bleeding and trauma management, sterile techniques, and first-line treatment in emergency cases. After attending the clinical clerkship process for 10 weeks, students were asked to complete a subjective skill attainment questionnaire. The levels of expectation and achievement for each skill were then compared. The results showed that acquisition of certain skills failed to meet the general expectations of students, and only 3/10 met student expectations, as shown in Table 2.

After completing the clinical clerkship process for 10 weeks, the students were asked to fill out an assessment questionnaire for lecturers in the surgery department. The results showed that, on average, students agreed that teaching lecturers in the surgical department had good skills and basic science knowledge and were professionals in providing services to patients, as shown in Table 3.

A paired t-test was conducted to assess the knowledge of students after going through the surgery clerkship for 10 weeks, and the results showed an increase with a mean difference (MD) of 3.94 (10.67) and p-value <0.001, as shown in Table 4.

**Table 1:** Characteristics of the subjects

Characteristics	Mean (SD)/n (%)
Age (years)	23.41 (0.93)
Gender	
Man	42 (30.4%)
Woman	96 (69.6%)
Length of study	
On time	105 (76.1%)
Not on time	33 (23.9%)
Pre-test score	73.63 (10.01)

**Table 2:** Expectations of students skills achievement

No	Skills	SKDI (2012)	Score (1-7)	
			Expectations	Results
1	Writing scientific papers	-	5.13	5.31
2	Oral scientific presentation skills	-	5.23	5.41

3	First aid (Emergency)	4A	5.88	5.50
4	Sterile technique	4A	5.89	5.99
5	Wound suture technique	4A	5.92	5.81
6	Trauma evaluation	4A	5.85	5.58
7	Trauma management	4A	5.89	5.47
8	Open wound management	4A	5.87	5.51
9	Shock management	4A	5.80	5.26
10	Management of active bleeding	4A	5.92	5.50

**Table 3:** Students expectations of academic lecturers (surgeons)

No	Expectations	Score (1-5)
1	Have faith and piety in God Almighty	3.99
2	Have good knowledge (basic science).	4.26
3	Good skill	4.31
4	Professional in providing services to patients	4.05
5	Guiding according to the competence of general practitioners	3.85
6	Caring for students (students)	3.71
7	Solutive in every problem faced by students	3.60
8	Have a good relationship with teaching lecturers	3.89
9	Intimidating	3.33
10	A good role model	3.55

**Table 4:** Knowledge of students after participating in clerkship in the surgical department

Variable	Mean (SD)	Mean Difference (MD)	p-value
Pre-test	73.63 (10.01)	3.94 (10.67)	<0.001
Post-test	77.58 (4.78)		

## Qualitative Analyses

FGD was conducted and attended by eight students, representing their respective groups. The FGD results were grouped into three sections.

### Expectations before entering the clinical clerkship at the surgery

Students hoped to gain general surgical skills that will be useful in clinical clerkships when they become doctors.

We hope to gain general surgical skills before dealing directly with patients in the field when we become doctors. (P324-FGD)

Students hoped to obtain knowledge that is in accordance with the competencies of general practitioners.

I hope to obtain knowledge that is in accordance with the competence of general practitioners at the surgical stage. (P148-FGD)

### Evaluations after attending the clinical clerkship

Students perceived that the opportunities available for skill practice still need to be improved.

Our main teaching hospital (Wahidin Sudirohusodo Hospital) is central hospital, therefore, most of the patients cases primarily align with the competence of specialist doctors rather than general practitioners. Consequently, the opportunity to practice skills in providing initial management is limited. (P109-FGD)

The opportunity for skill practice is not uniformly distributed among students. (P99-FGD)

In terms of quantity, we are not satisfied, because the number of students enrolled in this rotation is much, hence, sometimes we don't get the chance to practice our skills. (P116-FGD)

There are some obstacles such as the number of students who are too many and the limited time. (P132-FGD)

General surgical skill training is required before practicing in the hospital.

It is necessary to provide training before practicing at the hospital, for example for the first week all students are trained in basic skills on experimental tools, which will be used later when practicing at the hospital. (P315-FGD)

Several divisions have been implemented, on the first day there is guidance on sterile technique while the division provides basic surgical skill guidance. However, because it uses a rotation system, several groups receive this guidance on the last week of rotation. (P327-FGD)

The clinical clerkship at the Network Hospital accommodates training students but is very limited.

During clinical clerkship, most of us practiced at referral center hospitals whose cases were not the competence of general practitioners. Whereas cases that should be our competence are usually obtained at regional hospitals. (P190-FGD)

In one of the regional hospitals, we had the opportunity to practice skills starting from history taking, physical examination, analysis and diagnosis, and providing initial management. (P255-FGD)

At the regional hospital, we had many opportunities to practice skills such as placing intravenous catheters, nasogastric tubes, suturing wounds, and others. However, not all students get to practice at the regional hospital. (P259-FGD)

We hope that the rotation system is fairer to ensure that all students can get the opportunity to practice at regional hospitals. (P165-FGD)

The clinical clerkship system in each division is not uniform.

The surgery curriculum is divided into 8 divisions, but the system applied in each division is not uniform. (P283-FGD)

The curriculum design for each division is different and should be uniform. Then the final exams for each division must also be standardized to ensure that all students can achieve competency gains. (P284-FGD)

Students were very fulfilled in terms of knowledge.

The division of rotation into 8 is very useful to facilitate and direct us in learning materials that are in accordance with the competence of general practitioners. (P97-FGD)

From a scientific point of view, we acquired much knowledge, starting from cases that are in accordance with the competence of general practitioners or even those that we have never heard of before. The knowledge we obtained is also very updated from the latest references. (P114-FGD)

In terms of science during clinical clerkship at surgery it was very satisfying. (P122-FGD)

### **Evaluation of lecturer/supervisors (surgeons)**

Some supervisors were busy, so they rarely guide students.

Supervisors are given for each division for one week and being examiners in the final division exams. The distribution is given randomly. Some supervising lecturer is very good at guiding and inviting them to witness cases. This lecturer also discusses cases to ensure that students get a lot of insight, but some supervisors also have quite a lot of business so they don't guide students. (P149-FGD)

There is no standardization of guidance and examinations by supervisors.

There are supervisors who just stay silent, we just need to follow the operation for a week, follow them to visit patients, then get grades right away. Some have never even met their supervising lecturer on weekends and only meet for exams. Some lecturers give case exams, there are even just massage exams. There is no standardization, so there should be standardization regarding cases that the supervisor must discuss during the station in a division, the exam must also be uniform and standardized. (P284-FGD)

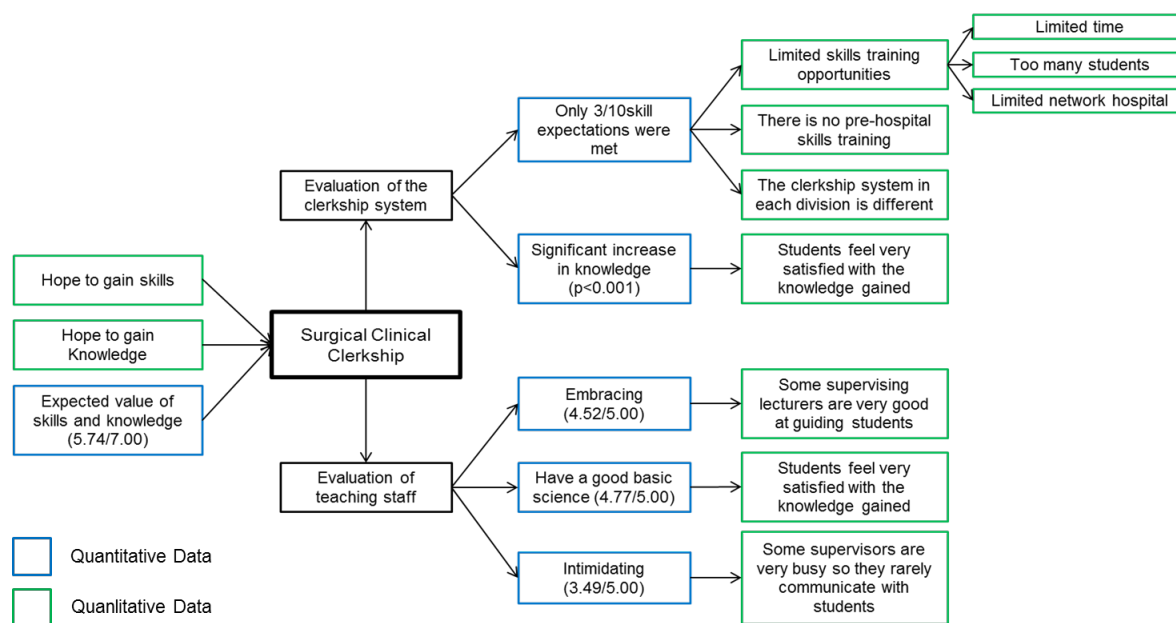
Each lecturer should have an even distribution regarding what he gives to the students under his guidance to close the gaps in knowledge or skills that are obtained, regardless of the assigned supervisor. (P161-FGD)



I suggest that the learning system by the supervisor is scheduled, for example, today we study case A, tomorrow study case B, and so on. And this is implemented thoroughly for all supervisors. (P335-FGD)

## Quantitative and Qualitative Data Integration

Overall, the quantitative data were qualitatively consistent. The integration of the qualitative and quantitative data is shown in Figure 1.



**Figure 1:** A framework of quantitative and qualitative data integration.

## DISCUSSION

This study aimed to provide evaluation material to enhance the education system in clinical clerkships of medical students in the surgical department. In this study, we used student expectations of clinical clerkship in the surgical department and student achievement as measures of the quality of the implemented education system.

Landmann et al. mentioned in their study that by knowing the competency expectations to be achieved, students focus more on getting what they expect, which can affect the competency outcomes after participating in rotations in the surgical department (6). The results of this study indicate that students expect to acquire more clinical skills such as wound suturing techniques, active bleeding management, and sterile techniques than reasoning skills such as writing and reviewing scientific work. The results of this study are in line with the study by De et al. conducted on medical students at the University of Michigan and reported that the sterile technique was the most important skill following surgical rotations (9).

After participating in the entire clerkship program, the results of the student achievement evaluation showed that achievement of some skills did not subjectively meet student expectations. After attending clinical clerkships for 10 weeks, only 3 out of 10 skills were achieved: writing scientific papers, scientific presentations, and sterile techniques. Meanwhile, after attending the clinical clerkship, expectations for other skills such as first aid, trauma management, bleeding management, shock

management, open wound management, and sewing techniques were not achieved. These results indicate that the currently implemented education system still needs to be evaluated to improve skills as a provision to become a general practitioner, according to competence (7). This is supported by the results of a qualitative analysis in which students felt that opportunities to improve their skills were lacking while attending clinical clerkships in the surgical department. This was owing to the limited time for clerkships, too many students, and the lack of network hospitals, which are places of practice for students. Students mentioned that at the network hospital, there were far more opportunities to practice skills than at the Wahidin Sudirohusodo Hospital (RSWS), which is the main teaching hospital, because most of the patients at RSWS were referral patients who had received initial treatment by general practitioners at health services (primary care), whereas in a network hospital, patients who come are usually in accordance with the competence of general practitioners, so that students are better trained to provide initial treatment to patients who come with cases that are in accordance with the competence of general practitioners. This has also been explained by Annisa (2016) who reported that variations in cases in network hospitals affected the achievement of the assessed competencies (10). Also, students feel the need to carry out basic skills training in accordance with the competence of general practitioners before practicing at a hospital because the surgical department is synonymous with many skills. These factors explain why student skill acquisition in surgical clinic clerkships remains unsatisfactory.

In addition to skills, knowledge, and experience are also important for medical students because the clinical clerkship process in the surgical department is the only place where they can participate in and observe the surgical process and anatomical structures that are usually only seen in books (11). This knowledge and experience can help provide initial treatment in emergency cases before referral to a surgeon. In this study, there was a significant increase in knowledge after attending the surgical clinic clerkship, with a mean difference (MD) of 3.94 (10.67) and a p-value  $<0.001$ , which is supported by qualitative data; students feel very satisfied with the new knowledge they acquired while attending clinical clerkships in the surgical department. This result is consistent with several previous studies reporting that surgical clinic clerks were able to increase student knowledge, especially in the field of anatomy, because they gain experience by observing cases and human anatomical structures in the operating room (12–14).

The results of this study indicate that the system implemented in the clinical clerkship of the surgical department at the Hasanuddin University Faculty of Medicine has been effective in increasing student knowledge but is still less effective in improving student skills. Some suggestions were obtained from qualitative data analysis, namely, considering the number of students accepted in one rotation relative to the availability of network hospitals, increasing cooperation with regional hospitals to become network educational hospitals, conducting basic skill training for one week before students practice going directly to the hospital, and carrying out an equalization of the clerkship system for all surgical divisions to avoid readjustment when they move to other divisions so that they can focus more on improving their skills.

Furthermore, we conducted student assessments of teaching lecturers (surgical specialists). In general, students have good ratings on various aspects, but they regard surgeons as respected. These results are in line with the qualitative study conducted by Hill et al. that there is a stereotype that states that surgeons are intimidating, competitive, and masculine (9,15–17). The results of the qualitative data show that students feel that some lecturers are very good at guiding, inviting students to observe and discuss cases, so that students gain a lot of knowledge. However, some supervisors are busy and rarely interact with students. The absence of standardization regarding the material taught by each supervisor is the main obstacle to the mentoring process in the surgery department; therefore, the knowledge gained by students is not evenly distributed but is dependent on the supervisor. Therefore, the results of this study suggest that a special curriculum be created regarding materials or cases that are in accordance with the competencies of general practitioners and must be discussed with the supervisor.

Mixed methods were fundamental to this study in providing a comprehensive perspective related to the clinical clerkship system of the surgical department. Qualitative data strengthened the findings of this study and provided constructive input from a student's perspective to improve the surgical department's clinical clerkship system by increasing student knowledge and skills. The results of this study will provide insights for all other surgical departments to implement a good clinical clerkship system for medical students. However, this study has some limitations. First, this research was conducted in only one educational center and one registrar period, which limits the generalization of the data. Second, the evaluation of supervisors in this study has a fairly high risk of bias because each student does not have the same opportunity to interact with all supervisors; most of them are limited to the supervisor.

## CONCLUSION

The clinical clerkship system for the surgical department at the Hasanuddin University Faculty of Medicine effectively increases student knowledge but is still limited in meeting their skill expectations in accordance with the competence of general practitioners. This can be attributed to the lack of opportunities to improve clinical skills, limited time, excessive number of students, differences in the clerkship system of each surgical division, and lack of network hospitals. Other factors include a lack of basic skills training before students are allowed to practice in hospitals.

## ETHICAL APPROVAL

This study received ethical approval from Universitas Hasanuddin (No.138/UN.4.6.4.5.31/PP36/2023).

## REFERENCES

1. Cymet T. What Is a Clinical Clerkship? *Am Coll Osteopath Fam Physicians*. 2018;1:1–3.
2. Lenhoff F, Goldberg RB, Reichgott M, Collins M, Jumper C, Elliott VS. Ensuring the Availability of Clinical Clerkships at U.S. Hospitals: A Tale of 2 States. *Acad Med J Assoc Am Med Coll*. 2020 Nov;95(11):1658–61.
3. Indonesian Medical Council. *Standar Pendidikan Profesi Dokter Indonesia*. Indones Med Counc IMC. 2012;
4. Irwandi, Lasmono MK, Wulantari RA, Novita R, Heychael M, Herdani Y, et al. *Buku Saku : Mengenal Sistem Penjaminan Mutu Pendidikan Tinggi Kesehatan*. Health Prof Educ Qual HPEQ Proj. 2013;
5. Miller GE. The assessment of clinical skills/competence/performance. *Acad Med J Assoc Am Med Coll*. 1990 Sep;65(9 Suppl):S63-67.

6. Landmann A, Havron WS, Patel A, Thompson BM, Lees JS. Medical student expectations from surgical education: A two-year institutional experience. *Am J Surg* [Internet]. 2016 Dec [cited 2022 Oct 11];212(6):1265–9.
7. Indonesian Medical Council. Standar Nasional Pendidikan Profesi Dokter Indonesia (SNPPDI). Indones Med Counc IMC. 2019;
8. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol* [Internet]. 2013 Sep 18 [cited 2023 May 23];13(1):117.
9. De SK, Henke PK, Ailawadi G, Dimick JB, Colletti LM. Attending, house officer, and medical student perceptions about teaching in the third-year medical school general surgery clerkship. *J Am Coll Surg* [Internet]. 2004 Dec [cited 2022 Oct 11];199(6):932–42.
10. Meitriasari A. Hubungan Antara Persepsi Mahasiswa Tentang Capaian Kompetensi Klinis Dengan Nilai Akhir Bagian - Studi Observasional terhadap Mahasiswa Kepaniteraan Klinik Bagian Ilmu Bedah Fakultas Kedokteran Unissula [Internet] [undergraduate]. Fakultas Kedokteran UNISSULA; 2016 [cited 2023 May 21]. Available from: <http://repository.unissula.ac.id/4936/>
11. Quillin RC, Pritts TA, Tevar AD, Hanseman DJ, Edwards MJ, Davis BR. Students' expectations on the surgery clerkship exceed those of residents and faculty. *J Surg Res* [Internet]. 2013 Sep [cited 2022 Oct 11];184(1):495–500.
12. Wilder C, Kilgore LJ, Fritzel A, Larson KE. Improving Medical Student Anatomy Knowledge and Confidence for the Breast Surgical Oncology Rotation. *Healthcare*. 2023;11(709):1–10.
13. Setiawan E, Sugeng B, Luailiyah A, Makarim FR, Trisnadi S. Evaluating knowledge and skill in surgery clerkship during covid 19 pandemics: A single-center experience in Indonesia. *Ann Med Surg* [Internet]. 2021 Aug 1 [cited 2023 May 21];68:102685. Available from: <https://www.sciencedirect.com/science/article/pii/S204908012100635X>
14. Tremont JNP, Kratzke IM, Williford ML, Pascarella L. A Novel Educational Tool to Improve Medical Student Knowledge Acquisition During Surgical Rotations. *Am Surg*. 88(9):2309–13.
15. Hill EJR, Bowman KA, Stalmeijer RE, Solomon Y, Dornan T. Can I cut it? Medical students' perceptions of surgeons and surgical careers. *Am J Surg* [Internet]. 2014 Nov [cited 2022 Oct 11];208(5):860–7.
16. Pettitt BJ. Medical student concerns and fears before their third-year surgical clerkship. *Am J Surg* [Internet]. 2005 Apr [cited 2022 Oct 11];189(4):492–6.
17. Sullivan ME, Trial J, Baker C, Inaba K, Etcheverry J, Nally M, et al. A framework for professionalism in surgery: what is important to medical students? *Am J Surg* [Internet]. 2014 Feb [cited 2022 Oct 11];207(2):255–9.