

# Assessment of knowledge of surgical and clinical skills among medical students and residents in Syria: A cross-sectional study.

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## Research Article

**Keywords:** Surgical skills, Clinical skills, Medical education

**Posted Date:** April 4th, 2022

**DOI:** <https://doi.org/10.21203/rs.3.rs-1428541/v1>

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# Abstract

## Background:

Based on the importance of surgical and clinical skills for any doctor, regardless of his specialty, it was necessary to assess the knowledge and familiarity of medical students and recent graduates with these skills, perhaps this assessment would be a constructive step towards improving the professional reality of all doctors in our country.

## Methods:

We surveyed medical students in Syrian Universities by a questionnaire which was published via online students platforms. Main topics of the questionnaire concerned basic surgical and clinical skills by twenty questions that were taken from international references.

## Results:

The final sample was 500 questionnaires and 77% of the students had an intermediate assessment. A relationship was noted with the University where they studied and the gender of participants. The percentage of correct answers ranged from 29% to 76.8% for surgical skills and from 9% to 98.4% for clinical skills.

## Conclusions:

We have noticed a defect in many students in applying their theoretical knowledge in a good practical way, so we suggested that these faculties adopt systematic plans to develop the teaching of these skills and provide efficient scientific expertise in addition to improving training methods by reducing the number of Students and placing them in an appropriate environment with securing the necessary laboratories and equipment.

# Background

The mastery of clinical and surgical skills is considered one of the basic matters to transform the student ,who studies at the Faculty of Medicine', into a competent health professionalist who fits the medical practice (1).

Whereas, in clinical skills, students learn diagnosis principles, decision-making, and patients' treatment, which enable him to deal with the patient as a doctor, and how to take a personal history and examination of the patient and formulate its results in the differential diagnosis, in addition, how to use investigations either to support or to negate the differential diagnosis (2)

Surgical skills are considered an essential cornerstone in the provision of primary health care (3), as they include many practical skills such as suturing the skin, wound care, the principles of anesthesia, the

installation of catheters, arterial puncture, and other helpful knowledge which is necessary for all specialties (4)(5).

However, recent studies have revealed that many students do not feel that they are clinically trained sufficiently to apply clinical skills in their professional lives, as it has been found that students face difficulties in impolying their theoretical knowledge within clinical practice (6).

As a result, we had to research this matter to assess students' knowledge of clinical and surgical skills in clinical years and among graduates and to determine whether this knowledge is sufficient or whether it needs to be developed and advanced.

## **Methods**

A cross-sectional study was carried out to stimulate the competence of undergraduate medical students and residents in their first and second years in clinical and surgical skills in all Syrian governorates in September 2021.

All participants were current fourth, fifth, and sixth medical students in public and private universities and the first and second year in residency in the entire Syrian government. All missing data have been discarded.

An anonymous online questionnaire was designed using Google Forms and disseminated via online student platforms due to difficulties reaching all Syrian governorates, especially during the covid-19 pandemic. Participation was available to all sample members, and all persons outside the sample frame were eliminated. Study objectives were explained to participants who were informed that their participation was voluntary and assured anonymity. The participants were also told that the results of this research would be published. The student's filling and submission of the questionnaire are considered an announcement of their willingness to participate.

## **Questionnaire:**

The questionnaire is composed of two sections; clinical and surgical skills. In addition to demographic information such as name, gender, age, and social status.

Each section includes ten questions with ten marks about basic skills that are taken from international, essential and new references.

The clinical division involves questions about the early sign of Disseminated intravascular coagulation (DIC) and examining the jugular venous pulse.

Whereas the surgical division involves questions about trauma management, the causes of primary and secondary brain injuries and the risk factors for ischemic heart diseases.

A pilot study had been conducted on 25 students before the survey was published to detect any fault in the survey, but the result was good, and there was no change from the supervising committee.

## **Statistical Analysis:**

The data entry and analysis were performed using Statistical Package for Social Sciences software package (SPSS Inc., Chicago, IL, USA) version 23. The survey was tested for reliability by using Cronbach's alpha test. Internal consistency of (0.711) was reported. Chi-square test was used to find out the association of demographic variables with the level of knowledge regarding of surgical and clinical skills.  $P < 0.05$  was taken as a statistically significant association.

## **Results**

Initially, 550 questionnaires were collected. Afterwards, the sample was inspected and processed and all questionnaires that did not match the study's criteria were deleted. 500 questionnaires were obtained to form the final sample. 52.6% of the participants were male. Also 51.6 of the participants were from Damascus University.

The basic demographic information of the sample show in Table 1.

Table 1  
The basic demographic information of the sample

variables		Count	Column N %
Gender:	Male	237	47.4%
	Female	263	52.6%
University	Homs.	34	6.8%
	Private.	21	4.2%
	Latakia.	55	11.0%
	Aleppo.	58	11.6%
	Hama.	11	2.2%
	Damascus.	258	51.6%
	Tartous.	63	12.6%
Speciality:	3rd Year	55	11.0%
	4th Year	149	29.8%
	5th Year	114	22.8%
	6th Year	135	27.0%
	Residents	47	9.4%
Marital status:	Single	487	97.4%
	Taken	13	2.6%
Working status:	I work	97	19.4%
	I do not work	403	80.6%

We gave one (1) point for each question from the questionnaire for each correct answer and zero (0) for incorrect answers so that the total points were 20. No student got the full point or 19, 18 or 17. The lowest score was 2 and the highest score was 16, while the total score is shown in Table 2.

To facilitate comparison, the points are categorized into three levels of knowledge, namely:

Weak level [2, 6] ,and the results were: 101 (20.2%).

Intermediate level [7, 13] ,and the results were: 385 (77.0%).

Excellent level [14, 20] ,and the results were: 14 (2.8%).

Table 2  
Shows Total score.

		Frequency	Percent	Cumulative Percent
Valid	2	2	.4	.4
	3	7	1.4	1.8
	4	24	4.8	6.6
	5	35	7.0	13.6
	6	33	6.6	20.2
	7	59	11.8	32.0
	8	67	13.4	45.4
	9	64	12.8	58.2
	10	69	13.8	72.0
	11	59	11.8	83.8
	12	39	7.8	91.6
	13	28	5.6	97.2
	14	10	2.0	99.2
	15	2	.4	99.6
	16	2	.4	100.0
		Total	500	100.0

Average score was 8.78.

We found a statistical relationship between gender and the level of knowledge ( $p = 0.014$ ). For example, an excellent rating was obtained by 5.1% of the males, in contrast only 0.8% of the females received this rating.

There was a statistically significant difference between students of different universities for level of knowledge ( $p = .000$ ). Students who obtained excellent rating were from the universities of Damascus and Aleppo only. 85.3% of Damascus University students got an intermediate score, while only 38.1% of private universities students got an intermediate score.

Only 9.7% of Damascus University students got a weak score, while 61.9% of private universities students got a weak score.

The questionnaire showed: There is no statistical relationship between the level of knowledge and each of the financial status( $p=.286$ ), marital status( $p=.118$ ), academic year ( $p=.188$ )and working status ( $p=.436$ ). THE P-values for these variables are shown in Table 3.

Table 3  
The p-values for those dependent and independent variables and the used test

<b>Chi-Square Tests</b>		
Level of Knowledge *	P-value	Significant or not
Academic Year	.188	Not significant
Gender	.014	Significant
University	.000	Significant
Marital status	.118	Not significant
Working status	.436	Not significant
Financial status	.286	Not significant

We found in the assessment of surgical skills:

The highest percentage of correct answers was 76.8% for a question about Specifications of a thread in a picture and The lowest percentage of correct answers was 29% to a question about a CT-scan of an umbilical hernia. Also on the X-ray image of the left epidural hemorrhage, the percentage of correct answers was 33.8%.

34.8% of the students knew the use of a surgical instrument shown in a picture and 44.8% knew the Farabov instrument in another picture shown to them

While in clinical skills assessment:

The highest percentage of correct answers was 98.4% in a question about the first step in examining the patient and the lowest percentage of correct answers was 9% in a question about nails pitting. 82% of the students answered correctly a question about identifying the patient's pain

Only 13% of the students answered correctly the question about jugular vein pulsation and only 16.8% of the students knew the early sign of DIC.

## Discussion

Most of the students in this study had an average score (77.0%) in assessing the knowledge of surgical and clinical skills and a very small group managed to achieve scores above the average (2.8%) Compared to 20.2% who received a low score.

These statistics indicate that there is a flaw in the medical curricula in our country.

In order to identify the areas of this defect, it was necessary to conduct our study which is considered to be the first of its kind in Syria and included all public and private universities in all governorates. Through it, we were able to monitor and evaluate two basic types of skills that must be included in the clinical and pre-clinical teaching years, which are surgical and clinical skills.

Regarding surgical skills:

The questions that tested the students' anatomical information got a very good percentage of correct answers when asked about the areas of the surgical incisions and the location of the pericardiocentesis procedure, with a percentage of (47.6%, 51.0%), respectively.

We can justify this by their excellent anatomical background provided by the anatomy courses accompanying them in their early pre-clinical years.

A previous study at the University of Cameroon indicated a similar result. Access to basic knowledge of these skills was well covered through lecturing and clinical teaching (7).

As for the radiographs, it is known that the ability to read them correctly requires knowledge of many basic sciences, on top of which is anatomy (8).

However, although our results showed that the students are well acquainted with the anatomical information, we noticed a significant defect in their ability to make the correct description of the radiographic images. The percentage of those who knew the type of hemorrhage in the MRI image was only (33.8%), and the percentage of those diagnosed with the umbilical hernia on the CT image was (29%) versus a high percentage (41.4%) admitted that they were completely unfamiliar with the picture, and this indicates their awareness of their weakness in this regard.

This result is not surprising because, despite the essential role of radiology in diagnostic medicine, especially in the field of surgery, it is given very briefly in many medical curricula and is not limited to our curricula (9).

A previous study confirmed this by showing that there is a lack of guidelines and standard curricula in teaching radiology to medical students across Australia (10).

As for the skills that require knowledge of surgical tools and how to use them, we noticed a disparity in percentages according to the tool, as the percentage of students who were able to identify surgical needle packages, their measurements and their types was somewhat excellent, reaching (76.8%).

We can find a justification for this encouraging percentage, given that surgical sutures are one of the most important topics that they learn in their practical lessons, noting that we cannot predict through this percentage the extent of their practical ability to perform sutures and tie knots despite their ability to accurately identify the tools.

In a contrasting study, training in the usual procedural skills such as suturing and tying knots was present in a small percentage in the British medical curricula (24.7%) and (17.4%) (4).

These percentages are not satisfactory at all, given that these skills are performed by junior doctors in operating rooms, and are not considered among the difficult skills that only professionals can master (4).

As for the percentage of students who knew the function of the tool from its image (the tissue grabbing tool), it was (34.8%).

This indicates a gap that students have in linking the shapes of tools and understanding how to use them.

In contrast, the percentage of students who admitted that they did not know the function of the tool through its name (Farabeuf retractor) was (47.2%), and the percentage of those who knew the correct answer was close to (44.8%).

All of these results are significant, as cross-sectional data in a previous study suggests that at least 22% of students intend to practice surgery (11).

We can conclude from the two previous results that it is necessary to strengthen the visual memory and link it with the functional aspect as a more important step than strengthening the nominal memory with a purely theoretical significance, while not neglecting the necessity of both.

Regarding for clinical skills, when asked about taking the history, medical history and clinical examination in general, the results were as follows: (98.4%) of the students were able to know how to start taking a clinical story, and (82%) were able to ask about pain correctly, and we believe that the reason is due to the great interest of teachers in this topic due to its importance in clinical practice in various disciplines.

On the other hand, only 26.6% of the students were able to ask about the medical history of a breast cancer patient, only 9% were able to find out the reason for the formation of nail pits, and 46.6% of the students were able to find out the reason for the sweaty and cold hands, and this could be attributed to the lack of patients examined by the students, and in another study conducted in In one of the Western universities, it was observed that there is a kind of modesty among students in conducting the clinical physical examination despite the openness of the Western culture to these matters, which is directly reflected on their clinical skills (12). Another study also proved that only 41.6% answered yes when asked about the knowledge of the examination. Clinical through online learning (13) Here we note the emphasis on the idea that clinical skills must be acquired through practice.

On the other hand, in a study conducted in Britain, it was noted that medical students have high confidence in clinical examination procedures (14) and this may be due to the recommendations of the General Medical Council on the necessity of early confrontation between medical students and clinical practice (15) (16).

The American Society also emphasized the necessity of frequent interaction with patients to improve clinical work (17).

From the above, it can be said that teaching the general clinical examination and taking the story is good, but it requires a larger number of patients and more practice.

As for the more detailed medical specialties, the results were somewhat unsatisfactory, as for cardiovascular matters only 35.4% were able to determine the most common presentation of myocardial infarction, and only 16.8% were able to determine the first sign of disseminated thrombosis across the vessels, and 13% knew what was required when examining the jugular heartbeat. (While in a study conducted in Jordan, it was found that 71% of male students and 48% of female students had at least ten clinical cardiac examinations during their study career, which gave them a good experience (18).

Here, it can be said that the short duration of clinical lessons in the cardiology division in Syrian universities and the focus in them on theoretical topics more than practical matters affected the students' outcomes, as learning cardiovascular examinations through simulation, including audio recordings, does not necessarily lead to an improvement in practical clinical skills (19).

As for chest issues, 27% were able to answer the tracheostomy question, which is considered a low percentage. This can be justified by the small number of tests that students conduct on the respiratory system level during clinical work, if compared with Jordan, where 80% of males and 62% of females have performed more than 10 examinations. For the respiratory system during their study career (18) and neurologically only 42.8% were able to answer when asked about the neurological reflexes of the farmers, and this percentage is considered somewhat strange if compared with the repetition of this type of information over the clinical and pre-clinical years.

With regard to gender, there was a statistically significant relationship ( $p = 0.14$ ), as we found that the percentage of those who got a poor rating is 53 females versus 48 males, and an average rating of 208 females against 177 males.

Although the results suggest a preponderance in favor of females, we cannot acknowledge this as long as the number of females in the entire sample exceeds the number of males (52.6% females, 47.4% males).

As for those with excellent grades, the ratio was overwhelming in favor of males (12 vs. 2), and we cannot find a logical justification for the result except that the males are more daring to test the abilities they possess on a practical level, and therefore more distinguished with regard to these skills they learn.

In another study conducted in Jordan, no effect of sex was observed for cardiovascular, digestive, thoracic and glandular matters. As for urinary and reproductive matters, the effect of sex was clearly found, as 27% of the males performed more than 5 tests of the male reproductive system, compared to 2% for females and 33% of the males. Females performed more than 5 breast exams compared to only 6% of males (18).

We noticed a statistically significant difference between universities in the level of knowledge ( $p = .000$ ), where the percentage of students who obtained an excellent grade was majorly from Damascus University.

Also, (85.3%) of Damascus University students got an average rating, and this indicates the high level of medical education at Damascus University thanks to the educational cadres and qualified university hospitals it possesses.

This percentage confirms that the advantageous position of Damascus University is due to the fact that it attracts students from different governorates as well, such as As-Suwayda, Daraa and others, due to the lack of universities to teach medicine in all Syrian governorates.

This result is not surprising given the demographic and economic data that the capital, Damascus, enjoys like any other capital, but this great disparity seems worrying and requires measures to raise the level of the rest of the Syrian universities in terms of teaching and in terms of financial capabilities as well.

We also found that most of the private university students had low scores, and we can only justify this result by the presence of a gap in their education despite the emphasis on attendance and its obligation, knowing that university professors in public universities teach in private universities as well.

We did not find a statistically significant relationship in terms of material status ( $p = .286$ ), academic year ( $p = .188$ ), marital status ( $p = .118$ ), work ( $p = .436$ ), as shown in Table 3.

## Conclusion

Medical colleges offer many theoretical curricula and some clinical and surgical practice exercises. Despite this, a gap has been observed for many students in applying their theoretical knowledge in a good practical manner. Based on that, we may find many suggestions that can help fill this gap.

Including: Improving skills training methods for students by training them in small groups in a good environment in the clinical and surgical skills laboratory.

In order to reinforce the acquired skills in the simulated environment, there should be increased hands-on experiences and ongoing assessments of their skill level (20).

That medical schools adopt a clear set of clinical and surgical skills education objectives by developing a comprehensive blueprint for developing competencies in the way basic clinical skills are taught (21).

## Abbreviation

Not applicable.

## Declarations

### **Ethics approval and consent to participate:**

The Ethical Committee approved this study in the Faculty of Medicine at Damascus University, Syria (732/4772, 30-03-2022). All our methods were carried out in accordance with relevant guidelines and regulations. The consent to participate and the consent to publish was obtained from everyone. Also it was clarified during the electronic questionnaire that the participant is considered to share this information once he has filled out this questionnaire, so informed consent was collected from participants as a part of the electronic form. All procedures were performed in accordance with relevant guidelines.

### **Consent of publication:**

The consent will be available on request.

### **Availability of data and materials:**

All the required data generated or analysed during this study are included in this published article, and the data was gathered through Google Form, so all the data is available in an Excel file.

### **Competing interests:**

The authors declare that they have no competing interests

### **Funding:**

Not applicable

### **Authors' contributions:**

Conception and design: JA, Abdullah I

Analysis and interpretation of the data: JA, AI, ZS, RA, AK, RG, Mazen Z

Writing and drafting the main manuscript: JA, AI, ZS, RA, AK, Rita G

Critical revision of the article for important intellectual content: JA, AI, AK, Mazen Z

Provide a substantive review of the research and overlook it as an entirety: Mazen Z

All authors read and approved the final manuscript.

### **Acknowledgements:**

Not applicable

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