Revista Española
de Educación Médica

Clinical skills learning of the first-year medical students at clinical skills laboratory using simulated patients

Mohammed Rasheeduddin Imran

Department of Pharmacy Practice, College of Pharmacy, University of Hafr Al Batin, KSA.

* Correspondenc: dr.imran@uhb.edu.sa

Recibido: 24/1/25; Aceptado: 25/2/25; Publicado: 6/3/25

Abstract:

Aims: To assess perceptions and performance of 1st MBBS students in clinical examination skills after early clinical exposure (ECE) through clinical skills lab (CSL) using simulated patients. **Methods**: The research involved 150 first-year MBBS students, 50 students attended in two groups with 25 students each. A pre and post-test of awareness about ECE and CSL, a training session with one set of students receiving traditional lecture-based "see one do one" teaching methods, and the other group receiving training in small group teaching with simulated patients in CSL. Performance was assessed using a validated checklist. Feedback was taken from all participants. **Results:** The ECE group performed better in clinical skills. 38 students performed well and 11 performed excellently, compared to the traditional teaching group with only 11 performing good. ECE was perceived to be better by the majority of students (82.9%) than traditional teaching method. The majority of teachers (97.7%) agreed that early clinical exposure will help students prepare before encountering real patients and 90% of simulated patients agreed that students of ECE exposed group have examined better than the traditional teaching method (11%). The pre- and post-test scores showed an increase in awareness. **Conclusion**: Students in the first year of medical school perform better in examination skills if they have early clinical exposure and clinical skills lab with simulated patients are the best resources for achieving the primary goal of skill acquisition.

Keywords: Simulated patients, Clinical Skills, teaching methods, skill acquisition, training

1. Introduction

In India's traditional medical education system, clinical courses are introduced in the second year after medical students have spent the first year of their study learning in classrooms and laboratories (1). The teaching in preclinical year is within the individual department which are water tight compartments, without any relation with other academic departments. There is unsatisfactory performance of first year MBBS students in clinical examination skills who are trained by the traditional lecture based teaching with see one do one demonstration method in clinical physiology laboratory. There is no connection with the clinical departments where the students can learn clinical skills at bedside. The students find it difficult to understand the significance of the basic medical science courses and their purpose of learning without integration to the clinical application. The challenge for health professions education is to look for ways to improve the quality of clinical education by comparing and assessing students' understanding and modifying practices of clinical education in new circumstances (2). Students should spend the preclinical year studying basic medical sciences along with an exposure to the clinical environment to learn basic clinical skills to reduce the stress and anxiety when dealing with real time situation. As 1st year students have no prior training in handling and facing patients, CSL is the most suitable place to avoid direct doctor/patient interaction (3). Early clinical exposure to the first-year medical students will provide a valuable introduction to the physician professional role in clinical practice, experiences that mimic their future roles, opportunities for reflection, and rehearsal of the skills involved in managing these experiences (4-5). Interaction of the medical students to the patients or

community contact at the very first year of the medicine and integration of the basic and clinical sciences is the need of current scenario (6).

Practice on the real patients to learn the clinical skills will raise the concerns for the safety of the patients and the related ethical issues. This has motivated the medical educationist to develop the skill laboratories with a conducive learning environment to practice and learn the clinical skills (7-10). It is therefore necessary to include the skill station training using simulators in clinical skill laboratory in the first-year medical education curriculum(9). With regards to the long-term performance, skills lab teaching seems to be particularly helpful for the reproduction of easier skills.

Early clinical exposure (ECE) is nothing but a teaching and learning methodology that prepares medical students to meet and learn from patients as early as from the first year of medical college, which enhances learning of health, illness or disease, and the role of the health professional. In Medical Council of India vision 2015 document (now NMC or National Medical Commission), there are proposed plans for undergraduate medical education in which ECE is one of the reforms to improve quality of medical education (11). With this view, the present study was planned to study the impact of early clinical exposure through the clinical skills laboratory to the first year MBBS students.

2. Methods

Study Design:

This is an interventional comparative study in medical education technology in which the study subjects are equally divided using randomization method.

Subjects:

The study was conducted by the researcher at a medical college in India as a part of FAIMER project. After obtaining written consent from each participant and approval from the institutional ethical committee, all 150 batch of MBBS students were included in the study. The module was developed to train clinical skills to one group of the students using clinical skills laboratory using simulated patients & Peyton's four-step teaching approach with teacher to student ratio of 1:5 and the other group with the traditional lecture based teaching with "see one do one" demonstration in a teacher to student ratio of 1:25 in the clinical physiology department. The students were trained for the clinical examination skills in motor and sensory system examination.

A structured checklist was designed for assessing the clinical examination skills and a standard feedback questionnaire forms were made separately to take feedback from students, faculty and peer group and patients and were validated by the subject experts. A pilot study was done using the forms and questionnaires and the results were analyzed for internal validity. A chronbach's α was found to be more than 0.7. Through separate workshops and sensitization program, the MEU faculty, students and the simulated patients received training and sensitization for this module of teaching and assessment.

Methodology:

A total of 150 participants attended the clinical laboratory in department of physiology in batches of 50 on three consecutive days. Fifty students were split into two groups of 25 each. Randomization is employed at each stage of grouping the students. The groups were:

1. Traditional teaching method: In the clinical laboratory of the physiology department, one group received practical training utilizing the traditional lecture-based teaching followed by "see one do one" demonstration method with teacher to student ratio of 1:25 for the motor system assessment.

2. Clinical skills lab with simulation based training: The other group of students received the same training for motor system examination, but in a clinical skills laboratory that replicated a hospital setting environment with simulated patient utilizing the Peyton's four-step teaching approach with teacher to student ratio of 1:5. Peyton's "Four-Step-Approach" which consists of the following four steps (3, 6) was used:

1. The teacher demonstrates the skill at his normal speed without any comments (Demonstration).
2. The teacher repeats the procedure, this time describing all necessary sub-steps (Deconstruction).
3. The student has to explain each sub-step with the teacher following the student's instructions (Comprehension).
4. The student performs the complete skill on his own (Performance).

For each skill, each student was permitted to complete step 4 once. Five students and one teacher participated in each session. Then, using a standardized checklist that had been established, the performance of both groups was evaluated. The post-Test of awareness of early clinical exposure and clinical skills laboratory was done. A second training session was done for sensory system examination after flipping the batches. The group that received the traditional teaching received training at clinical skill lab and the group that received training at clinical skill laboratory received the traditional teaching. This was done to give the benefits of clinical skills laboratory training to this group. After switching the batches, a second training session for the sensory system examination was conducted. The group that got traditional teaching received training at the clinical skill lab, and the group that received training at clinical skill laboratory received the traditional teaching. This was done so that this group might benefit from clinical skills laboratory training. Feedback was collected from all the participants including students, faculty and peer group and the simulated patients.

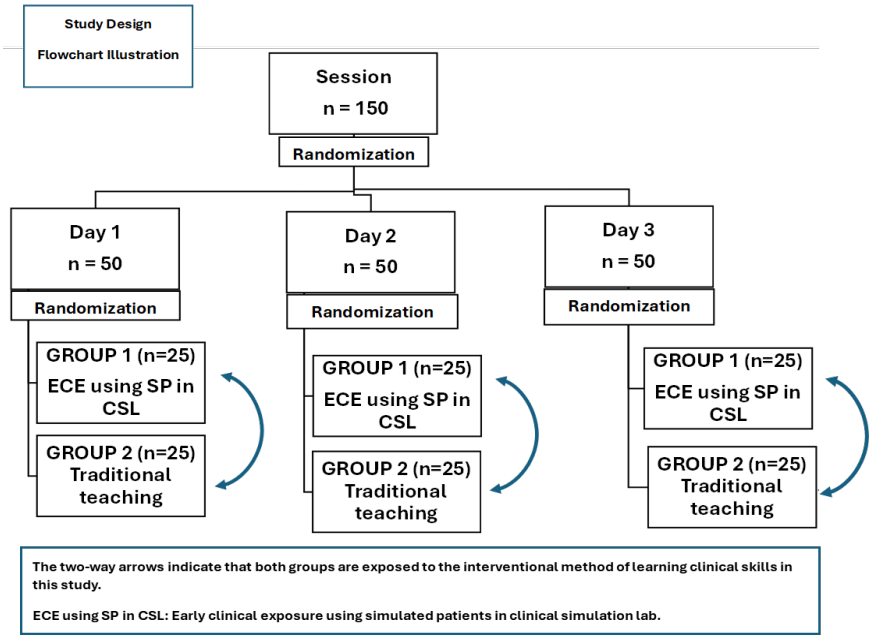

Figure 1. Flowchart illustration of the study design.

Data collection and analysis:

A) Collection of Assessment score: An assessment of the performance in clinical skills was conducted using a validated structured checklist at the end of first training session. (table 1, figure 1).

1) Stood on right side of patient
2) Wished patient
3) Introduced himself
4) Took a brief history
5) Listened to the patient carefully
6) Used helpful non-verbal communication
7) Reflected back on what patient says
8) Explained the procedure in patient's language
9) Exposed the area of examination
10) Positioned the limb properly
11) Held instrument correctly
12) Performed procedure
13) Performed on opposite side
14) Reassured the patient
15) Thanked the patient

B) Collection of Pre and Post Test score: A Pre-test and Post-test using a validated multiple-choice questionnaire was conducted, with Pre-test at the beginning of module and Post –test after completion of the orientation and first training session. It was done to assess the awareness of students and faculty about Early Clinical Exposure and Clinical Skills Laboratory (table 2).

Assessment questions:

1) What is early clinical exposure?
2) What is clinical skills laboratory?
3) Which is not a simulation-based training?
4) What types of simulators are not useful in training?
5) What skills can be learned and assed in clinical skills laboratory?
6) What assessment can be done using CSL?
7) Which teaching method facilitates competency based medical education?
8) Which method of teaching is useful for larger group?
9) Which method of teaching facilitates self-directed learning?
10) Which of the following Clinical teaching approach is used in Clinical Skills Laboratory?

C) Collection of Feedback:

a) Student's feedback: (table 3). A feedback was obtained using a validated feedback questionnaire from the students 1 week after the completion of all the teaching and assessment sessions. Feedback was taken in the form of closed ended questions with 5 point Likert scale to assess the perceptions, attitude and preferences towards the early clinical exposure using clinical skills laboratory (12). It also included open ended questions to reflect on the training session in Clinical Skills laboratory.

b) Faculty and Peer feedback: (table 4). Feedback was obtained using a validated feedback questionnaire from the MEU faculty who were internal part of the module contributing towards the main workshops as observers, facilitators and examiners. Demonstrators were excluded. It was obtained 1 week after the completion of all the teaching and assessment sessions. Feedback was taken in the form of closed ended questions with 3-point Likert scale to get the reflections about the teaching content, teaching method by demonstrators, learning environment and the student's attitude and performance (13). An open-ended question was given at the end "Write your Reflections and Recommendations/Suggestion about the entire project".

c) Patient feedback (table 5): Feedback was obtained from the simulated patients using a validated feedback questionnaire on 3 point Likert scale (12).

Ethical clearance:

The study was approved by the ethical committee of Bhaskar Medical College and Hospital, Hyderabad, Telangana, India, vide reference no. BMC/1/2017.

3. Results

When compared to the group trained using the traditional teaching method, which had 11 students score in the good range and none in the excellent range, the group exposed to early clinical exposure using the clinical skills laboratory performed better in clinical skills with 38 students scoring in the good range and 11 scoring in the excellent range (table 1). The early clinical exposure group has performed better in all the domains of learning skills including the cognitive, psychomotor and affective skills. They had shown better communication skills compared to the students trained using traditional teaching method.

Table 1. Assessment using standard checklist

Score	Early Clinical Exposed group		Traditionally trained group	
	Total number	% of students	Total number	% of students
Failed performance (0-7)	6	8	21	28
Borderline (8-10)	20	26.67	43	57.3
Good (11-13)	38	50.67	11	14.67
Excellent (14-15)	11	14.67	0	0

The pre and post test scores of awareness about early clinical exposure and clinical skills laboratory with simulation obtained from the students, the faculty and the peer group reflect that there was a significant improvement in the awareness among students and faculty exposed to the training session in clinical skills laboratory (table 2).

Table 2. Pre and Post Test score: Test of awareness (MCQ).

GROUP	Mean Pre-test score	Mean Post-test score	Standard Deviation	95% CI	95% CI	P value
				lower	Upper	
I : Early Clinical Exposed group (n=75)	6.7667	13.5667	2.59176	-7.76778	-5.83222	<0.001
II : Traditionally trained group (n=75)	6.4333	6.8667	1.85106	-1.12453	0.25787	0.210
FP : Faculty and Peer group (n-21)	7.3	12.6	1.96784	-6.03481	-4.56519	<0.001

CI = Confidence interval

The feedback was obtained from all the students (table 3), after exposing the other batch of students to the early clinical exposure using clinical skill laboratory. The majority of students strongly agreed (82.9%) that training of clinical skills by exposing to clinical skills laboratory has motivated them to learn and recall the basic concepts of clinical skills and is more effective than the traditional training method.

Table 3. Student feedback using 5 point Likert scale.

S. No	Students perception	Likert scale									
		Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree	
		N	%	N	%	No.	%	N	%	N	%
1	ECE has motivated you to read at home	120	80	22	15	8	5	0	0	0	0
2	ECE has created interest in learning the subject	123	82	18	12	9	6	0	0	0	0
3	The ECE helped in better understanding of subject	108	72	27	18	15	10	0	0	0	0
4	The ECE helped in integration of knowledge gained from basic and clinical subjects	129	86	16	11	5	3	0	0	0	0
5	The ECE has motivated for learning applied aspects of the topic	114	76	30	20	6	4	0	0	0	0
6	The ECE will motivate for lifelong learning	135	90	12	8	3	2	0	0	0	0
7	The ECE has helped in better retention of subject	129	86	18	12	3	2	0	0	0	0
8	The CSL has a safe environment for ECE	136	91	14	9	0	0	0	0	0	0
9	ECE through CSL has reduced anxiety	123	82	24	16	3	2	0	0	0	0
10	ECE through CSL will increase the confidence in dealing clinical cases	126	84	16	11	8	5	0	0	0	0

The feedback from the faculty and the peer group (table 4) reflected that majority of them agreed (97.7%) that the early clinical exposure of the first year medical students will help the students to prepare themselves before encountering real patients. They recommended motivating all the departments for integrated teaching in clinical skills laboratory and the assessment of clinical skills to be done by the clinical faculty. They also suggested that every clinical department should have their own mini clinical skills laboratory attached so that a student can get trained using simulation before getting exposed to real patients.

Table 4. Faculty and Peer Feedback

		GROUP	Agree (%)	Neutral (%)	Disagree (%)
Teaching content	The demonstrator has good subject knowledge	Group I	100	0	0
		Group II	100	0	0
	The purpose of each session of the study was evident	Group I	100	0	0
		Group II	69	31	0
	The content of the course was	Group I	100	0	0

	relevant	Group II	100	0	0
Teaching Method: The Demonstrators	Were clear in giving instruction	Group I	100	0	0
		Group II	81	19	0
	Presented in organized way	Group I	100	0	0
		Group II	94	6	0
	Used simple language to clarify concepts	Group I	100	0	0
		Group II	100	0	0
	Were enthusiastic about the subject	Group I	100	0	0
		Group II	37	63	0
	Adapted material to student needs	Group I	100	0	0
		Group II	56	13	31
	Used available teaching aids effectively	Group I	81	19	0
		Group II	0	37	63
	Responded to the student's feedback immediately	Group I	100	0	0
		Group II	0	0	100
Learning environment	The classroom atmosphere was conducive	Group I	100	0	0
		Group II	0	25	75
	The students were engaged with active learning	Group I	100	0	0
		Group II	6	44	50
	The demonstrator encouraged questions from the students	Group I	100	0	0
		Group II	0	0	100
	The demonstrator was successful in stimulating critical learning	Group I	100	0	0
		Group II	0	12	88
	The demonstrator was successful in giving a safe learning environment	Group I	100	0	0
		Group II	0	0	100
Students Attitude and Performance	The students were enthusiastic	Group I	75	25	0
		Group II	0	0	100
	The students were involved in active learning	Group I	100	0	0
		Group II	6	44	50
	The students performed better in clinical skills	Group I	100	0	0
		Group II	6	50	44
	The students were good in communication skills	Group I	100	0	0
		Group II	0	12	88
Group I = Early clinical exposed group		**Group II = Traditional teaching group**			

According to the feedback provided by the simulated patients (table 5), 90% of the simulated patients agreed that the students in the early clinical exposure group had met all the requirements for patient examination, in contrast to only 14% of the simulated patients who had been trained using traditional teaching methods.

Table 5. Patient feedback.

	GROUP	**Agree (%)**	**Neutral (%)**	**Disagree (%)**
Question 1: Doctor has wished me at the first encounter	Group I	100	0	0
	Group II	59	0	41
Question 2: Doctor has made me sit/lie down comfortably	Group I	100	0	0
	Group II	20	27	53
Question 3*:* Doctor has asked for History of my disease	Group I	87	0	13
	Group II	24	17	59
Question 4: The Doctor was clear in his/her	Group I	83	5	12

instructions	Group II	13	11	76
Question 5: The Doctor was courteous in his/her conversation	Group I	93	4	3
	Group II	64	23	13
Question 6: The Doctor empathized with my problem	Group I	73	11	16
	Group II	16	0	84
Question 7. The Doctor responded back to my questions	Group I	100	0	0
	Group II	0	37	63
Question 8: The doctor spoke to me clearly and politely in my language	Group I	93	4	3
	Group II	35	8	57
Question 9: The doctor was gentle in examination and maintained privacy	Group I	100	0	0
	Group II	11	17	72
Question 10: The Doctor reassured me at the end	Group I	71	15	15
	Group II	0	0	100
Group I = Early clinical exposed group	**Group II = Traditional teaching group**			

4. Discussion

The study was done to know the impact of early clinical exposure of first year MBBS students using clinical skills laboratory. All the 150 students participated in the study after giving their consent. The module was developed to train clinical skills to one group of the students using clinical skills laboratory and the other group with the traditional teaching in the clinical physiology department. The assessment of the training was done for both the groups using clinical skills station with a validated structured checklist. The entire project work was done according to the module and the feedback was obtained from all the participants including the students, faculty and peer group and the patients. A pre and post-test of awareness about early clinical exposure and clinical skills lab was done.

Early clinical exposure to the first-year medical students will help to prepare the students to encounter the real patients at the bedside in the hospital. The early clinical exposure will improve the ability to correlate and apply in integration, the scientific, social, professional and interpersonal elements in the field of medical education. Learning the clinical skills early in the preclinical year with multidisciplinary educational facility will also help the students to perform better in the academics. In the study done by M Nelliyanil et al, majority students (90.7%; 224/247) agreed that simulation supports the development of clinical skills (14).

The clinical skills laboratory serves as a bridge between basic science and the integration of clinical science. Clinical skill laboratories provide a structured environment for learning bedside techniques and procedures, which influences students' cognitive and learning capacities (15). It provides a simulated ward like safe environment where deliberate practice of clinical skills can be done and mistakes can be forgiven (16). The clinical skills laboratory offers a holistic platform for the development of skills across all learning domains. The feedback of the present study has shown that the study module will prepare the students with proper clinical examination skills before encountering real patients. The study done by Archana Shetty et al has demonstrated the students has perceived the teaching methodology of early clinical exposure positively and recognized the need to integrate basic science with clinical expertise and professional identity at an early stage in medical school (17).

The feedback obtained from the students (table 3) shows that most students strongly agreed (82.9%) that training of clinical skills by exposing to clinical skills laboratory has motivated them to learn and recall the basic concepts of clinical skills and is better than the traditional training method. This is similar to the results of the study done by Alka Rawekar et al, in which 86% students strongly agreed that early clinical exposure created interest in the subject and 72% agreed that they had a better understanding of topic by incorporation of early clinical exposure (18). The study done by Biniam Ewnte et al has also shown that the early clinical exposure was beneficial learning method with 64.3% of the surveyed students believing that ECE was effective in constructing their professional knowledge, 52.4% for problem-solving skills and facilitated constructive/active learning and 57.1% reported that ECE improved their motivation (19).

The study result has shown that the students who are exposed to early clinical exposure not only performed better in procedural skills but also there was a change in attitude and communication skills. The study feedback depict that the students and the faculty were satisfied and accepted that the module should be made a part of preclinical curriculum. The present study has used the simulated patients for the training as this will reduce the student anxiety and apprehension of dealing with the real patient and found that this training method has motivated the students to practice multiple times at their convenience without fear of committing mistakes in a controlled environment. In the study done by Lukas Mileder et al, students have perceived that training in skills laboratory using simulation has motivated to train the acquired skills regularly (20). In the study by Namrata Upadhayay for the preclinical students, the students are confident and showed better exam performance after basic clinical skills training in the lab (21).

5. Conclusions

- The study design has given a significant result in improving the clinical examination skills among the 1st year MBBS students.
- The study results have illustrated that the use of the simulation method of teaching in the clinical skills lab as early clinical exposure have improved the clinical examination skills significantly compared to the traditional teaching method.
- There was a significant improvement in the awareness among students and faculty of early clinical exposure and clinical skills laboratory with simulation-based training.
- The feedback of the study has shown that the training of the clinical skills in the clinical skills laboratory using simulated patients as early clinical exposure will motivate the students to learn, prepare the students with proper clinical examination skills before encountering real patients.
- Use of innovative teaching and learning methods motivates the students to learn, practice and implement the skills to be competent in clinical examination.

Annex: Qualitative Analysis: open ended question to the faculty and peer. Write your Reflections and Recommendations/Suggestion about the entie project.

Themes and Thematic breakdown of reflactions and recommendations

1. Project Design & Implementation
- Well-structured project (Reflection 1)
- Orientation program was useful (Reflection 5)
- Need for better planning to ensure sufficient faculty availability (Reflection 9)
- Time constraints affecting feasibility (Reflection 10)

2. Effectiveness of Clinical Skills Lab
- Improves subject comprehension (Reflection 2)
- Enhances clinical skills in a controlled environment (Reflection 3)
- Early exposure leads to better preparedness for real patients (Reflections 7 & 8)

3. Faculty and Resource Availability
- Well-trained faculty enhances learning (Reflection 4)
- Shortage of faculty during practical sessions is a challenge (Reflection 9)

4. Simulated Patient Training & Realism

- More training required for simulated patients (Reflection 6)
- Ward-like simulated environment is beneficial for clinical learning (Reflection 3)

5. Assessment & Teaching Methodology

- Clinical faculty should assess students (Recommendation 1)
- Encourage integrated teaching in clinical skills labs (Recommendation 2)

6. Infrastructure Development

- Departments should have their own mini-clinical skills labs (Recommendation 3)

Summary

- **Strengths:** The project was well-organized, the clinical skills lab was beneficial for learning, and early exposure to clinical skills was highly valued.
- **Challenges:** Faculty availability, training for simulated patients, and time constraints were major hurdles.
- **Recommendations:** Faculty involvement in assessment, integrated teaching, and the expansion of mini-clinical skills labs in each department would enhance the effectiveness of clinical training.

Acknowledgement: Sincere thanks for the support to the Head of the Department, Physiology, faculty of MEU, students and simulated patients at Bhaskar Medical College. A special appreciation to the FAIMER co-fellows and the faculty of the CMC Ludhiana for support and extensive review. Special thanks to Dr Sayeeda Anjum manuscript review and feedback.

Ethical clearance: The study was approved by the ethical committee of Bhaskar Medical College and Hospital, Hyderabad, Telangana, India, vide reference no. BMC/1/2017

Conflict of Interest: None

Source of funding: None

References

1. Tayade M, Bhimani N, Kulkarni N, Dandekar KN. The impact of Early Clinical Exposure on First M.B.B.S. Students 1, *International J. of Healthcare and Biomedical Research*, **2014**, 2, 4, 176-181.

2. McLean M. Sometimes we do get it right! Early Clinical Contact is a rewarding experience. *Education for Health*. **2004**, 17(1), 42-52. https://doi.org/10.1080/13576280310001656178

3. Ali L, Nisar S, Ghassan A, Khan SA. Impact of clinical skill lab on students' learning in preclinical years. *J Ayub Med Coll Abbottabad*. **2011**, 23(4), 114-7. PMID: 23472431.

4. Goldie J, Dowie A, Cotton P, Morrison J. Teaching professionalism in the early years of a medical curriculum: a qualitative study. *Med Educ*, **2007**, 41, 610–7. https://doi.org/10.1111/j.1365-2923.2007.02772.x

5. Nimkuntod P, Kaewpitoon S, Uengarporn N, Ratanakeereepun K, Tongdee P. Perceptions of medical students and facilitators of an early clinical exposure instructional program. *J Med Association Thai*. **2015**, 98, 64–70. https://pubmed.ncbi.nlm.nih.gov/26201136/

6. Herrmann-Werner A, Nikendei C, Keifenheim K, Bosse HM, Lund F, Wagner R, Celebi N, Zipfel S, Weyrich P. "Best practice" skills lab training vs. a "see one, do one" approach in undergraduate medical education: an RCT on students' long-term ability to perform procedural clinical skills. *PLoS One*. **2013**, 8(9), e76354. https://doi.org/10.1371/journal.pone.0076354

7. Moon MR, Hughes MT, et.al. Ethics skills laboratory experience for surgery interns. *J Surg Educ* **2014**, 71, 829-38. https://doi.org/10.1016/j.jsurg.2014.03.010

8. McGaghie WC, Issenberg SB, et.al. A critical review of simulation-based medical education research: 2003-2009. Med Educ 2010, 44, 50-63. https://doi.org/10.1111/j.1365-2923.2009.03547.x

9. Al-Elq AH. Medicine and clinical skills laboratories. J Family Community Med. 2007, 14(2), 59-63. PMID: 23012147; PMCID: PMC3410147.

10. Rizwan Hashim et al. Role of Skill Laboratory Training in Medical Education – Students 'Perspective. *Journal Coll Physicians Surg Pak* **2016**, 26(3), 195-198. https://pubmed.ncbi.nlm.nih.gov/26975950/

11. Nikendei C, et al. "Heidelberg standard examination" and "Heidelberg standard procedures" - Development of faculty-wide standards for physical examination techniques and clinical procedures in undergraduate medical education. GMS *J Med Educ.* **2016**, 33(4), Doc 54, http://dx.doi.org/10.3205/zma001053.

12. Vision 2015. Medical Council of India. Available from www.mciindia.org/tools/[2] announcement/MCI_booklet.pdf (accessed on 11.1.2014).

13. Sullivan GM, Artino AR Jr. Analyzing and interpreting data from likert-type scales. *J Grad Med Educ.* **2013**, 5(4), 541-2. https://doi.org/10.4300/JGME-5-4-18
14. Joseph N, Nelliyanil M, Jindal S, Utkarsha, Abraham AE, Alok Y, Srivastava N, Lankeshwar S. Perception of Simulation-based Learning among Medical Students in South India. *Ann Med Health Sci Res.* **2015**, (4), 247-52. https://doi.org/10.4103/2141-9248.160186
15. Madiha Imran et al. Effect of preclinical skill lab training on clinical skills of students during clinical years. *Pak J Physiol* **2016**;12 (3). https://doi.org/10.69656/pjp.v12i3.580
16. McGaghie WC, Issenberg SB, Cohen ER, Barsuk JH, Wayne DB. Does simulation-based medical education with deliberate practice yield better results than traditional clinical education? A meta-analytic comparative review of the evidence. *Acad Med*. **2011**, 86(6), 706-11. https://doi.org/10.1097/acm.0b013e318217e119
17. Kumar P, Mythri G, Shetty A et al. First-Year Medical Students' Perspective on Early Clinical Exposure in the Era of Competency-Based Medical Education: Unraveling by Thematic Analysis. *Medical Journal of Dr. D.Y. Patil Vidyapeeth*, **2023**, 16, 3. https://doi.org/10.4103/mjdrdypu.mjdrdypu_997_21
18. Rawekar A, Jagzape A, Srivastava T, Gotarkar S. Skill Learning Through Early Clinical Exposure: An Experience of Indian Medical School. *J Clin Diagn Res*. **2016**, 10(1), JC01-4. https://doi.org/10.7860/JCDR/2016/17101.7022
19. Ewnte B, Yigzaw T. Early clinical exposure in medical education: the experience from Debre Tabor University. *BMC Med Educ* **2023**, 23, 252. https://doi.org/10.1186/s12909-023-04221-4
20. Mileder L, Wegscheider T, Dimai HP. Teaching first-year medical students in basic clinical and procedural skills--a novel course concept at a medical school in Austria. *GMS Z Med Ausbild*. **2014**, 31(1), Doc6. https://doi.org/10.3205/zma000898
21. Upadhayay N. Clinical training in medical students during preclinical years in the skill lab. *Adv Med Educ Pract*. **2017,** 8, 189-194. https://doi.org/10.2147/AMEP.S130367