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ANALYZING THE PERCEPTION AND EFFECTIVENESS OF BEDSIDE CLINICS COMPARED TO SIMULATED PATIENTS FOR ACQUIRING ORTHOPEDIC CLINICAL SKILLS: AN EXPLORATORY STUDY

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ABSTRACT

Introduction: The COVID-19 pandemic and similar calamities can prevent learners from attending offline classes. Simulation is a valuable alternative in such a situation.
Aim: To compare learner perceptions and efficacy between simulated patients (SPs) and bedside clinics (BSCs) as a teaching-learning method for the clinical skill training of orthopedic residents.
Methods: Our study was an exploratory study conducted at a tertiary care teaching institution in 2021. We randomly divided 21 residents into the BSC group (Group A) and the SP group (Group B). These participants underwent training in five essential clinical skills. We assessed the learners' perceptions with a Likert scale and focus group discussion. The Likert scale covers seven important domains: liking, understanding, confidence in performance, memorization, interest, willingness to recommend to other faculty, and the need for alternative teaching methods. Furthermore, we effectively compared the efficacy of both approaches by analyzing scores obtained from the MCQ and OSCE examinations.
Results: Among the 23 invited participants, 21 participated (participation rate of 91.3%). There were 55 responses (A) and 50 from the group (B). The Likert scale scores for all the cases were not significantly different between the two groups for understanding and confidently performing the concept (P value < 0.05). Learners' perceptions were similar between the two groups in most domains regarding neurological cases (p value <0.05). The perception was similar in domains such as interest and confidence for ortho cases. We assessed learner perceptions by conducting focus group discussions. There was no significant difference in the final scores obtained on the MCQ and OSCE.
Discussion: We can use SP as an alternative to BSC for training in orthopedic clinical skills. SPs are as effective as BSCs. Both methods have no uniformity in terms of learners' perceptions of different domains.

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Keywords: bedside clinics, simulated patients, simulations, focus group discussion, Covid-19, medical education, simulation in orthopedic teaching

BACKGROUND

Simulated patients (SPs) are trained to portray a patient with a specific condition realistically. SPs provide a consistent presentation that does not vary from student to student. Different simulation methods involve the use of simulated patients, roleplay, manikins, written clinical scenarios, and computer software. We can teach and assess clinical and physical examination skills via SPs (Ingrassia PL et al. 2021 & Cleland JA et al. 2019). Sir William Osler stated, "To study the phenomenon of disease without books is to sail an unchartered sea while to study books without patients is not to go to sea at all, "and "medicine is learned by the bedside and not in the classroom" is still valid. Traditionally, bedside clinics (BSCs) are considered the primary modality of teaching medicine. It is one of the best teaching-learning methods for history taking, physical examination skills, and developing a professional attitude. It provides a holistic approach to the diagnostic process and patient care. In the early 20th century, BSC accounted for 75% of medical teaching. However, it now constitutes only 8% to 19% (Peters M. 2014).

Presently, there is a lack of opportunities for the learner to obtain a real patient. Institutional policies, a shortage of patients, natural disasters, and pandemics such as COVID-19 have led to a decline in hospital consultations. SPs help learners acquire safe practice skills before they encounter complex and unpredictable real-life situations. We routinely use simulations for surgical training. However, the literature on teaching orthopedic clinical skills using simulated patients is scarce.

AIM

We aimed to compare learner perceptions and efficacy between simulated patients and bedside clinics as a teaching-learning method for the clinical skill training of orthopedic residents.

METHODS

Our study was an exploratory study conducted at a tertiary care teaching institution between January 2021 and September 2021. We used a mixed study design with both qualitative and quantitative methods. A Likert scale survey and a focus group discussion (FGD) were conducted to assess learners' perceptions. We compared the effectiveness quantitatively via the scores obtained in the final analysis.

We selected all residents in the Department of Orthopedics for this study, excluding the final-year residents and those unwilling to consent. Twenty-eight

residents were studying for a master's degree in our department. Five were final-year residents, and two could not attend the study. We had 21 residents in the study, and they were divided randomly into groups A and B via the lottery method (participation rate of 91.3%). There were six second-year residents in Group A and four in Group B. There were 11 residents in Group A. We taught them practical skills at the BSC using real patients. The remaining 10 in group B were taught via simulated patients.

There were three clinical examination skills from orthopedics and two from neurology. All these were must-know competencies as per the curriculum. The demonstrated orthopedic clinical skills included demonstration of the flexion deformity of the hip via Thomas's well-leg raising test, the Trendelenburg sign in the hip, and Adam's forward bending test for detecting structural scoliosis. The neurological examination skills taught demonstrated Froment's sign-in claw hand and elicited Babinski's reflex in spasticity (Reider B. 2005). We trained four of our interns, who acted like simulated patients. The investigator took classes for both groups. The instructor taught the etiology, clinical features, demonstration of physical signs, and management of each skill. The session lasted for 45 minutes. There were ten such sessions.

We assessed the learner's perception via a Likert scale immediately following the session. Three weeks after the sessions, the learner's performance was assessed via multiple-choice questions and the OSCE. Afterward, we conducted a focus group discussion in which the participants were divided into four groups. This discussion aimed to gather their opinions on both teaching and learning methods. Each group was encouraged to share their experiences and insights regarding the perceived strengths and weaknesses of the bedside clinic (BSC) and simulated patient (SP) methods. By fostering an open dialog, we aimed to understand how each approach impacted their learning, confidence, and overall skill development in orthopedic clinical training. The feedback gathered during these discussions would provide valuable qualitative data to complement the quantitative results obtained from the Likert scale surveys. A crossover between each group was performed at the end.

The analysis of the responses gathered from the Likert scale, as well as the assessment scores and opinions from different domains of the focus group discussions, was conducted by an independent evaluator from another department. Learners' perceptions were assessed across seven domains via a five-point Likert scale ranging from "strongly disagree" to "strongly agree." The responses were then categorized and compared between the SP and BSC groups via either chi-square tests or Fisher's exact tests on the basis of the data distribution. We compared the results across three categories: all cases, neurology cases, and orthopedic cases. The scores of the MCQs and OSCE were analyzed via an unpaired *t* test. We entered the data into Microsoft Excel and analyzed them via SPSS version 21.

ETHICS

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments. This study was approved by the Institutional Ethics Committee. An informed consent was obtained from all the participants. All the participants are asked for verbal consent before commencing focus group discussion.

RESULTS

There were 55 responses on the Likert scale from Group A and 50 from Group B. There was no significant difference in the perceptions between the two groups in the domains, such as (a) I understood the concept well (*p* value of 0.054) and (b) I can perform this clinical sign confidently in the future (*p* value of 0.81). The simulated patient group had a significantly better perception in the following domains: (a) I like this method of teaching (*p* value <0.001), (b) I think this method of demonstration helps me to memorize it easily (*p* value <0.001), (c) I think this teaching-learning method is quite interesting (*p* value <0.001), (d) I recommend this method to other faculties (6) (*p* value <0.001), and (e) I think an alternative teaching method helps me learn demonstrations of clinical signs (*p* value <0.001) (Table 1).

There were no significant differences in perceptions between the two groups in the majority of the domains related to learning neurological skills (*p* value >0.05), except for "I think an alternative teaching method is useful for learning demonstrations of clinical signs" (*p* value 0.01) (Table 2).

There was a significantly better perception in the SP group for learning orthopedic skills in domains such as (a) I like this method of teaching, (b) I think this method of demonstration helps to memorize it easily, (c) I think this teaching-learning method is quite interesting, and (d) I will recommend this method to other faculties (*p* value < 0.05) compared to other domains (Table 3).

Both groups discussed the advantages and disadvantages of bedside clinics and simulated patients during the focus group discussion. The primary and minor domains that emerged during their discussion were noted (Table 4). There was no significant difference between the two groups' final assessment scores for the MCQs and OSCE (*p* values of 0.81 and 0.82, respectively) (Table 5).

DISCUSSION

We choose tests to reveal concealed deformities as orthopedic clinical skill training. However, their learning and demonstrations are difficult. They assess the psychomotor domain. Neurological tests assess the cognitive and psychomotor domains. The assessment will be incomplete without assessing

Table 1. Comparison of the likert scale scores of the students' perceptions of simulated patients and bedside clinic teaching in all the cases

Questions	Group	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total	p-value
Domain 1. I liked this method of teaching	SP	0	1	9	34	6	50	<.001
	BSC	0	1	2	22	30	55	
Domain 2. I understood the concept well	SP	0	1	3	29	17	50	.054
	BSC	0	0	11	22	22	55	
Domain 3. I can perform this clinical sign confidently in the future	SP	0	1	11	18	20	50	.81
	BSC	0	1	8	23	23	55	
Domain 4. I think this method of demonstration helps to memorize it easy	SP	0	4	11	27	8	50	<.001
	BSC	0	0	3	25	27	55	
Domain 5. I think this teaching-learning method is quite interesting	SP	0	5	13	27	5	50	<.001
	BSC	0	0	3	23	29	55	
Domain 6. I will recommend this method to other faculties	SP	0	9	17	18	6	50	<.001
	BSC	0	0	5	28	22	55	
Domain 7. I think an alternative teaching method is useful for learning and demonstrating clinical signs	SP	0	10	10	27	3	50	<.001
	BSC	6	12	26	9	2	55	

Table 2. Comparison of the likert scale scores of the students' perceptions of simulated patients and bedside clinical teaching of neurology cases

Questions	Group	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total	p-value
Domain 1. I liked this method of teaching	SP	0	0	4	14	2	20	.006
	BSC	0	0	1	8	11	20	
Domain 2. I understood the concept well	SP	0	0	0	12	8	20	.31
	BSC	0	0	3	10	7	20	
Domain 3. I can perform this clinical sign confidently in the future	SP	0	1	5	6	8	20	.68
	BSC	0	0	3	7	10	20	
Domain 4. I think this method of demonstration helps to memorize it easy	SP	0	2	4	8	6	20	.07
	BSC	0	0	0	10	10	20	
Domain 5. I think this teaching-learning method is quite interesting	SP	0	2	3	12	3	20	.08
	BSC	0	0	2	8	10	20	
Domain 6. I will recommend this method to other faculties	SP	0	3	5	8	4	20	.42
	BSC	0	0	2	10	8	20	
Domain 7. I think an alternative teaching method is useful for learning and demonstrating clinical signs	SP	0	6	5	9	0	20	.01

Table 3. Comparison of the likert scale scores of the students' perceptions of simulated patients and bedside clinical teaching of orthopedic cases

Questions	Group	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total	p-value
Domain 1. I liked this method of teaching	SP	0	1	4	20	5	30	.005
	BSC	0	1	1	14	19	35	
Domain 2. I understood the concept well	SP	0	1	3	16	10	30	.31
	BSC	0	0	7	13	15	35	
Domain 3. I can perform this clinical sign confidently in the future	SP	0	0	6	11	13	30	.55
	BSC	0	2	5	16	12	35	
Domain 4. I think this method of demonstration helps to memorise it easy	SP	1	3	6	17	3	30	.004
	BSC	0	0	3	16	16	35	
Domain 5. I think this teaching learning method is quite interesting	SP	0	3	10	15	2	30	<.001
	BSC	0	0	1	15	19	35	
Domain 6. I will recommend this method to other faculties	SP	0	3	12	13	2	30	<.001
	BSC	0	0	3	18	14	35	
Domain 7. I think an alternative teaching method is useful for learning demonstration of clinical signs	SP	0	8	5	14	3	30	.01

Table 4. The major and minor domains that evolved during the focus group discussion on the advantages and disadvantages of bedside clinics and simulated patients

Major domain	Minor domain
Advantages and disadvantages of BSC	1. It is a real-life experience 2. They can experience the emotions of the patients while examining 3. Patients may not cooperate due to pain 4. The practical problems while examing the patients are demonstrated well 5. The different variations of the same test can`t be seen in BSC 6. All the signs of a disease may not be present in a simulated patient. 7. Patient discomfort may not be taken into consideration in BSC 8. We can consider other diseases in the patient and have an integrated approach in BSC 9. In bedside clinic, we concentrate only on a single disease or system that is a disadvantage 10. We can see only the signs present in the patient at the time of examination 11. Gender difference is well demonstrated in BSC 12. Less number of persons get the chance for examination during BS 13. Early stages and different stages of the disease is demonstrated in BSSC 14. The majority opines BSC cannot be avoided 15. Active participation by the students are less in BSC 16. We can improve BSC by including multimedia 17. Better memorization in BSC 18. The teacher will demonstrate a sign thinking that the student is having some basic knowledge.
Advantages and disadvantages of SP	1. SP will give a visual picture for memorization 2. Variations in signs will be better demonstrated in BSC 3. SP will perform just like a textbook description 4. For rare cases SP will be better 5. Patient resistance for demonstration will be less. 6. Subjectivity of signs can not be demonstrated 7. Demonstration will be as of textbook description 8. Many persons can learn the sign in SP 9. Real patients many signs of the same disease can be demonstrated 10. It is better to use SP in the earlier phases of learning before seeing the actual patient. 11. In SP no time constraints for examination and learning 12. In situations like pandemics SP will be better 13. We will be learning the ideal situation so misinterpretation chances are high 14. Lot of confidence if we use real patients in the final assessment 15. Lot of time money and infrastructure are needed for making SP 16. A holistic approach can be obtained in BSC 17. Better memorization in SP 18. Number of different SPs can reduce the redundancy 19. We can use recovered patients as SPs 20. We have to use both SP and BSC

Table 5. OSCE and MCQ scores of the groups

	SP group (n = 10)	BSC group (n= 11)	p value
MCQ Score	5.4 (1.8)	5.5 (0.9)	.81
OSCE Score	3.0 (0.8)	2.9 (0.9)	.82

the retention power of the learner. We conducted OSCE and MCQs to determine retention. Using interns as SPs helped us save time and resources. Random allocation and evaluation by an unknown person helped minimize selection and information bias.

The learners' responses to various domains were not uniform. When we compared residents' perceptions of simulated patients and bedside clinics for all five interventions, the majority in the SP group opined that they liked it, that it was interesting and that it helped in memorizing. They also recommended it as an alternative method for teaching these skills. For neurological cases alone, most domains were not agreed upon by the SP. They strongly recommended an alternative teaching-learning method. Most of the SP group said that they liked this method for orthopedic cases. Compared with bedside clinics, SPs are an interesting teaching-learning method. They felt that they could recommend the SP method to other faculties, but no alternate method was needed. Despite these differences, there was no significant difference in the final score obtained between the two groups. Both simulated patients and bedside clinics are equally effective teaching-learning methods for teaching orthopedic clinical skills. The reluctance to change from the traditional method and lack of adequate exposure to a new method may be the reasons for the varying perceptions toward simulated patients.

During the FGD, both groups discussed the pros and cons of each method. The SP group said that it was not like a real-life situation. They cannot experience the emotional aspects of patients, such as pain. All the symptoms and signs in a standardized patient with a particular disease may not be present in SPs. Another disadvantage was that they could not obtain sex differences in clinical signs. Some opine that SPs are more like machines. The advantage is that multiple learners can perform the test many times in SP, so there is a greater chance of correction. The majority thought that BSCs are inevitable for learning clinical skills. The BSC group believed that this method was better for memorization. They can better demonstrate different variations of the same findings in real patients. A large amount of money and infrastructure are needed to train standardized patients. One of the suggestions was to use recovered patients as SPs. SPs are better during earlier phases of learning, where there is a greater chance of making mistakes.

A bedside clinic is a small group discussion where a clinical teacher and a group of students see a patient, elicit or verify physical findings, and learn about

diagnosis and management (Elakkuvana Bhaskara RD. 2018). It is a teacher, student, and patient triad and involves interaction among these three (Shehab A. 2013). The role of BSCs is declining in modern medicine. The median time a medical student spends on the BSC is 2.9 minutes, whereas it is 69 minutes in the classroom (Fitzgerald FT. 1993). Demonstration and practice (DP) is a commonly practiced method in BSCs. Here, one student demonstrates a clinical skill, and others observe it. Later, the teacher corrects or confirms it and presents the correct method. Thereafter, everybody practices the proper technique.

In the collaborative discovery (CD) method, all the students perform the skill and report their findings. The teacher examines these findings neutrally and highlights the consensus and disagreement. He then demonstrated the standard method. Thereafter, the students re-examine the skill. This process is repeated several times until the group members reach a consensus (Smith CA et al. 2006). We can best teach skills such as history taking, physical examination, and clinical ethics in BSC. It helps one to become more professional and improve communication skills. The BSC also helped the learners observe the faculty performing the clinical examinations. Thus, it helps develop a bond between the faculty and students and can be the beginning of the mentoring process. The fascination with technological advances, imaging, and laboratory testing has led to a decline in BSC in recent years. The faculty must sharpen their physical diagnostic skills to be effective bedside teachers. They should be gentle with learners and patients, be better communicators, and teach professionalism and ethics (LaCombe MA. 1997). The time constraints, attitudes, knowledge, skill of the faculty, lack of respect for patients, and overdependence on technology are some of the barriers to the effective conduct of BSCs (Castiglioni A et al. 2008).

Recently, there has been increased use of SPs in medical education. The increased number of medical students, reduced number of patients for learning, safety of patients, patient empowerment, and increased use of simulation as an educational method all lead to the use of SPs in medical education (Nestel D et al. 2010). Interaction with patients is an integral part of the medical curriculum. It helps students learn specific competencies such as empathy, responsibility toward patients, and professional identities that they cannot learn from textbooks (Bokken L et al. 2009). SPs are also known as standardized patients. Standardization means that they must be valid (accuracy of performance) and reliable (performance consistency). We must assess both of these aspects accurately via expert reviews. SPs are used in undergraduate and postgraduate learning, for monitoring doctors' performance, and for standardized clinical examinations (Wallace J et al. 2002).

SPs can be used in orthopedics for finite element simulations and for evaluating implant variations, surgical techniques, and pathologies to obtain an ideal implant design, screening, and treatment (Pfeiffer F. 2016). They are used in training surgical skills (Kalun P. 2018). Cadaveric simulation for orthopedic residents can reduce training time and learning of technical and nontechnical

skills and benefit patients in the operating theatre (James HK et al. 2020). 3D digital technologies are used in orthopedics for preoperative planning, surgical simulations, creating patient-specific implants, and designing orthotics and prostheses. (Papagelopoulos PJ.2018). There is a dearth of literature regarding the use of SPs for learning the orthopedic clinical examination skills of residents rather than for their assessments. (Haglin JM et al. 2017, Swift M et al. 2013 & Marte et al. 2019).

Most preclinical dietetic students showed modest improvement in communication skills with standardized patients (Gibson SJ. 2016). Clever et al. reported greater satisfaction among students and faculty when outpatient volunteers were used for communication skills than when SPs were used. (Clever SL et al. 2011). Most of our learners favored bedside clinics over SPs for learning communication skills, and they opined in the FGD. According to a systematic review, there was a lack of uniformity in the performance of the standardized patients used for disaster management training (Ingrassia PL et al. 2021). We did not have such a problem, as we used trained interns as SPs. There was a positive perception among psychology residents when SPs were used for OSCE and learning (Roberts RM et al. 2020). Most undergraduate medical students can integrate their knowledge and improve their communication skills when SPs are used for clinical simulation (Zambrano Sánchez G et al. 2020). Our postgraduates also had a satisfactory perception of the use of SPs in clinical examinations.

The student's perception regarding BSC can vary with the teacher's behavior. Teaching excellence depends more on communication skills than on demographic characteristics (Alweshahi Yet al.2007). The UK reported a deficit in bedside teaching in a nationwide study to assess students' perspectives on bedside teaching (Jones P .2015). The time spent on bedside teaching has decreased over the years. Recent reports suggest that 25% of the time is spent on bedside teaching. Patients prefer bedside clinics more. They perceive that medical providers spend more time caring for them (Gonzalo JD et al.2010). An RCT of bedside versus conference room case presentations in pediatric intensive care units demonstrated that learners were more satisfied with bedside clinical case presentations (Landry M-A et al.2007). The reduced number of patients, easy internet access, lack of time for both faculty and students for BSC, and opportunities for cadaveric and simulation are reasons for a reduction in BSC. In the mid-17th century, Franciscus Sylvius started bedside teaching. William Osler popularized this method during the 20th century. According to him, medicine could not be learned in classrooms. The students need to use their five senses.`` Learn to see, learn to hear, learn to feel, learn to smell, and know by practice alone you can become an expert`` (Gonzalo JD. 2010).

In a comparative study of real patients, simulated patients, or video-recorded interviews in which medical students were taught about alcohol misuse, there was no difference in the knowledge level and attitudes of students toward patients with alcohol misuse between the groups. However, the students

in the SP group reported higher satisfaction than did those in the other groups in terms of their ability to acquire interview skills (Eagles J et al. 2001). SPs are useful for exposing students to a variety of psychopathologic states and teaching and assessing complex interpersonal processes, such as empathetic engagement and psychodynamic psychotherapy (Brenner AM. 2009).

No standard guidelines for sustaining medical education during pandemics and natural calamities exist. If there is an infrastructure for distance education, we can take the theory classes synchronously or asynchronously. However, videos or live-streaming sessions cannot replace the traditional methods of learning practical skills (Özçelik s et al. 2020). Medical education is in a transition stage. We were transforming from pedagogical methodologies to andrological methods. The new curriculum is based on the development of entrustable professional activities and competency-based medical education, which identify certain milestones that need to be achieved by the students before the completion of the course. The learning process is currently more learner-centered. Newer techniques, such as small group discussions (SGDs), flipped classrooms, problem-based learning, and self-directed learning, are included in reducing the duration of didactic lectures. Most of these methods require student-teacher interactions. The pandemic has constrained all these activities (Rose S. 2020).

During the COVID-19 pandemic, there was a reduction in the number of patients attending the orthopedic department. Our hospital is the major hospital that treats COVID-19 patients. There were no elective surgeries. Most of our postgraduate students and faculty were deployed to care for COVID-19 patients. Patients used telemedicine for routine consultations. The availability of patients for clinical skill training was difficult. Therefore, we used SPs. The opinions obtained from the Likert scale and focus group discussions in our study are more valuable because they are from postgraduate students with clinical medicine experience.

Our study has a few limitations. Since we conducted this study with our postgraduates, there were few participants and fewer interventions. This can affect the power of the study. We did not perform a preintervention assessment. Agreement scales such as the Likert scale are not the best method of an educational survey, according to AMEE guide 87, for developing a questionnaire for medical education (Artino AR et al. 2014). However, this is the first endeavor to determine learner satisfaction with and the efficacy of using simulated patients as a teaching-learning method for assessing residents' orthopedic clinical examination skills. Similar studies in the future can provide clearer views on this topic.

CONCLUSIONS

Bedside clinics are an inevitable part of clinical training. Simulated patients can be used for clinical training. There is no uniformity in students' perceptions of various domains of BSC and SPs.

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ETHICAL APPROVAL

This study was approved by the Institutional Ethics Committee.

CONFLICT OF INTEREST

We have no conflicts of interest related to this manuscript.

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AUTHOR CONTRIBUTIONS

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