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Observing the Objective Structured Clinical Exam: A Deeper Dive into Structured Clinical Examination

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ABSTRACT

Objective: To explore the perceptions of students and examiners regarding objective structured clinical examination (OSCE).
Study Design: Cross-sectional study.
Place and Duration of Study: University College of Medicine & Dentistry, Lahore Pakistan from Dec to Apr 2023.
Methodology: Data was collected through Google Forms, which served as a secure and user-friendly platform for survey administration. Data was collected from the students who were enrolled in the integrated curriculum. The research involved administering a pre-validated questionnaire to 40 examiners and 272 fourth- and final-year MBBS students. The questionnaire aimed to gather insights into various aspects of the objective structured clinical examination (OSCE), including its attributes, structure, and validity.
Results: The mean attributes of OSCE were analysed, the students' perceptions of organization, validity, and reliability were 3.52±0.72, 3.6±0.79, and 3.69±0.75, respectively. Examiners addressed clinical knowledge, skills, and station organisation SCE's positive impact. 47.5% of faculty faced equipment challenges, while 30% of examiners did not find OSCE stressful.
Conclusion: The study examines organisational and examiner views on OSCE, highlighting its effectiveness in teaching clinical skills and knowledge.

Keywords: Clinical exam, Examiner, Objective structured clinical examination (OSCE), Perception, Students,

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INTRODUCTION

The objective structured clinical examination (OSCE) is a widely acknowledged assessment tool that evaluates various clinical skills and competencies. These encompass medical professionalism and areas such as behaviour, attitude, data analysis, proficiency in history taking, and problem-solving capabilities.[1] OSCE has gained global acceptance as the standard framework for assessing clinical proficiency in medical students.[2] The OSCE is widely used in undergraduate, postgraduate, and licensing exams across medical specialities.[3] Despite its resource-intensive nature, the OSCE's comprehensive evaluation surpasses traditional oral exams, enhancing reliability and validity.[4,5]

Objective structured clinical examination has garnered global acceptance as the standard for evaluating clinical proficiency across medical students.[6] University College of Medicine & Dentistry (UCMD) has an integrated curriculum that includes clerkships commencing in the mid-fourth year, with students undertaking rotations in clinical disciplines, including medicine, gynaecology and obstetrics, surgery, and paediatrics. This phase incorporates two assessments: a theoretical examination & an observed Objective Structured Clinical Examination (OSCE). The observed OSCE is structured with students rotating through discipline-specific stations. Their competen-cies in the examination, management, investigations, counselling, and other skills are evaluated. It is an extensive and resource-intensive exam in which all OSCE stations are observed by examiners who assess students' performance based on a checklist. Hence, it is integral to explore the efficacy of OSCE and identify potential areas for enhancement. This study measured the examination's efficacy in terms of attributes of OSCE and organisational structure, aiming to identify actionable areas for improvement within a six-month timeframe. By gathering insights from both those who take the exam and those who administer it, the study aims to provide a comprehensive understanding of the organisation and its weaknesses regarding its quality, credibility, consistency, and overall structure. Such insights can help refine the OSCE, making it an even more robust tool for evaluating medical students' clinical proficiency.

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METHODOLOGY

The cross-sectional study conducted at the University College of Medicine & Dentistry Lahore, Pakistan from December to April 2023 after Institutional ERB approval was attained for the study (ERC/16/23/01 dated 30/01/2023). The sample size for this study was calculated using the Open Epi sample size calculator, considering a reference prevalence or population proportion of 48%.[7] Following the completion of the examination, a questionnaire was administered using convenience sampling to gather insights from student participants and examiners.

Inclusion Criteria: Students enrolled in the integrated curriculum were included.

Exclusion Criteria: Students enrolled in the traditional curriculum were excluded.

Of the total pool of 300 fourth and final-year MBBS students, 272 responded, while 40 out of 51 examiners contributed to the study's data collection process. After obtaining verbal consent from the participants, data was collected using a pre-validated structured questionnaire. The student questionnaire gathered perceptions regarding OSCE attributes, structure, organization, and validity. It also included questions comparing various assessment methods. A similar set of questions was employed for faculty. The questions were organised on a 5-point Likert scale, ranging from "strongly disagree" (score of 1) to "strongly agree" (score of 5).

Statistical Package for Social Sciences (SPSS) version 26.0 was used for the data analysis. Vraiables were analysed as Mean±SD, median and interquartile range, frequencies and percentages were calculated.

RESULTS

A total of 272 students completed the questionnaire. The mean age of the study participants was 23.7±1.12 years. The proportion of males who responded to the questionnaire was 57.4% higher than females. A total of 40 examiners responded to the questionnaire, representing a high response rate of 78.4%. Among these respondents, the gender distribution was fairly balanced, with 45% male and 55% female. The mean age of the participating faculty members was 42.0±8.80 years, indicating a diverse range of experience levels.

Responding to the questions regarding attributes of OSCE, participants generally provided positive feedback on various aspects of the OSCE assessment. The examination comprehensively evaluated knowledge and clinical skills, with median scores of 4.00 and interquartile ranges (IQR) of (3-4) for both. While perceived as somewhat stressful (median: 4.00, IQR: 3-4), opinions on intimidation varied (median: 3.00, IQR: 3-4). Views diverged on the examination's ability to minimize failure chances (median: 3.00, IQR: 3-4) and allow compensation for poor performance (neutral median: 3.00, IQR: 2-4). However, participants widely agreed with minimisexamination's effectiveness in revealing strengths and weaknesses (median: 4.00, IQR: 3-4) and providing valuable self-improvement feedback (median: 4.00, IQR: 3-4). The OSCE was perceived to align with medical profession requirements (median: 4.00, IQR: 3-4), covering competencies in realistic scenarios (median: 4.00, IQR: 3-4). Overall, participants saw the OSCE as a comprehensive educational experience valuable for shaping clinical skills and knowledge. Responses are shown in Table-I. Participants positively perceived the OSCE structure. Results showed a median score of 4.00 and an IQR of (3-4), indicating consistent approval. Allocated time at stations was deemed sufficient, with a median score of 4.00 and an IQR of (3-4), showing a consensus on adequacy. Recognizing the importance of prior practice, the median score was 4.00 with an IQR of (3-4), reflecting participant agreement. Examiners were positively described, with a Recognisingian score of 4.00 and an IQR of (3-4), emphasizing their professionalism. Clear instructions received general agreement, with a median score of 4.00 and an IQR of (3-4). Logical station sequencing earned an emphasising score of 4.00 and an IQR of (3-4), indicating positive feedback. Participants perceived standardized patients as authentic, with a median score of 4.00 and an IQR of (3-4). Overall, participants had a favourable experience with OSCE logistics and structure standardised personal aspects, contributing to a positive overall perception of the assessment process (Table-I).

Responding to the questions regarding the organization of OSCE, participants positively evaluated the logistical aspects of the examination. The pre-exam orientation received a median score of 4.00 (IQR: 3-4), organisations informativeness. The clarity of station locations and rotation earned a median score of 4.00 (IQR: 3-4), reflecting participant understanding. Organizers facilitated student flow and were accessible for questions (median: 4.00, IQR: 3-4). The exam environment was quiet and conducive (median: 4.00, IQR: 3-4 Organisers and equipment availability, including simulators, received positive feedback (median: 4.00, IQR: 3-4) (Table-I).

Responding to the questions regarding validity and reliability, organisation participants generally view the Objective Structured Clinical Examination (OSCE) positively for assessing essential clinical skills, as indicated by a median score of 4.00 and an interquartile range (IQR) of (3-4). While opinions vary on the statement "OSCE is a well-standardized examination," with a median score of 3.00 and an IQR of (2-4), there is a predominant agreement that uniform questions and case scenarios contribute well-standardised competency assessment (median: 4.00, IQR: 3-4). Regarding the impact of personality, ethnicity, and gender on OSCE scores, participants are somewhat divided, with a median score of 3.00 and an IQR of (2-4), suggesting varying perspectives on these factors' influence on performance (Table-I).

Table-I: Students' Perception on Attributes and Structure of Objective Structured Clinical Examination (OSCE) (n=272)

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Median	IQR
Attributes of Objective Structured Clinical Examination							
It assessed a wide range of knowledge	22(8.1%)	9(3.3%)	57(21%)	142(52.2%)	42(15.4%)	4.00	(4-3)
It assessed a wide range of clinical skills	16(5.9%)	6(2.2%)	60(22.1%)	133(48.9%)	57(21%)	4.00	(4-3)
Examination was stressful.	27(9.9%)	11(4.0%)	66(24.3%)	103(37.9%)	65(23.9%)	4.00	(4-3)
Examination was intimidating.	20(7.4%)	9(3.3%)	143(52.6%)	57(21%)	43(15.8%)	3.00	(4-3)
Examination minimized chances of failing.	36(13.2%)	18(6.6%)	95(34.9%)	100(36.8%)	23(8.5%)	3.00	(4-3)
Allows for compensation of poor performance in other stations and/or other examination.	23(8.5%)	72(26.5%)	102(37.5%)	75(27.6%)		3.00	(4-2)
Reveals areas of strengths and weakness.	21(7.7%)	26(9.6%)	52(19.1%)	136(50%)	37(13.6%)	4.00	(4-3)
It gives feedback on performance that can be used for self-improvement.	14(5.1%)	33(12.1%)	66(24.3%)	129(47.4%)	30(11%)	4.00	(4-3)
It reflects requirements of medical profession.	16(5.9%)	16(5.9%)	56(20.6%)	148(54.4%)	36(13.2%)	4.00	(4-3)
Stations sufficiency covered the major areas of course/attachment competencies.	16(5.9%)		60(22.1%)	160(58.8%)	36(13.2%)	4.00	(4-3)
The stations reflected real clinical scenario.	9(3.3%)	5(1.8%)	66(24.3%)	145(53.3%)	47(17.3%)	4.00	(4-3)
The examination was also educational.	9(3.3%)	28(10.3%)	73(26.8%)	116(42.5%)	46(16.9%)	4.00	(4-3)
Structure of Objective Structured Clinical Examination							
Examination was well structured and sequenced.	21(7.7%)	11(4.0%)	74(27.2%)	120(44.1%)	46(16.9%)	4.00	(4-3)
The time allocated at the stations was adequate.	12(4.4%)	34(12.5%)	77(28.3%)	114(41.9%)	35(12.9%)	4.00	(4-3)
Prior practice or mock sessions should be prepared.	9(3.3%)	7(2.6%)	65(23.9%)	110(40.4%)	81(29.8%)	4.00	(4-3)
Examiners were polite, professional and helpful.	22(8.1%)	37(13.6%)	64(23.5%)	109(40.1%)	40(14.7%)	4.00	(4-3)
Instructions were clear and unambiguous.	23(8.5%)	8(2.9%)	54(19.9%)	137(50.4%)	50(18.4%)	4.00	(4-3)
Sequence of stations was logical and appropriate.	22(8.1%)	15(5.5%)	88(32.4%)	108(39.7%)	39(14.3%)	4.00	(4-3)
Standardized patients, if they were included, resembled a real patient scenario.	8(2.9%)	15(5.5%)	69(25.4%)	132(48.5%)	48(17.6%)	4.00	(4-3)
Organization of Objective Structured Clinical Examination							
The orientation given before the examination was informative.		26(9.6%)	59(21.7%)	147(54%)	40(14.7%)	4.00	(4-3)
The location of stations and rotation was clear.	5(1.8%)	29(10.7%)	34(12.5%)	155(57%)	49(18%)	4.00	(4-3)
Organizers were facilitating the flow of students between stations	9(3.3%)	7(2.6%)	65(23.9%)	106(38.9%)	81(29.7%)	4.00	(4-3)
Organizers were available to answer questions	9(3.3%)	7(2.6%)	65(23.9%)	107(39.3%)	84(30.8%)	4.00	(4-3)
The environement was quiet and conducive for exam with little distraction.	5(1.8%)	19(6.9%)	34(12.5%)	155(57%)	59(21.6%)	4.00	(4-3)
Equipment including simulators, medical instruments and imaging studies were available and had good quality	8(2.9%)	15(5.5%)	69(25.4%)	122(44.8%)	58(21.3%)	4.00	(4-3)
Validity and reliability of Objective Structured Clinical Examination							
OSCE provides true measure of essential clinical skills	16(5.9%)	6(2.2%)	50(18.3%)	133(48.9%)	67(24.6%)	4.00	(4-3)
OSCE is a well standardized examination	11(4%)	11(4.0%)	60(27.2%)	135(49.6%)	55(20.2%)	3.00	(4-2)
Having similar questions and case scenario for all students is a good measure of competency	8(2.9%)	7(2.5%)	53(19.4%)	147(54%)	57(21%)	4.00	(4-3)
Personality, ethnicity and gender will not affect OSCE scores.	34(12.5%)	7(2.6%)	59(21.7%)	120(44.1%)	52(19.1%)	3.00	(4-2)

The faculty's evaluation of the objective structured clinical examination (OSCE) reveals predominantly positive perceptions, with median scores indicating general agreement. OSCE is applauded for its comprehensive coverage of clinical skills and knowledge (median: 4.00, IQR: 4-3), well-organized administration (median: 4.00, IQR: 5-3), clear instructions (median: 4.00, IQR: 5-2), and reflection of authentic clinical scenarios (median: 4.00, well-organised faculty acknowledges the adequacy of time (median: 4.00, IQR: 4-2) and the number of stations (median: 4.00, IQR: 4-4), highlighting OSCE's effectiveness in minimizing the likelihood of student failure and positively impacting learning. Despite the acknowledgement of stress for students (median: 3.00, IQR: 4-2), OSCE is minimising a standardized and

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preferable examination format (median: 4.00, IQR: 4-3), aligning with medical profession requirements and providing valuable feedback for self-imprstandardisedever, concerns are raised about the availability and quality of equipment (median: 2.00, IQR: 3-2). Faculty members endorse OSCE as a robust assessment tool, emphasizing its educational value and preference over alternative clinical examination formats (Table-II).

DISCUSSION

In the current study, students and examiners had positive opinions of OSCE's characteristics, organization, structure, and validity. In the present study, over 60% of students, as indicated by a median score of 4.00 (IQR: 4-3), considered OSCE a precisorganisation tool for both knowledge and skill domains. Similar findings about overall OSCE satisfaction by students and examiners' have been reflected in earlier studies.[7,8] Majumder *et al*.[4] reported similar findings regarding the medicine and therapeutics exit OSCE at the University of the West Indies (Cave Hill) widely, students were of the view that stations reflected real clinical scenarios and stations covered major areas of course.

In the present study, 60% of students, corresponding to a median score of 4.00 (IQR: 4-3), associated OSCE as a stressful and daunting event. Contrary to this, only 33% of examiners in the current study, aligned with a median score of 3.00 (IQR: 4-2), considered OSCE stressful for students. Moreover, significant OSCE-related stress has been repeatedly reported in recent literature.[9,10] Divergent to this observation, a study reported less anxiety during virtual OSCEs. It has also been noted that the stress response varies depending on the station's requirements.[11-13]

More than half, 58.4% of the participants, aligned with a median score of 4.00 (IQR: 4-3), agreed that one of the major attributes of OSCE is its ability to reveal areas of strengths and weaknesses, triggering self-improvement through effective feedback. Research on OSCE attributes by Ataro *et al*. depicted similar findings in students and examiners from the Obstetrics and Gynecology Department of the Institute of Health, Jimma University, Ethiopia.[14]

Almost 70% of students, corresponding to a median score of 4.00 (IQR: 4-3), believed practice mock sessions should be prearranged. A beneficial effect of mock OSCE is improving students' confidence and better performance. This observation is supported by Braier-Lorimeret al., who reported the positive effects of peer-led mock OSCE in undergraduate medical students from the University of Oxford.[15]

A high percentage of students, almost 65.6%, stated that standardized patients mimic real patients to a great extent, corresponding to a median score of 4.00 (IQR: 4-3). Our finding shows that 68.7% of the students were standardised with the orientation provided, aligning with a median value of 4.00 (IQR: 4-3). Other studies also reported similar outcomes. Pierre et al. pointed out OSCE as an acceptable assessment tool by the University of the West Indies, Jamaica students during their paediatric clerkship.[16]

Most examiners and students agree that there is minimum bias during OSCE regarding ethnicity, gender, and personality, supporting it as a reliable, objective assessment tool to evaluate skill and attitude. The OSCE is reported as a standardized, reliable and valid format for the analysis of clinical skills globally,[17-19] and a true measure of clinical skills.[20]

Availability of resources was the major challenge for 47.5% of examiners in our study, corresponding to a median score of 2.00 (IQR: 3-2). OSCE is a resource-intensive assessment method which requires adequate staff, infrastructure, and updated medical equipment with the proper examiner training.

CONCLUSION

The study showed the students' and examiners' responses regarding OSCE. Most participants believed that OSCE well inculcates clinical skills and knowledge; however, certain challenges related to stress perception, compensation for poor performance, availability of resources, and time constraints were identified. To improve exam performance, Practice mock sessions should be planned to enhance performance in OSCE. Examiners should get proper training, and essential resources should be ensured.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

TA & MN: Data acquisition, data analysis, critical review, approval of the final version to be published.

KAM & KA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SM & SR: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Khan KZ, Ramachandran S, Gaunt K, Pushkar P. The objective structured clinical examination (OSCE): AMEE guide no. 81. Part I: an historical and theoretical perspective. Med Teach 2013; 35(9): e1437-e46. https://doi.org/10.3109/0142159X.2013.818634.
2. Harden RM, Stevenson M, Downie WW, Wilson G. Assessment of clinical competence using objective structured examination. Br Med J 1975; 1(5955): 447-451. https://doi.org/10.1136/bmj.1.5955.447.
3. Jain SS, Nadler S, Eyles M, Kirshblum S, DeLisa JA, Smith A, et al. Development of an objective structured clinical examination (OSCE) for physical medicine and rehabilitation residents. Am J Phys Med Rehabil 1997; 76(2): 102-106. https://doi.org/10.1097/00002060-199703000-00003.
4. Majumder MAA, Kumar A, Krishnamurthy K. An evaluative study of objective structured clinical examination (OSCE): students and examiners perspectives. Adv Med Educ Pract 2019; 10: 387-397. https://doi.org/10.2147/AMEP.S197275.
5. Plakiotis C. Objective Structured Clinical Examination (OSCE) in Psychiatry Education: A Review of Its Role in Competency-Based Assessment. Adv Exp Med Biol 2017; 988: 159-180. https://doi.org/10.1007/978-3-319-56246-9_13.
6. Naumann FL, Marshall S, Shulruf B, Jones PD. Exploring examiner judgement of professional competence in rater based assessment. Adv Health Sci Educ Theory Pract 2016; 21(4): 775-88. https://doi.org/10.1007/s10459-016-9665-x.
7. Khan SA, Aaraj S, Talat S, Javed N. Students' perception and scores in Paediatrics end-of-clerkship and final professional Objective Structured Clinical Examination (OSCE): A comparative study. Pak J Med Sci 2021; 37(2): 525. https://doi.org/10.12669/pjms.37.2.3422.
8. Tadese M, Yeshaneh A, Mulu GB. Determinants of good academic performance among university students in Ethiopia: a cross-sectional study. BMC Med Educ 2022; 22(1): 395. https://doi.org/10.1186/s12909-022-03461-0.
9. Fisseha H, Desalegn H. Perception of Students and Examiners about Objective Structured Clinical Examination in a Teaching Hospital in Ethiopia. Adv Med Educ Pract 2021; 12: 1439-1448. https://doi.org/10.2147/AMEP.S342582.
10. Ferreira ÉdMR, Pinto RZ, Arantes PMM, Vieira ÉLM, Teixeira AL. Stress, anxiety, self-efficacy, and the meanings that physical therapy students attribute to their experience with an objective structured clinical examination. BMC Med Educ 2020; 20(1): 296. https://doi.org/10.1186/s12909-020-02202-5.
11. Mamatha S, Rajalakshmi R, Ramya C. Medical Education/Original Article First Year MBBS Student's Perception of Objective Structured Clinical Examination and Objective Structured Practical Examination. Indian J Physiol Pharmacol 2017; 61(4): 440-444.
12. Mak V, Krishnan S, Chuang S. Students' and Examiners' Experiences of Their First Virtual Pharmacy Objective Structured Clinical Examination (OSCE) in Australia during the COVID-19 Pandemic. Healthcare 2022; 10(2): 328. https://doi.org/10.3390/healthcare10020328.
13. Sánchez-Conde P, Clemente-Suárez VJ. Autonomic stress response of nurse students in an objective structured clinical examination (OSCE). Sustainability 2021; 13(11): 5803. https://doi.org/10.3390/su13115803
14. Ataro G, Worku S, Asaminew T. Experience and Challenges of Objective Structured Clinical Examination (OSCE): Perspective of Students and Examiners in a Clinical Department of Ethiopian University. Ethiop J Health Sci 2020; 30(3): 417-426. https://doi.org/10.4314/ejhs.v30i3.13.
15. Braier-Lorimer DA, Warren-Miell H. A peer-led mock OSCE improves student confidence for summative OSCE assessments in a traditional medical course. Med Teach 2022; 44(5): 535-540. https://doi.org/10.1080/0142159X.2021.2004306.
16. Pierre RB, Wierenga A, Barton M, Branday JM, Christie CD. Student evaluation of an OSCE in paediatrics at the University of the West Indies, Jamaica. BMC Med Educ 2004; 4(1): 22-25. https://doi.org/10.1186/1472-6920-4-22.
17. Zimmermann P, Kadmon M. Standardized examinees: development of a new tool to evaluate factors influencing OSCE scores and to train examiners. GMS J Med Educ 2020; 37(4): Doc40. https://doi.org/10.3205/zma001333.
18. Alkhateeb N, Salih AM, Shabila N, Al-Dabbagh A. Objective structured clinical examination: Challenges and opportunities from students' perspective. PLoS One 2022; 17(9): e0274055. https://doi.org/10.1371/journal.pone.0274055.
19. Siddiqui FG. Final year MBBS students' perception for observed structured clinical examination. J Coll Physicians Surg Pak 2013; 23(1): 20-24.
20. Müller S, Settmacher U, Koch I, Dahmen U. A pilot survey of student perceptions on the benefit of the OSCE and MCQ modalities. GMS J Med Educ 2018; 35(4): Doc51. https://doi.org/10.3205/zma001197.