Mimicking Rashes: Use of Moulage Technique in Undergraduate Assessment at the Aga University, Karachi.

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Mimicking Rashes: Use of Moulage Technique in Undergraduate Assessment at the Aga Khan University, Karachi

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ABSTRACT

Background: The use of simulated patients in student assessment is supported by the Best Evidence Medical Education and U.S. Agency for Healthcare Research and Quality, and it provides a safe and effective alternative to real patients in many situations. To assess the validity and feasibility of moulage technique—where a cosmetically constructed rash is used on simulated patients—two dermatologic rashes were developed using moulage simulation on standardized patients at Aga Khan University Hospital for 3rd year medical summative Objective Structured Clinical Examination (OSCE). **Methods:** Checklists for cases that focused on history taking of a skin rash were developed. These also included a description and identification of lesions, differential diagnosis, and basic management. Cases were first reviewed and approved by the Educational Committee and a dermatologist content expert. Stations were piloted to assess validity and feasibility. Simple nontoxic materials were used to develop the rash by faculty familiar with moulage simulation. **Results:** Sixty-four students were assessed on a Herpes Zoster case and 32 students on a Herpes Simplex case in morning and afternoon sessions. The total mean score obtained at all OSCE stations was 64.82 ± 10.22. Mean scores on the morning and afternoon dermatology stations were 62.72 ± 9.74 and 69.03 ± 9.98, respectively. Face validity for both stations was established through input of content experts. The internal reliability as measured by Cronbach's alpha between the checklist items on the morning and afternoon stations was acceptable at 0.60 (20 items) and 0.65 (18 items), respectively. **Discussion:** The use of moulage technique to develop dermatologic lesions on simulated patients may be utilized for student assessment.

Keywords: Dermatology, moulage, Objective Structured Clinical Examination, simulation technology

Background

The use of simulated patients in student assessment has been supported by the Best Evidence Medical Education and U.S. Agency for Healthcare Research and Quality[1] and it provides a safe and effective alternative to real patients in many situations where medical conditions can be replicated and communication skills can be assessed. One shortcoming posed by such simulations is the limited range of clinical conditions (from a curricular blueprint) that can be duplicated in a standardized fashion, leaving a gap for clinical conditions that may only be assessed in real time on real patients.

Whereas role play can never replace "real findings," certain innovations and technologies may augment the role of simulations.[2] One such attempt was undertaken at Aga Khan University (AKU) Hospital, Karachi, during a summative (16-station) end-of-year Objective Structured Clinical Examination (OSCE) of the 3rd year medical students, in which a cosmetically constructed rash was used on simulated patients to replicate two dermatologic conditions.

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The term moulage comes from the French word *moulé* meaning cast used in the art of creating imitation injures for the purposes of training medical personnel.[3] Moulage technique for detection of dermatologic lesions in undergraduate education has been cited in an earlier study as well.[4]

The 3rd year medical students of our school rotate through Dermatology, Family Medicine, and Internal Medicine where they commonly encounter rashes and exanthems and learn to identify various dermatologic lesions, their patterns and basic management. Prior to 2013, the dermatology component was assessed through multiple choice questions accompanied by slides or pictures that tested the cognitive component, the "knows" part of the Miller's pyramid,[5] but clinical application, the "knows how" and "shows," was only being evaluated in a nonstandardized manner during clinical encounters. At times, picture identification was used in a noninteractive OSCE station in a similar manner ensuring standardization but targeting a lower level of cognition, i.e., knowledge and recall with little problem-solving.

Simulated learning through manikins and simulated patients has been utilized at our institution for learning and its use has improved learner outcomes, as cited in literature.[6,7] Students are familiarized with clinical examinations from year 1 of their study, participating in a formative OSCE that year, summative OSCE in year 2, followed by clerkship OSCEs in clinical years 3–5. Standardized patients involved in OSCEs undergo robust training relevant to the case requirements and practice with examiners in advance to ensure accuracy and consistency of simulation. Use of standardized patients in summative clinical assessments has also helped manage the ethical and procedural issues inherent in the use of real patients.

This was the first time a pilot study was undertaken using moulage technique with the objective of identifying the validity, fidelity, and feasibility of the use of moulage-based simulation in summative assessment.

Methods

Case development
With the help of the Department of Education Development, we developed two cases of herpes zoster and herpes simplex, selected based on learning objectives and blueprint of dermatology for year 3 students. The objective of these cases was to assess a student's ability to take a history of a rash, recognize the lesion to reach a probable diagnosis, and suggest basic management. OSCE evaluation at our institution is based on two broad areas: data gathering (history taking and examination) and data assimilation and processing, which include recognition, diagnosis, and basic management. Each station has a passing score of 55% based on the total score

obtained from an item checklist. For these OSCE stations, initial items evaluated in the checklist station focused on history taking of a skin lesion including site, onset, duration, progression of rash, and associated symptoms such as pain and fever. Additional history items focused on past medical, family, drug, and social history. The last three questions in each station were related to the likely description and identification of lesion, differential diagnosis, and basic management.

These cases were first reviewed and approved by the year committee including approval from a content expert (dermatologist). Being the first moulage case, it was decided to pilot these stations to factor in concerns about genuineness of the rash (validity) and the ability of the cosmetic effect to last throughout the OSCE session (utility and reliability).

Moulage simulation
Two simulators were selected keeping their skin texture, hair distribution, and absence of prior lesions/scars in mind. A trial run of simulating pathology, i.e., skin rashes using pictures, was done a day prior to the examination.

The moulage simulation was created by faculty with experience in medical moulage. The material for the artificial herpes vesicles was created by mixing clear epoxy with a small amount of red dye to simulate a natural appearance. The vesicles were shaped before curing incompletely to keep the vesicles soft. The vesicles were made as clusters and single vesicle in varying sizes. The vesicles were arranged to simulate the eruptions seen in herpes zoster and simplex and attached to the skin using a nontoxic adhesive solution after testing for allergic reaction to skin in contact. The area around the vesicles was then touched up with makeup, and the prepared patient was shown to a dermatologist and asked for a spot diagnosis to evaluate the fidelity of the simulation. The moulage simulation was treated with a fixative to ensure that it did not rub off and remain constant throughout the day. This process took about 30 min per simulator [Figure 1 and 2].

Examiners selected for OSCE were faculty members who undergo prior training as assessors in a mandatory introductory short course on joining the institution.

In addition, examination coordinators briefed all examiners about cases and objectives before the start of the OSCE.

Ethical approval
Ethical approval for this pilot study was obtained from the Institutional Ethical Review Committee. Informed consent was obtained from all the four simulated patients for case development. Written permission to photograph the rash was obtained from the simulated patients as well.

Figure 1: Herpes zoster moulage simulation

Figure 2: Herpes simplex moulage simulation

Data analysis

Data were double entered and analyzed on SPSS software version 19.0. Descriptive statistics, i.e., mean and standard deviation were reported for the morning and afternoon OSCE session scores. Cronbach's alpha was used as a measure for internal reliability between the checklist items on the morning and afternoon OSCE stations. Pearson's correlation was used to assess correlation between the checklist items and global rating for both stations. $P \leq 0.05$ was considered statistically significant.

Results

Sixty-four students in the morning session had the herpes zoster case and 32 students in the afternoon were given the herpes simplex case. The performance statistics were as follows:

The total mean score obtained at all OSCE stations was 64.82 ± 10.22 [Table 1]. Mean scores on the morning and afternoon dermatology stations were 62.72 ± 9.74 and 69.03 ± 9.98, respectively. In the checklist, the item for diagnosis had a mean score of 4.77 and 4.31 out of 6, respectively.

The discrimination indices were 0.316 for herpes zoster and 0.1 for herpes simplex. The difficulty index was 90.6 for both.

The authors were able to establish face validity for both dermatology stations through input of content experts (dermatologists). The internal reliability as measured by Cronbach's alpha between the checklist items on the morning and afternoon stations was acceptable at 0.60 (20 items) and 0.65 (18 items), respectively. There was an insignificant correlation between the checklist items and global rating for both dermatology stations (Pearson's correlation morning = 2.4, $P = 0.84$, Pearson's correlation afternoon = 25.5, $P = 0.15$).

Table 1: Student OSCE scores at different OSCE stations

Morning scores
Afternoon scores

Chest exam Dysentery Back Pain Skin Rash
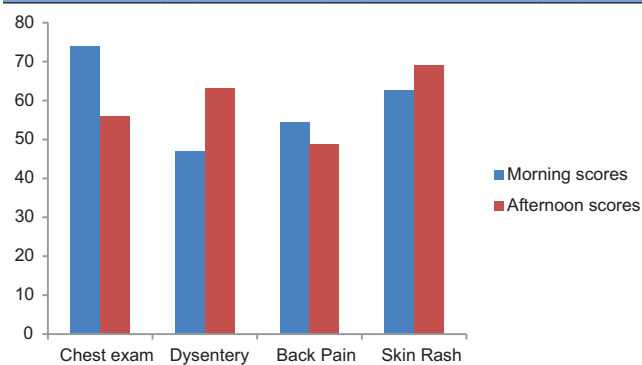
Discussion

This was the first time that moulage technique was used in a summative assessment in the undergraduate education at AKU. A short description of the steps leading to the development of these two OSCE stations was explained above. The technique and raw materials used for the rash were of ease and did not require much skill and training. A formal moulage kit was not utilized for this pilot study. The content and face validity of both dermatology stations were good, and based on student scores, both dermatology stations performed comparably to other stations in the OSCE. Medical students were able to diagnose/identify the artificially created dermatological lesion well. Use of moulage technique to mimic dermatological lesions has been utilized in prior studies as well.[8]

The weak correlation between items and global rating was primarily more examiner dependent than on station construct. This has been found in other OSCE stations and does not reflect on a particular station but rather on examiner briefing. More examiner training is required to improve inter-rater reliability.

Another important criterion of an OSCE station is its feasibility and ease of use.[9] Both the stations piloted were easily

developed and feasible in terms of cost and resources of time and personnel.

Students did well in terms of lesion recognition and diagnosis, based on the mean scores in both morning and afternoon groups. During their 3rd year, students spend 2 weeks in a clinical dermatology rotation, learning different common dermatologic conditions in clinical settings as well as a component of online learning and end-of-rotation testing which may explain their performance. In contrast, in a melanoma moulage study, most students did not detect the lesion, however a likely explanation maybe that the finding was kept incidental and not as a presenting complaint in contrast to our cases.[7]

The low difficulty index for both stations may reflect on the fidelity of the moulage simulation; however, more dermatologic assessments based on moulage need to be done to verify this.

Limitations

One limitation was that a comparison between a moulage-assisted and traditional- or picture-based dermatologic OSCE could not be done. As this was a pilot study, it was limited to one group of 3rd year students; therefore, class correlation could not be done. Comparison across different years may be useful for determining construct validity.

Utilization of formal moulage kits may help develop similar OSCE stations to simulate pathologies that may otherwise be hard to assess in real patients and situations. An institutional initiative to further this method to expand the range of clinical presentations available for learning and assessing should be planned for undergraduate and postgraduate education.

Conclusion

The use of the moulage technique to develop skin rashes on simulated patients proved to be a successful exercise in terms of the validity of presentation, and it was also found to be a feasible way to depict pathology when access to real patients is limited in OSCE settings.

Conflicts of interest

There are no conflicts of interest.

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