Research article

Simulation-based training in otoscopy for undergraduate medical students

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ABSTRACT

Introduction and Aim: Medical education training has undergone a paradigm shift emphasizing newer teaching methods due to challenges in teaching procedural skills by demonstration alone and difficulty in assessment. Simulation is one teaching method in which students can repeatedly practice and strengthen their confidence without causing untoward harm to the patient. Otorhinolaryngology is a technically demanding specialty, and the methods of clinical examination need practice to attain proficiency in performing the skill. Otoscopy being a basic clinical procedure has become a core competency in the medical curriculum. Hence, our study highlights the importance of using simulation to teach clinical skills such as otoscopy.

Materials and Methods: In our study, sixty undergraduate students who attended the clinical posting in the Department of Otorhinolaryngology were recruited. The consultant demonstrated the technique of performing otoscopy, and one week later, the students were asked to perform otoscopy on an ear examination manikin and assessed using a checklist. Following this, hands-on training on otoscopy was given on the manikin, and after one week, the students were reassessed in a similar method. Feedback about the training was obtained from the participants.

Results: Sixty students, 32 (53%) girls, and 28 (47%) boys participated in the study. Seven point questionnaires were used for the assessment of otoscopy in the students. Better performance scores were observed after hands-on simulation training in five parameters (P<0.05). Wilcoxon signed-rank test for the total score showed significant improvement in the post-intervention scores (Z value of -6.723). On analysing the student feedback, 87% felt hands-on simulation was a better method to learn otoscopy than OPD demonstration.

Conclusion: Simulation is an effective tool for teaching and assessing the clinical skill of otoscopy in otorhinolaryngology. Implementing simulation for learning otoscopy in medical education will improve the proficiency and confidence to perform this skill.

Keywords: Simulation; otoscopy; medical education; otorhinolaryngology.

INTRODUCTION

Medical education involves multiple aspects of learning, including knowledge, attitude, and skill. Knowledge about various disease conditions can be taught by traditional teaching methods of lectures and small group discussions. However, teaching attitude and skill requires a different approach. Traditionally these were learned by observing the faculty during clinical sessions, outpatient department (OPD), ward, and operation theatres. The assessment of the same was done by examination in the form of written tests, case presentations, and viva voce. With the introduction of Competency-based medical education (CBME), the new curriculum emphasizes that students should demonstrate what they learn practically, and the same must be certified by the faculty after the teaching session (1).

However, it is challenging to teach procedural skills by demonstration alone, and it is equally difficult to assess. Otoscopy is an essential clinical examination to diagnose diseases of the ear. This procedure was not given importance in the undergraduate medical curriculum, as performing the procedure on a patient can cause discomfort; hence it was primarily taught by a demonstration by the faculty. With the changes in the curriculum in ENT subject, “Otoscopy” has been included as a core competency in the Competency-based Medical Education curriculum, and hence there is a need to make sure that each student can perform otoscopy before completing the MBBS course (2).

“Simulation” is increasingly being used as an effective tool in skill acquisition in medical education (3). Scheduled simulation training can complement traditional lecture-based teaching (4). The application of simulation can assist in learning the method of demonstration of otoscopy in undergraduate teaching.
The study aims to compare the traditional method and simulation-based teaching in the demonstration of otoscopy.

MATERIALS AND METHODS

This study was conducted in the department of and the simulation laboratory of KS Hegde Medical Academy, affiliated with NITTE deemed to be University, Mangalore. After obtaining ethical clearance, sixty students of third-year MBBS posted in the department of ENT were included in the study. The consultant explained and demonstrated the traditional method of performing ear examination with an otoscope in the OPD, but students were not allowed to perform the otoscopy on patients. After one week of training, students were assessed in an objective structured clinical examination (OSCE) station. The students were asked to perform otoscopy on an ear examination manikin (Ear examination simulator), which was observed and scored by an observer. Seven parameters were observed: 1) Holding the Otoscope in the correct hand (Right hand for right ear/ left hand for left ear); 2) Selecting the proper size speculum for the otoscope; 3) Switching on the otoscope before insertion; 4) Holding the Otoscope properly (like a pen); 5) Pulling the pinna upward, backward and outward; 6) Supporting the hand over the cheek; 7) Visualizing the ear canal along with the insertion of the otoscope. The scores for each step of the procedure were recorded. Following this, students were trained hands-on with an ear examination manikin for one week. At the end of one week, the OSCE assessment was repeated, and the individual scores were recorded. Feedback about the training was obtained from the participants, and the data was analysed. Pre and post-intervention scores were analysed for individual parameters using the McNemar test and the total score using the Wilcoxon signed-rank test.

RESULTS

The study included sixty students of third-year medical undergraduates MBBS, posted in the department of ENT department for their regular clinical posting. There were 32 (53%) girls and 28 (47%) boys. Table 1 shows the pre and post-intervention scores of each step of the otoscopy procedure.

<table>
<thead>
<tr>
<th>Step</th>
<th>Pre-intervention score (n=60)</th>
<th>Post-intervention score (n=60)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand-selection</td>
<td>46 (77%)</td>
<td>60 (100%)</td>
<td>.000</td>
</tr>
<tr>
<td>Selected the proper speculum</td>
<td>10 (17%)</td>
<td>33 (55%)</td>
<td>.000</td>
</tr>
<tr>
<td>Switched the otoscope “on”</td>
<td>59 (97%)</td>
<td>60 (100%)</td>
<td>.500</td>
</tr>
<tr>
<td>Held the otoscope like a pen</td>
<td>6 (10%)</td>
<td>56 (93%)</td>
<td>.000</td>
</tr>
<tr>
<td>Pulled the pinna in proper direction</td>
<td>58 (97%)</td>
<td>60 (100%)</td>
<td>.500</td>
</tr>
<tr>
<td>Supported the hand over cheek</td>
<td>6 (10%)</td>
<td>53 (88%)</td>
<td>.000</td>
</tr>
<tr>
<td>Visualized during insertion</td>
<td>6 (10%)</td>
<td>53 (88%)</td>
<td>.000</td>
</tr>
</tbody>
</table>

There was a significant improvement in post-intervention scores in five out of the seven parameters. Students scored well in the other two parameters, switching the otoscope “on” and holding the pinna before and after the training. Wilcoxon signed-rank test for total score showed significant improvement in the post-intervention scores (Z value of -6.723).

The feedback obtained by the students after the study was encouraging. Students felt simulation gave a realistic feeling, and 87% felt simulation is a better training method for otoscopy than OPD demonstration. The usefulness of otoscopy in the ear examination was graded as 5/5 by 80% of students, 4/5 by 7%, and 3/5 by 13%.

DISCUSSION

Simulation-based learning is a practical method of teaching clinical procedures and is accepted by most institutions as a reliable tool for teaching, self-learning, and evaluation (5). The simulators enrich the learning experience and enhance confidence. Simulation provides a controlled, relaxed yet realistic environment, which gives the learner, an opportunity of multiple attempts without compromising patient safety (6).

In our study, the students performed the steps of otoscopy demonstration better in simulation-based training than with the traditional method of teaching (Z value of -6.723). All the sixty students participated in the feedback and 87% experienced simulation as a better method of teaching otoscopy. Similar results were observed by Davies et al. (5), who surveyed 92 medical students at the University of Toronto following a large group otoscopy simulation session. In his nine-question survey related to the experience of learning otoscopy by simulation and traditional method, 71% of respondents had an improvement in confidence in diagnosing pathologies in the ear. After the training session, most respondents (70%) developed an interest in Otorhinolaryngology as a specialty. In a prospective, randomized nonclinical trial, Vincent et al. (7) observed that the simulation group had the most significant improvement in

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otoscopy clinical skills compared to the traditional group.

The innovative method of teaching the skill of otoscopy by simulation is beneficial, as an improper introduction of the otoscope can cause patient discomfort and even injury to the external auditory canal. The advantage of simulation is that the otoscopy skill can be repeated without affecting patient safety. Different ear diseases can be shown, and students can be assessed in a simulated environment. Once feedback is given to the student, the student can have an opportunity to pause, restart and repeat the skill (8). We recommend using simulations, a suitable method to teach otoscopy skills with learning objectives that are achievable and can be assessed.

CONCLUSION
As “Otoscopy” has been included as a core competency in the Competency-based Medical Education curriculum, there is a need to make sure that each student is able to perform otoscopy. Simulation training is a valuable and feasible method to teach and assess the technique of otoscopy for MBBS students.

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CONFLICT OF INTEREST
Authors declare that there is no conflict of interest.

REFERENCES