Simulation-based teaching in Oral Radiology

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Abstract: *Use of simulators in health education is common as patient's safety is important .Simulation techniques are being used in dental education too. In oral radiology students practice radiographs on patients and likely to commit mistakes but it is at the cost of patients extra radiation . So, the present study was planned to assess the learning skills of patients after simulation based teaching.The students were taught IOPA technique on mannequins and were then assessed by DOPS assessment tool.*
Simulation helps to sharpen student's skills without practicing it on real patients and minimizes the heath hazards.

I. Introduction

Health education shows constant reformations as it concerns patient's health and safety. Simulation – based education is any educational activity that utilizes simulation aides to replicate clinical scenarios. Medical simulation has been found to enhance clinical competence at the undergraduate and postgraduate level. Since late 1960s, it is being used for training in anesthesia, cardiology, and laparoscopic surgery. The use of simulation in dental preclinics has been used way back in 18th century[1].

With the discovery of x –rays , its biologic harmful nature noticed by the scientists. But x- rays are useful not only for diagnostic purpose but also for therapeutic one. Dental students are introduced to the subject of Oral Radiology in their third year of BDS syllabus. The students made aware with the theory of x-ray techniques and also its harmful effects. In the practical examination, marks are allotted to the radiographic exercise i.e. radiographs of the patient. As the students are in learning phase may commit mistakes but it is at the cost of extra radiation to the patient.

Direct Observation of procedural skills (DOPS) is an assessment tool which assesses the student's procedural skills in structured format[2]. It includes student's feedback and immediate discussion with instructor. So, the study was planned with aim to assess the undergraduates' learning skills after simulation-based teaching in Oral Radiology**.**

II. Material And Methods

Materials required were IOPA films, IOPA radiograph machine, Film holders and Mannequin. This interventional study was commenced after approval from the Institutional Ethics Committee. Total 60 third year second term BDS students were selected
 Students with regular attendance in their theory as well as practical classes and who were willing to undergo for the study included. Students were divided in two groups and IOPA technique was demonstrated.
- **Group I- Traditional teaching method (control)**
- **Group II- Simulation –based method (experimental)**

Simulation- based teaching was performed on study group while traditional training on control group. Students from both the groups were assessed for their learning skill by DOPS (Direct observation of procedural skills).

III. Result

DOPS assessment tool is having   structured checklist to assess trainee. In the present study score scale includes five parameters as: below expectation (1), borderline for (2), meets expectation (3), above expectation (4), well above expectations (5). There were seven criteria in the DOPS form and students were assessed for that.

- 53.33 % students of both the groups **knew indications, relevant anatomy and technique** to the expectation and scored3.
- 86.66%were borderline and 13.33% met expectation in study group while 53.33% met expectation in control in **explaining procedure to patient, and in obtaining informed consent where appropriate**.
- 41% were borderline and only 9.99% met expectation in control while 83.43% met expectation in study group in **demonstrating appropriate pre-procedural preparation and infection control**.
- **Technical ability** in study group was above expectation (60%) while it was borderline in control (53.33%) .

- **The communication skills** in the study group was borderline in 53.33% and below expectation in 40% while in control 53.33 % met expectation and 40% above expectation.
- 60.53% and 73% met expectation in control and study group respectively in **minimizing ionization.**
- **Quality of procedure** was 74.44% above expectation in study group and 53.33% in control .
- Mean time taken for the procedure was 8+/-3 minutes in study group while 12+/- 4 minutes in control group.

IV. Discussion

Health education is a competency based education where the students knowledge, psychomotor and affective skills should be developed and assessed. Simulation –based education is any educational activity that utilizes simulation aid to replicate clinical scenarios. Medical simulation has been found to enhance clinical competence at the undergraduate and postgraduate level. There is no substitute for knowledge of particular topic. Knowledge is remembering the previously learned facts, terms, principles and procedures. The fundamental skills require for student in oral radiology are comprehension, application, analysis, synthesis and evaluation.

Simulation is an important technique when training is hazardous, time consuming or expensive[3]. In medicine it is used for the purpose of patient safety and patient care and to make education more effective.

In the present study, simulation model is used for developing psychomotor skill of student. The students were traditionally performing the same exercise on patients and are not ethical. But as the cost of simulators is high, trained personal require to manipulate, it is not practiced routinely[4,5]. Oral radiology as a subject is in third year of BDS syllabus which includes use of x-ray for diagnosis purpose in various maxillofacial pathologies. As a part of practice every dentist should be capable of taking radiographs and its interpretation. But during learning phase students commit mistakes though under supervision, is at the cost of radiation to patient.

In the present study when student practiced the IOPA radiographs of different region on mannequin, they were relaxed and were concentrating on the technique which also was reflected in their performance. On the other hand in control group the students were under stress as there cannot be practice on live person. The study group students showed better performance when correlated with control group students.

Roy E et al, Tavkar et al promotes the need of simulators in dental education [6,7]. Simulator model helps the student understand the procedure and allow them to practice so as to increase their confidence. Use of mannequins is not rare in dentistry but in oral radiology has not been tried. Realistic educational simulations can be effective for clinical subjects and enhance learner-perceived competence and confidence[8].

Our education pattern is student centered and simulation tool helps them to develop their psychomotor skills and especially important in conditions where patient's safety is concern. **Alghamdi AA (2015)** proposed several physical and virtual components for the purpose of imaging study. The synthetic image was produced which is helpful in improving students competency[9].

In the present study students were assessed by DOPS. It is one of the best methods to assess any procedure in clinics. The advantage of this assessment tool is that the students get to learn while doing. The procedure is supervised and discussion is done after the assessment.

The student has performed well in the study group as compare to control in the technique, infection control. But the control group students performed above expectation in communication skill while the study group performed below expectation. This might be as the study group students had practiced on mannequins and so they were focused for technique accuracy and lack in the communication

V. Conclusion

Simulation helps to sharpen clinician's skills without practicing it on real patients and minimizes the health hazards. Use of this tool in educating techniques in oral radiology should be promoted as it increases overall performance and confidence of students and patients will be prevented from extra radiation. Assessing by DOPS technique makes student more confident to face the clinical challenge.

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