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Simulation based learning approach in skill enhancement of mandibular anesthesia techniques amongst dental graduates - An interventional study

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Abstract

Objective: To assess the evolution of self-confidence among dental graduates using simulation-based learning approach to administer inferior alveolar nerve block in the department of conservative dentistry and endodontics, MES Dental college, Perinthalmanna.

Methodology: A short-term interventional study was carried out among dental graduates to assess their evolution of self-confidence using simulation-based learning approach to administer inferior alveolar nerve block injection. A questionnaire consisting of 4 questions were given to the 30 participants to understand their difficulties in performing inferior alveolar nerve block injection. The total duration of the study was 4 weeks. During the first week, a questionnaire consisting of 4 questions were given to the 30 participants to understand their difficulties and confidence level in performing inferior alveolar nerve block injection. In the following 2 weeks, graduates were trained using dental simulator for administering inferior alveolar nerve block

injection. In the 4th week, the same questionnaire was given to the 30 participants to understand their evolution of self-confidence in performing inferior alveolar nerve block injection.

Results: There was a highly significant difference in the pre and post intervention training scores. Post intervention training scores (Mean ± SD = 17.86 ± 1.026) were significantly higher than pre-training scores (Mean ± SD = 10.86 ± 1.505) with p value < 0.001.

Conclusion: This study demonstrates introduction of simulator-based models into the dental curriculum may offer students a possibility to rehearse their skills before they perform a real injection.

Keywords: Ergonomics, WMSD, Posture

Introduction

Pain management is critical for successful treatment. For efficient patient care, pain control is necessary before, during, and after therapy. Local anesthesia is an essential aspect of dental treatment and has been taught at dental schools across the world since the 1940s.

The technique of local anesthesia (LA) education is an integral part of the undergraduate dental curriculum. Dental students must grasp the administration of LA to their patients since it is one of the fundamental ways the dental practitioner regulates patient pain during a dental operation.[1]

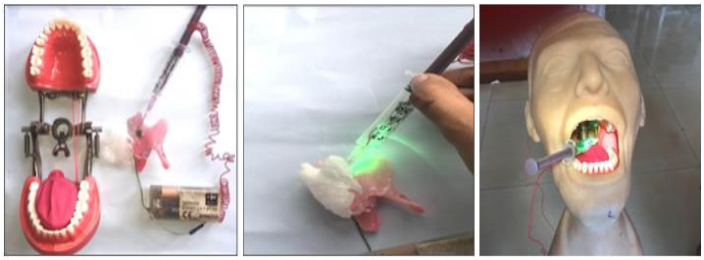
Many dental students believe they are unprepared for their first human injection. Anatomy knowledge and anesthesia problems have frequently been noted as areas where students feel underprepared. The emotion may linger even after graduating as a dentist. According to several professionals, giving LA is one of the most stressful aspects of dental practice.[2] The quest of dental instructors and students for a more seamless transition from preclinical to clinical instruction has necessitated the use of simulation technologies in the undergraduate dental education.[3]

Dental simulation has been around since 1894, when Oswald Fergus developed the 'phantom head,' the first dental simulator. Technology is increasingly being used in medical education because it allows students to learn more interactively.

Simulation is essential in the dental curriculum because it allows treatments to be performed many times until an acceptable level of skill and procedural competence is achieved. This study aims to assess the evolution of self-confidence among dental graduates using simulation-based learning approach to administer inferior alveolar nerve block.

Methodology

A dental simulator was constructed for this purpose. It was designed in a way it could be mounted on to a mannequin to simulate a patient for learning administration of local anesthesia. The injection site to receive local anesthesia is embedded with metal strips with an electrical circuit which includes a dc battery, a metal needle and a syringe. The electrical circuit is completed when the metal needle contacts the metal strips indicated by lighting up of green led which indicates the correct site of injection.



A questionnaire consisting of 4 questions were given to the 30 participants to understand their difficulties and confidence level in performing inferior alveolar nerve block injection. By judging the questionnaire, it was

clear that majority of the participants had difficulty while performing injection technique.

The total duration of the study was 4 weeks. During the first week of study, a questionnaire consisting of 4 questions were given to the participants to understand the difficulties and confidence level in performing inferior alveolar nerve block injection.

Sn.	Questionnaire	1	2	3	4	5
1.	I am unable to connect theoretical learning with practical learning					
2.	I am nervous on administering local anesthetic					
3.	I have difficulty in determining anatomical landmarks					
4.	I have difficulty in attaining boney contact on insertion of needle					

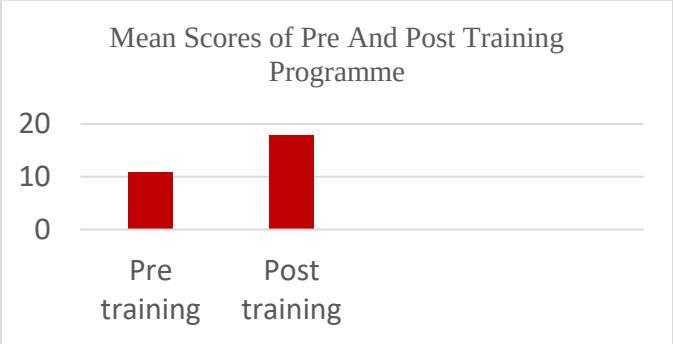
In the following 2 weeks, graduates were trained using dental simulator for administering inferior alveolar nerve block injection.




In the last week, the same questionnaire was given to the 30 participants to understand their evolution of self-confidence in performing inferior alveolar nerve block injection.

Statistical analysis

- Data was coded and entered into MS Excel. Data was analyzed using statistical software SPSS version 23.
- Paired t test was done to compare the mean scores before and after the intervention.
- Other results were expressed in frequencies and percentages.



SCORE	N	Mean ± Std. Deviation	t value	p value
Pre training	29	10.86 ± 1.505	-23.188	<0.001
Post training	29	17.86 ± 1.026		

Discussion

Dental pain is one of the main reasons a patient seeks treatment from a dentist. During dental treatment, local anaesthesia is frequently used to assist a painless procedure so that the patient's comfort is maximized, and the dentist may operate calmly with concentration and precision. The inferior alveolar nerve block is a frequent dental operation that involves inserting a needle near the mandibular foramen to deposit local anaesthetic solution near the nerve before it enters the foramen, which also contains the inferior alveolar vein and artery. The pterygoid plexus is located posterior and superior to this

area. The failure rate of the inferior alveolar nerve block has been reported to be 20-25%.[4]

The common reasons for failure are anatomical factors like the position of the mandibular foramen, variation in mandibular canal anatomy, patient anxiety, localized infection, volume and concentration of the anaesthetic solution, and incorrect placement of the needle. [5]

The role of simulators has been recognized as a vital aspect of training in dentistry.[3] Simulation model learning system aids in developing students' psychomotor skills before performing a clinical intervention for the first time, teaching or improving students' clinical mani pulation skills, and the increase of patient safety when inexperienced students or young clinicians are treating patients. With this method, a student may practice a clinical operation several times without doing it on a live patient. Endodontics, periodontics, and surgical dentistry have all benefited from simulation models.[6]

In this study, there was a highly significant increase in the mean value between pre and post training sessions which strengthens the fact that simulation-based learning approach helped in improving the confidence of dental graduates to administer inferior alveolar nerve block injection.

Conclusion

- There was a highly significant difference in the pre and post intervention training scores.
- Introduction of simulator-based models into the dental curriculum may offer students a possibility to rehearse their skills before they perform a real injection.
- This may have positive effects on the administration of local anesthetics and may help them to prepare for future dental practice.

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