



# Evaluation of the Impact of Dentoalveolar Trauma Management Training Course on Physicians and Dentists' Education in Multiple Hospitals in Mashhad, Iran

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## Abstract

**Background:** Dental trauma injuries are the second most common traumatic injuries among children and adolescents. An incorrect diagnosis or a delayed treatment of traumatic injuries may lead to irreparable damages. Thus, proper management provided by physicians and dentists is crucial for patients affected by these injuries. This study aimed to evaluate the impact of dentoalveolar trauma management training on improving physicians' and dentists' knowledge in different emergency wards in Mashhad, Iran.

**Methods:** In this educational interventional study, a total number of 60 residents and interns selected from the following categories: maxillofacial surgery residents, emergency medicine residents, ear-nose-throat (ENT) residents, and medical interns were included, who were randomly selected. We gathered information using a valid and reliable questionnaire. Afterward, we provided the participants with booklets about dental traumas. By passing one month, the above-mentioned questionnaire was used to re-evaluate the target groups' knowledge. The results were statistically analyzed using Chi-square, One-way ANOVA and paired sample T-test with statistically significant differences defined for  $p < 0.05$ .

**Results:** Prior to the training, the interns had the lowest knowledge, while the maxillofacial surgery residents had the highest level of knowledge in comparison to interns, ENT residents, and emergency medicine residents, respectively ( $p < 0.001$ ). After completing the course, the maxillofacial surgery residents once again represented the highest knowledge, followed by emergency medicine residents, ENT residents, and medical interns, respectively. A statistically significant difference was noticed in pre- and post-course knowledge evaluation.

**Conclusion:** A comparison of the results before and after the training course demonstrates a significant lack of knowledge on dentoalveolar traumas among physicians and also reveals that providing this education is necessary because it significantly increases their knowledge in this regard.

**Keywords:** Dental Trauma, Knowledge, Dentists, Physicians

**Conflicts of Interest:** None declared

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## Introduction

Traumatic dental injuries (TDI) are known as the most prevalent oral disease after dental caries, which affect

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### ↑What is “already known” in this topic:

It is important that medical doctors are familiar with the management of emergency dental trauma since they meet the patients in the initial phase of treatment in emergency rooms and in most cases urgent actions are needed in order to save the tooth. However, physicians have insufficient level of knowledge about dentoalveolar injuries.

### →What this article adds:

Dentists are trained about dentoalveolar traumas during their undergraduate studies. It is also crucial for physicians to have these training courses in order to improve their knowledge and attitude toward head and neck traumas.

periodontal and teeth states (1). This problem is growing worldwide as a public health concern because of its impact on both the physical and psychological circumstances of people (2, 3). Although the prevalence of dental traumas varies in different countries, it has been determined that about one-third of preschool children and one-quarter of adolescents have experienced dental trauma at least once during their lifetime (4). There are different ways of classifying TDIs, which include a range from simple enamel infraction to fracture of the supporting bones. Permanent teeth traumas are more common than primary dentition traumas, both of which mostly involve maxillary incisors (5, 6).

Patients with dental trauma require appropriate urgent treatments to result in the best outcome and prognosis (7). Thus, the consequences of the therapy mainly depend on the awareness of the caregivers referred to the emergency centers. Proper treatments result in patients' satisfaction and decrease the possibility of tooth loss (8). However, many studies have revealed a deficit in caregivers' knowledge of different specialties (6, 8-15). Therefore, the importance of the education of health providers in different articles about dental traumas has been stated (16). There are contrary data on dentists' knowledge of dental traumas in recently performed studies (17, 18). Although some studies have been conducted on the knowledge level of both dentists and physicians about dental traumas, there have been few empirical investigations on various medical specialties and the impact of training courses. This study aimed to assess the effect of TDIs management education on the improvement of physicians' knowledge in Mashhad's emergency centers.

## Methods

This educational interventional study was approved by the ethical committee of Mashhad University of medical science, Iran (IR.MUMS.REC.1394.442). The study population consisted of 15 maxillofacial surgery residents, 79 emergency medicine residents, 26 ear nose throat (ENT) residents, and 80 medical interns who were working and training in emergency centers during that period. According to the research study done by Lin et al. (19), due to the difference in the mean score of knowledge before and after the intervention ( $0.559 \pm 0.93$ ) in nurses, the sample size of 14 people with a 99% confidence interval provides 80% of the power. Considering the possibility of dropouts, the sample size was increased to 15 who were selected by simple randomization from each group. Criteria for selecting the subjects were their major and willingness to participate in the study. Moreover, they would be excluded during the procedure on the basis of their incapability to cooperate.

A short questionnaire was designed to ascertain the participants' level of knowledge of dental trauma injuries. The first part of the questionnaire included demographic information such as age, gender, work experience, the field of study, and the history of first aid training in dental trauma management. In the second part, 12 clinical case report questions about different aspects of dentoalveolar trauma such as Avulsion, Luxation, Fractures and etc.

were included (Appendix 1). The questionnaire was validated based on the opinion of a panel of experts (including maxillofacial surgeon specialists, pediatric dental specialists, endodontic specialists, and emergency medicine specialists) and had an adequate content validity ratio. To determine the reliability of this questionnaire, Cronbach's alpha was measured among 20 participants (5 subjects from each group) using a pilot test, which indicated the reliability as 0.9.

Once the questionnaire was prepared, it was distributed among the target groups in hospitals and the faculty of dentistry. To calculate the participants' level of knowledge, each correct answer was scored as 1 and each incorrect answer earned a score of 0. A total score lower than 50 percent was identified as poor knowledge, a score between 50 and 75 percent was considered moderate knowledge, and a score above 75 percent was counted as favorable knowledge. Thereafter, we provided the participants with a booklet about dental trauma injuries and treatment plans which was prepared based on the International Association of Dental Traumatology (IADT) guidelines. Subsequently, the participants were asked to read the booklet and respond to the questionnaire once again after one month. The results were analyzed before and after the training course.

We used the Chi-square statistical test for comparing demographic characteristics' distribution. One-way ANOVA and paired sample T-test were applied to compare the average knowledge level. Finally, SPSS software (SPSS, IBM, Chicago, IL, USA) was used for data analysis.  $P$ -value  $< 0.05$  was considered statistically significant.

## Results

A total of 120 questionnaires were collected and then analyzed. The demographic data are demonstrated in Table 1.

One-way ANOVA revealed that there was a significant difference between mean scores before and after the training course for all the groups ( $p < 0.001$ ). According to the Tukey post hoc test, prior to the training lessons, the lowest knowledge belonged to medical interns, while maxillofacial surgery residents gained the highest mean scores. After performing the intervention, the Tukey post hoc test showed that the changes in scores of maxillofacial surgery residents were significantly lower than those of the other groups ( $p < 0.001$ ). (Fig. 1).

Paired sample T-test determined a considerable difference in mean scores before and after the distribution of the booklet among all the target groups ( $p < 0.001$ ). In order to evaluate the effect of first aid training experience, age, and educational field, we utilized the ANOVA test, the results of which showed that only the educational field has a significant effect on changing the score ( $p = 0.003$ ). Mann-Whitney test indicated a significant difference in knowledge distribution and knowledge variation fields before and after the intervention among all educational fields ( $p < 0.05$ ). (Table 2).

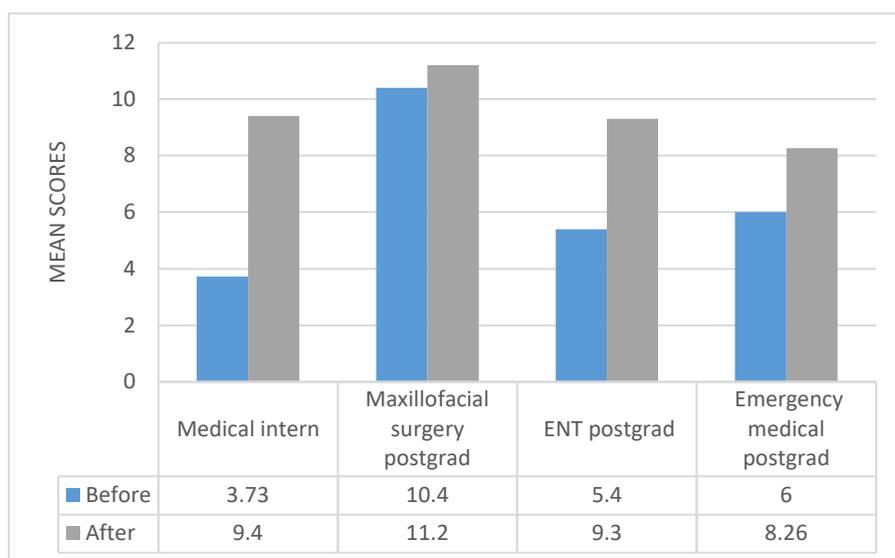
## Discussion

Dental trauma and its management are fundamental

**Table 1.** Demographic information and training experience of the study population

Variables	Study participants				p-value
	Maxillofacial surgery residents N (%)	ENT residents N (%)	Emergency medicine residents N (%)	Medical interns N (%)	
Gender					0.202
Male	10 (66.7)	5 (33.3)	5 (33.3)	6 (40.0)	
Female	5 (33.3)	10 (66.7)	10 (66.7)	9 (60.0)	
Age					<0.001*
20-25	0 (0.0)	0 (0.0)	0 (0.0)	10 (66.7)	
25-30	6 (40.0)	7 (46.7)	8 (53.3)	5 (33.3)	
30-35	9 (60.0)	8 (53.3)	7 (46.7)	0 (0.0)	
First aid training					<0.001*
Yes	15	3	5	0	
No	0	12	10	15	

\*A significant difference

**Fig. 1.** Comparison of the scores before and after the instructions**Table 2.** Distribution of knowledge level before and after the intervention

Level of Knowledge	Study Population				p-value
	Maxillofacial surgery residents Number (%)	ENT residents Number (%)	Emergency medicine residents Number (%)	Medical interns Number (%)	
Poor					
Before intervention	0 (0.0)	7 (46.7)	6 (40.0)	11 (73.3)	
After intervention	0 (0.0)	0 (0.0)	1 (6.7)	10 (66.7)	<0.001*
Moderate					
Before intervention	0 (0.0)	7 (46.7)	8 (53.3)	4 (26.7)	
After intervention	0 (0.0)	3 (20.0)	7 (46.7)	4 (26.7)	
Favorable					
Before intervention	15 (100.0)	1 (6.7)	1 (6.7)	0 (0.0)	
After intervention	15 (100.0)	12 (80.0)	3 (20.0)	1 (6.7)	

\*A significant difference

parts of dental science. Previous studies have noted the importance and abundance of dental trauma injuries. Considering the prevalence of head and facial injuries in accidents and the essential role of physicians in these issues' management since injured people are referred to hospitals first, and they need urgent treatments, physicians' awareness about the causes, prevention, and treatment of these injuries is of paramount importance (3).

The present research was designed to determine the effect of the dentoalveolar trauma training course on the knowledge improvement of 60 participants from various education programs.

This study revealed that there is no relationship between

age, gender, and dental trauma knowledge and only the field of study affects the knowledge level. This finding is consistent with that of Holan et al. (20). The results of this study show the significant effect of previous first aid courses on the responses of the participants to the questionnaire. All maxillofacial surgery residents have received first aid dental trauma management courses, which can explain their high knowledge. This outcome is contrary to previous studies that reported poor knowledge of dentists (10, 11, 21). On the other hand, some investigations showed adequate knowledge of dentists. Correspondingly, a probable explanation could be the experience and trauma lessons in resident programs (22, 23).

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Moreover, emergency medicine residents and ENT residents gained better scores compared to medical interns, which can also be explained by passing the trauma courses in residency programs. These findings are in agreement with former studies indicating sufficient awareness of dentists in comparison with physicians (9, 24).

Needleman et al., in their study, showed that physicians in emergency centers had low knowledge of dental trauma management. The participants expressed that if they had received an academic education, they would act better in this regard (25). Based on a study on the awareness of emergency medicine physicians about the diagnosis and treatment of dentoalveolar injuries in Turkey, there was a need for training courses (26). Accordingly, this is in line with our earlier results and another research study in Kerman, Iran (15).

After the intervention, maxillofacial surgery residents gained the highest scores once again, followed by medical interns, ENT residents, and emergency medicine residents, respectively. Although the intervention had a positive impact on the knowledge level of the target groups, emergency medicine residents had moderate knowledge of the cases and their scores were significantly lower than the others. A possible explanation for this might be either a lack of time to study the booklet or their occupation.

The highest variation in scores belonged to medical interns, which can be explained by their knowledge deficit before the trauma lessons and the favorable influence of the booklet.

This study supported evidence from previous observations of Skapetis et al. (27) and Cruz-da-Saliva et al. (28), who reported a notable rise in the knowledge level of general physicians, emergency medicine specialists, paramedics, and nurses on dental traumas after an educational workshop.

The consistency of these studies with our research determines the shortage of knowledge in the management of dental traumas, especially among general physicians. Moreover, short-term education, which is cost-effective, can result in increased knowledge of dentoalveolar emergency and trauma management. Nevertheless, in this study, the results could be better if the instructions were represented as theoretical and practical workshops. However, we preferred booklets since the participants were occupied and their coordination was difficult. Concerning the limitations of this study, there was a significant difference in the mean scores before and after the intervention, which illustrates the effectiveness of the training. For further investigations, we recommend a larger sample size as well as the evaluation of the caregivers by their clinical performance.

## Conclusion

To conclude, this paper determined the deficiency in the knowledge level of ENT residents, emergency medicine residents, and medical interns on dentoalveolar traumas. However, it was shown that participating in training courses can significantly affect the knowledge level in this field.

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## Conflict of Interests

The authors declare that they have no competing interests.

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Appendix

Personal Information

- 1) Age (A) 20-25 (B) 25-30 (C) 30-35
- 2) Gender (A) Female (B) Male
- 3) Work Experience:
- 4) Field Of Study: (A) Medical Intern (B) Maxillofacial Surgery Resident (C) emergency medicine Resident (D) Ear, Nose and Throat Resident
- 5) Have you had any first aid training about dental traumas during your program? (A) Yes (B) No

Case Scenarios

**Case 1:** The Upper Central tooth of a 14-year-old boy has been completely removed from the Alveolar socket as a result of an accident and has been kept in a dry environment.



- 1) What is the best treatment plan?
  - A) Control Bleeding and suturing of the area without tooth placement
  - B) Replace the tooth in the socket after root preparation and splinting with wire and composite
  - C) Replace the tooth immediately in the socket and use arch wire
  - D) Patient referral to a specialist
- 2) How long do you think an emergency treatment can be done?
  - A) At the moment
  - B) Until 30 minutes after
  - C) Less than an hour
  - D) Less than 24 hours
- 3) What is your best course of action if the patient's avulsed tooth is dirty?
  - A) Cleaning the tooth with a paper tissue
  - B) Cleaning the tooth with a toothbrush
  - C) Rinsing the tooth with tap water without scrubbing
  - D) There is no need to clean the tooth because it is unusable
- 4) How do you hold the tooth?
  - A) From the crown
  - B) From the root
  - C) From the crown or the root
- 5) Which of the following is suitable for keeping an avulsed tooth? (Select all possible answers)
  - A) No need to keep the teeth
  - B) Tap water
  - C) Cold water
  - D) Hot Water
  - E) Milk
  - F) Brine
  - G) Ice
  - H) Saline solution
  - I) Paper Towel
  - J) Disinfectant solution
  - K) Patient's Saliva
  - L) Plastic foil



**Case 2:** In a 12-year-old teenager who's maxillary right central was displaced into the alveolar bone for 6 millimeters (Intrusion) as a result of a car accident and was referred to the hospital immediately after the accident. Which treatment option do you choose?



- A) Allow growing spontaneously
- B) Patient referral to a specialist
- C) Surgical Extrusion and arch bar
- D) Surgical Extrusion and splinting with wire and composite

**Case 3:** A three-year-old boy fell from a height, and his left upper central was avulsed. What is your appropriate treatment choice?

- A) Control Bleeding and suturing of the area without tooth placement
- B) Replace the tooth in the socket after root preparation and splinting with wire and composite
- C) Replace the tooth immediately in the socket and use arch wire
- D) Patient referral to a specialist

**Case 4:** A 40-year-old patient with the trauma of the mandible has a fracture in the body of the mandible and the premolars. The second premolars are in the fracture line and bleeding is observed from the displacement of the teeth. What is the best treatment for him?

- A) Tooth extraction and suturing of the socket
- B) Pack placement in the bleeding area and patient referral to a specialist
- C) Teeth splinting with wire and maintaining the displaced tooth
- D) Using arch bar and fracture reduction after tooth extraction
- E) Using arch bar and fracture reduction and maintaining the tooth
- F) Refer the patient to a specialist dentist urgently without any treatment

**Case 5:** A 15-year-old girl presented with facial trauma. The maxillary central tooth suffered from a crown fracture with this clinical appearance shown in the picture below and the lower lip was torn. What is the best treatment for her?

- A) Refer the patient to a specialist dentist urgently without any treatment
- B) Suture the lip and refer the patient to a specialist dentist
- C) Controlling the rupture site for the presence of a foreign body and suturing the wound site is your only treatment



**Case 6:** A 12-year-old boy fell on the ground and has been referred to you. In the clinical examination, all his vital signs are normal. In the oral examination, you notice a displacement of the maxillary lateral tooth with the below clinical appearance. What is your best treatment?



- A) Insert the tooth in its place and suture the ruptured
- B) Insert the tooth in place, splint the tooth, and suture the ruptured gum
- C) Refer the patient to a specialist dentist urgently

**Case 7:** An 11-year-old teenager came to you after falling at school. In the clinical examination you see in the picture below, the left maxillary central tooth was slightly removed. What is the best emergency treatment for him?

- A) Return the tooth to its place in the tooth cavity and splint
- B) Refer the patient to a specialist dentist urgently
- C) Extract the tooth in order to prevent tooth aspiration

**Case 8:** A 22-year-old man presented with a fracture of the crown of the upper central teeth and a rupture of the lower lip due to a trauma to the mouth. In his clinical view, a crown fracture can be seen. What is your best treatment?



A) Suturing the lip, bleeding control, and refer the patient to a specialist dentist urgently

B) Refer the patient to a specialist dentist without any treatment

C) Suturing the lip and bleeding control is your only treatment

