Knowledge of Management of Traumatic Dental Injuries of Emergency Department Physicians and Residents in the United Arab Emirates

Amal Al Mahmoud, DDS, MSc[1] Manal Al Halabi, BDS, MS[2]
Iyad Hussein, DDS, MDentSci[3]
Mawlood Kowash, BDS, MSc, DDSc[4]

ABSTRACT

Purpose: To investigate knowledge of emergency department physicians and residents (ED-Drs) about management of traumatic dental injuries (TDI) in the United Arab Emirates (UAE).

Methods: A cross sectional study of ED-Drs was conducted using a questionnaire and a score of TDI knowledge (TDI-K) was created (maximum of six). Statistical analysis was performed using chi-square, Fisher's exact, Mann-Whitney U, and Kruskal-Wallis tests, and significance was set as $P<0.05$.

Results: One hundred fifty-five physicians participated, with one-third reporting they encountered TDI more than once a week. Sixty percent of ED-Drs had received TDI education, of which a significantly higher proportion (84.4 percent) were Western-trained ($P=0.007$). Consultants and specialists had the highest knowledge scores ($P=0.001$). ED-Drs with five to 10 years' experience scored significantly lower (3.07±1.65) than those with less than five years of experience (3.86±1.36) and those with more than 10 years of experience (3.83±1.36, $P=0.034$). Only 38.2 percent of general practitioners (GPs) were confident placing sutures intraorally, compared to 80.6 percent of the consultants and specialists and 57.1 percent of the residents.

Conclusion: Overall knowledge of TDI and their management among ED-Drs across the UAE is inadequate. GPs had the lowest knowledge and confidence to manage TDI. **(J Dent Child 2019;86(1):24-31)**

Received December 11, 2018; Last Revision January 11, 2019; Accepted January 11, 2019.

KEYWORDS: TRAUMATIC DENTAL INJURIES, EMERGENCY ROOM, PHYSICIANS, UNITED ARAB EMIRATES, KNOWLEDGE

[1]Dr. Mahmoud is a pediatric dentist in private practice, Abu Dhabi; [2]Dr. Halabi is an associate professor and chair, [3]Dr. Hussein is an assistant clinical professor, and [4]Dr. Kowash is an associate professor, all in the Department of Pediatric Dentistry, Hamdan Bin Mohammed College of Dental Medicine, Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai, all in the United Arab Emirates.
Correspond with Dr. Al Halabi at manal.halabi@gmail.com

Traumatic dental injuries (TDIs) are impact injuries to the hard and soft tissues of the teeth within or around the oral cavity.[1] Dental trauma is a very common injury in children and adolescents and is recognized to be a real public dental health problem.[2] It has been reported that the incidence of dental trauma is high in comparison to non-oral injuries, particularly within the first 10 years of life.[3]

The emergency management of a TDI should begin immediately at the time of injury, rather than when the patient first sees the dentist, as this delay may impact outcomes.[1] However, rather than seeking a dentist, an increasing number of patients with dental emergencies are presenting to hospital emergency departments (**EDs**).[3-5] TDIs and especially avulsions are among the few dental emergencies in which prognosis is drastically affected by the time elapsed between injury and management.[6]

Many published studies highlighted the fact that the EDs receive a significant number of TDIs and ED doctors (**ED-Drs**) are confronted with triaging and managing dental emergencies of both traumatic and non-traumatic causes.[7] The frequency of TDI presentations in EDs ranged from 1.47 to 66 percent of all patients treated there.[8-12] TDIs requiring acute treatment (within three hours) include avulsion, extrusion, root fractures, and alveolar fractures.[13]

Knowledge of TDI management by ED-Drs has been studied globally, ranging from poor[14-19] to good,[20]

Knowledge of emergency department physicians about the management of traumatic dental injuries

1) Age
2) Sex:
   a) Male
   b) Female
3) Year of graduation
4) Country of graduation
5) Years of experience
6) Current place of practice
7) Your position at your practice
   a) Resident
   b) Consultant
   c) Specialist
   d) General practioner
8) During your training, did you receive any education about diagnosis and treatment of dental trauma?
   a) YES
   b) NO
9) How often do you see traumatic dental injuries in the emergency room
   a) Everyday
   b) More than once a week
   c) More than once a month
   d) Rarely
10) Are you familiar with the following terminology

a) Crown fracture	YES	NO
b) Luxation of tooth	YES	NO
c) Dental avulsion	YES	NO
d) Alveolar bone fracture	YES	NO
e) Dental intrusion	YES	NO

11) Have you come across the following dental injuries during your practice?

a) Crown fracture (tooth break)	YES	NO
b) Luxation of tooth (tooth moved out of place)	YES	NO
c) Dental avulsion (tooth knocked out of the mouth)	YES	NO
d) Alveolar bone fracture (tooth knocked out of the mouth)	YES	NO
e) Dental intrusion (tooth driven into the bone)	YES	NO

12) An 8 year old girl presents with a fractured upper maxillary central incisor (front tooth). The fractured tooth probably is:
   a) A primary incisor (baby/milk tooth)
   b) A permanent incisor (adult)
   c) Not sure
13) A 9 year old was injured and his upper front tooth was knocked out of the mouth. What are the instructions that should be given to the mother over the phone?
   a) Look for the tooth, put it into a napkin and go immediately to a dentist.
   b) Transport the tooth in the mouth and go immediately to the emergency room.
   c) Try to replant the tooth but if you can't, put the tooth inside a glass of cold milk, and go to a dentist as soon as possible.
   d) Do not know.
14) During your emergency duty, you receive a 4-year-old with one of her upper front teeth knocked out of the mouth. What is the correct management?
   a) Replant the knocked out tooth immediately
   b) Do not replant the tooth
   c) Do not know what to do
15) A 10 year old child comes to the ER with soft tissue lacerations in the lip and a fractured upper front tooth (central incisor). The parents said that they could not find the fractured fragment. What would your next step be?
   a) Suture the lip
   b) Immediately debride the lip
   c) Radiograph of the lip
   d) No further investigations
16) A 13 year old who suffered from trauma comes to the ER with a front tooth still in the socket but moved out of position. What is the correct course of action?
   a) Refer to a dentist immediately
   b) Leave the tooth to reposition naturally
   c) Do not know what to do
17) A fracture in an adult front tooth (permanent central incisor)
   a) Is an urgent situation and the patient needs to see a dentist as soon as possible.
   b) Needs to be left for 3 days before treatment to allow inflammation reduction before treatment.
   c) Will heal spontaneously.
18) A patient with extensive intraoral soft tissue laceration requiring sutures
   a) I am confident in placing the sutures
   b) I am not confident in placing the sutures

Figure 1. The questionnaire distributed to physicians.

but a large proportion of ED-Drs had not received any formal education.[15,18,21] A Turkish study reported good knowledge of ED-Drs about the management of crown fractures and avulsions but poor knowledge about luxation injuries.[22] Bahammam[23] reported that the majority of ER physicians in Jeddah, Saudi Arabia, had insufficient knowledge of management of dental avulsion. Only 3.9 percent of ED-Drs would choose to be treated by an ED-Dr if they themselves presented to the ED with a dental injury.[24]

Presentation of TDIs in the emergency department is a frequent occurrence.[7-12,20,22] Additionally, certain TDIs require more urgent care and attention than others.[6,25] ED-Drs should have a minimum amount of knowledge to diagnose and either manage or know when to refer a TDI. Currently, no data is available about the knowledge levels of TDI management by ED-Drs in the United Arab Emirates (**UAE**), where TDI education is not mandatory in emergency medicine residency programs. The purpose of this study was to assess the knowledge of ED-Drs in the UAE regarding management of TDI.

METHODS

This cross-sectional study was approved by the Research and Ethics Committee at Hamdan Bin Mohammed College of Dental Medicine, Mohammed Bin Rashed University, Dubai, UAE. All EDs across the seven Emirates of the UAE and all 448 registered ED-Drs were approached to participate.[26] The list of registered ED-Drs was obtained from the Ministry of Health and Prevention registry. ED-Drs willing to participate in the hospitals where we were granted access to were included in the sample.

We designed and piloted a questionnaire (Figure 1) that was divided into four sections: (1) participants' demographics questions; (2) questions about the frequency of encountering types of TDIs and the familiarity with TDI terminology; (3) knowledge questions about the ability to manage different scenarios of TDIs and the ability to distinguish between primary and permanent teeth; and (4) questions about the practice of ED-Drs, including their confidence in placing intraoral sutures. The pilot study was conducted using 35 ED residents at Latifa Hospital in Dubai. In the UAE, in any given specialty in medicine or dentistry, the licensing bodies have two designations: (1) "specialist" and (2) "consultant". Consultants usually hold higher positions in the ED and are often in charge of the whole team. In addition to that, there are also GPs who work in the ED. To facilitate the statistical analysis, we divided the participants into two groups: those who graduated more than 10 years before the time of data analysis (≤2005) and those who graduated less than 10 years from that time (≥2006). The results of the pilot study were not included in the main study.

Data analysis was conducted using Statistical Package for Social Sciences (SPSS) 20.0 software for Windows (SPSS Inc., Chicago, Ill., USA). Results were cross-tabulated to examine the independence between variables. Statistical analysis was performed using chi-square and Fisher's exact tests, as appropriate. Where two or more continuous independent variables were examined, the Mann-Whitney U and Kruskal-Wallis tests were used. A *P*-value of less than 0.05 was considered significant in all statistical analyses.

RESULTS

DEMOGRAPHIC CHARACTERISTICS

A total of 448 paper questionnaires were distributed to all hospitals in the UAE with ED services where we were granted access. One hundred and fifty five completed questionnaires were returned (response rate of 35 percent). The demographic characteristics of the ED-Drs participating in this study are summarized in Table 1.

Table 1. Demographic Characteristics of the Study Population

Item	N (%)
Age (years)	
<40	112 (76.7)
≥40	34 (23.3)
Sex	
Male	87 (57.2)
Female	65 (42.8)
Emirate	
Abu Dhabi	68 (43.9)
Dubai	61 (39.3)
Sharjah	6 (3.9)
Ajman	3 (1.9)
RAK	4 (2.6)
Fujairah	13 (8.4)
Place of practice	
Public	90 (58.1)
Private	65 (41.9)
Year of graduation	
Before 2005	76 (52.4)
After 2006	69 (45.6)
*Country of highest medical qualification**	
Arab countries	82 (52.9)
Asian countries	41 (26.5)
Western countries	32 (20.6)
Years of experience	
<5	50 (34.2)
5-10	41 (28.1)
>10	55 (37.7)
Position	
Consultant	23 (14.8)
Specialist	13 (8.4)
General practitioner	77 (49.7)
Resident	42 (27.1)

**** Country of graduation for the highest medical qualification (medical school for general practitioners and residents, and specialization for specialists and consultants).***

FREQUENCY OF TDI ENCOUNTERS

The percentages of physicians having encountered TDIs in relation to their positions are shown in Figure 2. As the number of consultants (N=23, 14.8 percent) and specialists (N=13, 8.4 percent) in the study group was low compared to the other two groups, we decided to combine the two groups for the purpose of statistical analysis. Specialists and consultants were the most likely to encounter different types of TDIs. The differences between the groups were statistically significant, with the exception of dental avulsion.

TDI EDUCATION

Ninety-three (60 percent) respondents reported having received education about diagnosis and treatment of TDIs. There was no statistically significant difference between the groups regarding previous TDI education, with the exception of country of qualification. There was a significantly higher proportion (N=27, 84.4 percent) of ED-Drs trained in the West who received education about diagnosis and treatment of TDIs compared to Asian and Arab graduates (P=0.007).

KNOWLEDGE QUESTIONS

We made up five short scenarios to test knowledge of TDI management. A score was created as the cumulative result of the answers, with the higher limit of the score being six, while the lowest was zero. The average score for the whole sample was 3.63±1.44 (standard deviation [SD]).

The difference in the knowledge mean rank score was not found to be statistically significant across all the demographic groups, except in years of experience and rank/position (Table 2). Those with five to 10 years of experience scored a statistically significant lower score (3.07±1.65) than those with less than five years of experience (3.86±1.36) and those with over 10 years of experience (3.83±1.36; P=0.034). Consultants and specialists scored the highest (4.22±1.5), followed by residents (3.95±1.19) and then GPs (3.18±1.54; P=0.001).

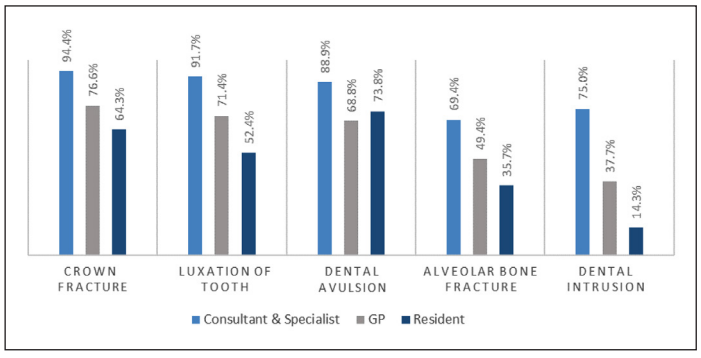

Figure 2. Percentage of physicians who have encountered traumatic dental injuries in relation to their positions.

IDENTIFICATION OF PERMANENT INCISORS

When asked to identify whether a traumatized maxillary central incisor was a primary or permanent tooth in an eight-year-old child, 46 (51.1 percent) of the physicians in the public sector and 42 (64.6 percent) of those in the private sector recognized it to be a permanent incisor (P=0.012).

A significantly larger proportion of GPs (N=50, 64.9 percent) recognized that the tooth was a permanent incisor than both consultants and specialists (N=18, 50.0 percent), and residents (N=20, 47.6 percent; P=0.036). All the remaining demographics of age, sex, year of graduation, experience, and country of graduation did not result in any statistically significant difference between the groups.

INSTRUCTIONS REGARDING AVULSED PERMANENT TEETH

The answers of the participants to the question "What instructions should be given to the mother over the phone regarding an avulsed permanent incisor?" are in Table 3. The best answer would be to replant, or put the tooth inside a glass of cold milk, and go to dentist as soon as possible. Only 49 (31.6 percent) of the study

Table 2. Score of Knowledge According to Demographic Characteristics

Item		Mean rank±(SD)	P-value Significant if <0.05
Age (years)	<40	3.53±(1.48)	0.093
	≥40	3.97±(1.45)	
Sex	Male	3.57±(1.48)	0.699
	Female	3.69±(1.41)	
Year of qualification	Before 2005	3.70±(1.45)	0.595
	After 2006	3.61±(1.46)	
Country of highest medical qualification **	Arab countries	3.44±(1.50)	0.260
	Asian countries	3.68±(1.59)	
	Western countries	4.06±(0.91)	
Years of experience	<5	3.86±(1.36)	0.034 *
	5-10	3.07±(1.65)	
	>10	3.83±(1.36)	
Place of practice	Public	3.76±(1.40)	0.210
	Private	3.46±(1.5)	
Position	Consultant and specialist	4.22±(1.17)	0.001 *
	General practitioner	3.18±(1.54)	
	Resident	3.95±(1.19)	

** Statistically significance difference.*
*** Country of graduation for the highest medical qualification (medical school for general practitioners and residents, and and specialization for specialists and consultants).*

participants gave the correct management of an avulsed tooth. Country of graduation, place of practice, and position were demographic variables significantly related to giving proper instructions. ED-Drs who graduated from Asian countries gave statistically significant more accurate instructions compared to graduates from Arab and Western countries (P=0.001). Public sector physicians gave statistically significant more accurate instructions compared to private sector ED-Drs (P=0.003). GP doctors gave more incorret answers, which was statistically significant compared to consultants/specialists and residents.

MANAGEMENT OF AN AVULSED PRIMARY TOOTH

When asked how they would manage an avulsed primary tooth in a four-year-old child, 65.8 percent of the participants recognized the fact that the tooth should not be replanted. The only statistically significant difference was observed between the private and public sector physicians, where 69 (76.7 percent) public sector physicians, and 33 (52.4 percent) private sector physicians answered correctly and would not replant a primary tooth (P<0.001).

Table 3. Avulsed Permanent Tooth Telephone Instructions

Demographic variable		Answer 1 N (%)	Answer 2 N (%)	Answer 3 N (%)	Answer 4 N (%)	P-value Significant if <0.05
Age (years)	<40	24 (21.4)	20 (17.9)	37 (33.0)*	31 (27.7)	0.688
	≥40	9 (26.5)		12 (35.3)*	6 (17.6)	
Sex	Male	22 (25.3)	7 (20.6) 17 (19.5) 13 (20.0)	27 (31.0)*	21 (24.1)	0.956
	Female	14 (21.5)		22 (33.8)*	16 (24.6)	
Year of graduation	Before 2005	23 (30.3)*	12 (15.8)	22 (28.9)*	19 (25.0)	0.124
	After 2006	10 (14.5)	15 (21.7)	27 (39.1)	17 (24.6)	
Country of highest medical qualification**	Arab countries	12 (14.6)	18 (22.0)	27 (32.9)*	25 (30.5)	0.001†
	Asian countries	14 (34.1)	2 (4.9)	15 (36.6)*	10 (24.4)	
	Western countries	12 (37.5)*	11 (34.4)	7 (21.9)	2 (6.3)	
Years of experience	<5 years	5 (10.0)	10 (20.0)	22 (44.0)*	13 (26.0)	0.111
	5-10 years	10 (24.4)	8 (19.5)	10 (24.4)	13 (31.7)*	
	>10 years	18 (32.7)*	9 (16.4)	17 (30.9)	11 (20.0)	
Place of practice	Public	16 (17.8)	19 (21.1)	38 (42.2)*	17 (18.9)	0.003†
	Private	22 (33.8)*	12 (18.5)	11 (16.9)	20 (30.8)	
Position	Consultant and specialist	6 (16.7)	11 (30.6)	17 (47.2)*	2 (5.6)	0.000†
	General practitioner	28 (36.4)*	10 (13.0)	12 (15.6)	27 (35.1)	
	Resident	4 (9.5)	10 (23.8)	20 (47.6)	8 (19.0)	
Answer	Answer 1. Look for the tooth, put it into a napkin and go immediately to a dentist. Answer 2. Transport the tooth in the mouth and go immediately to the emergency room. Answer 3. Replant or put the tooth inside a glass of cold milk and go to dentist as soon as possible (best answer). Answer 4. Do not know.					

** Largest percentage for that group.*
† Statistically significant.
*** Country of graduation for the highest medical qualification (medical school for general practitioners and residents, and specialization for specialists and consultants).*

MANAGEMENT OF A MISSING TOOTH FRAGMENT

When questioned about the best management in a case of a missing tooth fragment after a TDI, 60 percent of study participants chose the correct answer: exposing a radiograph to the lip to rule out foreign body entrapment. No statistically significant difference was found among the groups.

MANAGEMENT OF A LUXATED TOOTH

Most study participants (77.4 percent) also recognized the proper management of a child with a luxated tooth, with no statistically significant differences noted between the groups except between the regions of graduation and the physician's rank. Western country graduates ranked first, with 30 (93.8 percent) responding that they would refer to a dentist immediately, followed by graduates of Asian countries (N=35, 87.5 percent) and then graduates of Arab countries (N=58, 70.7 percent; P=0.032). Consultants and specialists were significantly more accurate, as 33 (91.7 percent) chose the proper answer compared to 35 residents (83.3 percent) and 55 GPs (72.4 percent, P=0.031).

MANAGEMENT OF CROWN FRACTURES

When asked about the urgency of treating a crown fracture and seeking dentist's help, 65.8 of percent of physicians recognized that it was an urgent situation requiring that the patient see a dentist as soon as possible, with no significant difference observed between all demographic groups and variables.

CONFIDENCE IN PLACING INTRAORAL SUTURES

Only 53.9 percent of all ED-Drs reported being confident in placing intraoral sutures. Over 80 percent of consultants and specialists reported confidence in placing sutures intraorally compared to 57.1 percent of residents and 38.2 percent of GPs (P<0.001).

DISCUSSION

The long-term prognosis of TDIs is highly correlated to their proper and timely management.[13] Our study aimed primarily to assess knowledge about TDIs among ED-Drs in the UAE. To correctly diagnose and treat a TDI, formal education in the subject is necessary. When questioning our study sample, 60 percent said they had received TDI education.

Graduates of Western countries reported higher percentages of TDI education. Our study participants reported a lower percentage of TDI education compared to those in the United States, where 80 percent of physicians received formal TDI education.[21] However, this was considerably high when compared to the 19.2 percent reported in a previous UAE study by Hashim in 2012[27] and in other reports (e.g., 9.8 percent in Chile,[15] 5.9 percent in Israel,[21] 54.1 percent in Saudi Arabia,[23] and 23.5 percent in the United Kingdom[24]), where there was a clearly reported lack of proper TDI education.

The overall score of the whole sample for six knowledge questions was 3.68 out of 6.00 (i.e., out of every six TDI scenarios, 40 percent would have been mismanaged, which is unacceptable), although that score was higher than that of a Saudi study (mean knowledge score of 2.88 out of a maximum of 7.00).[17]

Consultants and specialists scored a statistically significant score that was highest for knowledge, followed by residents and then GPs. This indicated that a higher level of education influenced the level of TDI knowledge among ED-Drs, which was in agreement with the aforementioned Saudi study.[17] A Turkish study found that emergency medicine specialists were more experienced in managing TDIs compared to GPs and residents.[19]

In the scenario describing an avulsed permanent tooth, only 31.6 percent of study participants gave the correct management of an avulsed tooth, which was was unacceptable. This was disappointing compared to two other studies[20,21] that showed a much higher rate of knowledge. Our study results were better than Subhashraj's study, which reported that 5.5 percent of Indian ED-Drs knew about reimplantation of avulsed teeth,[3] and Qazi and Navi's study,[28] in which only three percent of Pakistani physicians suggested immediate reimplantation as the treatment of choice for an avulsion.

A significant correlation was found between being a Western country graduate and providing the wrong management in the case of an avulsed permanent incisor, despite the fact that they had an overall higher knowledge score compared to others. A possible explanation is that many of avulsion cases go to specialized trauma centers in major UAE cities, thus limiting the exposure of ED-Drs to these cases. These trauma centers belong to the public sector, which might explain why public sector ED-Drs possessed significantly better knowledge about avulsion management versus the private sector group.

It is of great importance that a physician recognize the difference between a permanent and a primary incisor as well as knowing the correct management of each type to avoid further insult to permanent incisors. Public sector physicians follow correct management actions more often than their private sector counterparts.

When an incisor suffers a fracture injury, locating the missing fragment is a priority. Further investigations should be carried out, including radiographing the lip in the presence of lip lacerations to rule out an embedded tooth fragment.[29] Failure to do so can result in infection and swelling of the affected lip. Approximately 40 percent of our study participants said they would not radiograph the lip.

When faced with a luxation injury, the ideal management is to immediately reposition the tooth.[29] We recognize that this may not be achievable in a very busy ED and that the ED-Dr may not have the training nor the armamentarium required to manage a luxation. Our personal expectation was that the ED-Dr recognize the urgency of a referral to a dentist. Most of our study participants (77.4 percent) responded that they would refer a patient with a luxation injury to a dentist immediately, in agreement with Needleman et al.[20]

Consultants and specialists were found to be significantly more confident in placing sutures than residents and GPs, which was surprising since we would have expected ED-Drs to be confident in suture placement due to the nature of their work. Our results agree with those reported by Trivedy et al.[24]

Our sample size represented more than a quarter of the total of UAE ED-Drs; nevertheless, several limitations in our study were identified. Although we attempted to have all ED-Drs in the UAE participate, this could not be achieved. This might have introduced some sample bias. In addition to that, we asked ED-Drs whether they had received TDI education, but we did not ask about the source of the education. We did not take into account the different levels of TDI education they received, especially when it came to the residents. It would have also been beneficial if we included a question about how ED-Drs perceive their current knowledge (so as to compare it against actual knowledge scores) and whether they believed they needed further education or not.

Based on our findings, several recommendations are suggested. TDIs diagnosis and management should be incorporated in undergraduate and postgraduate UAE medical school and residency curriculum. Regular workshops and seminars should be arranged to keep the ED-Drs' knowledge current and up to date. GPs should especially be targeted, since they were the group displaying the lowest knowledge levels. It would be also beneficial to provide ED-Drs access to online dental trauma guide services.

CONCLUSIONS

Based on the results of this study, the following conclusions can be made:

1. The overall knowledge of TDI and their management among ED-Drs across the UAE were inadequate.
2. Knowledge of TDIs was the highest among consultants and specialists and lowest among GPs, especially, in relation to permanent tooth avulsion and suture placement.
3. TDI knowledge levels dropped five years after graduation.

ACKNOWLEDGMENT

The authors wish to thank Amar Hassan Khamis, professor of biostatistics at MBRU, Dubai for his valuable contribution to the statistical analysis of the data.

REFERENCES

1. Lam R. Epidemiology and outcomes of traumatic dental injuries: a review of the literature. Aust Dent J 2016;61(Suppl 1):4-20.
2. World Health Organizaiton. Oral health. Available at: "https://www.who.int/oral_health/en/". Accessed February 6, 2019. (Archived by WebCite® at: "http://www.webcitation.org/75yz7Hdet")
3. Petersson EE, Andersson L, Sörensen S. Traumatic oral vs non-oral injuries. Swed Dent J 1997;21 (1-2):55-68.
4. Subhashraj K. Awareness of management of dental trauma among medical professionals in Pondicherry, India. Dent Traumatol 2009;25(1):92-4.
5. Waldrop RD, Ho B, Reed S. Increasing frequency of dental patients in the urban ED. Am J Emerg Med 2000;18(6):687-9.
6. Andersson L, Andreasen JO, Day P, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dent Traumatol 2012;28(2):88-96.
7. Lewis C, Lynch H, Johnston B. Dental complaints in emergency departments: a national perspective. Ann Emerg Med 2003;42(1):93-9.
8. Wilson S, Smith GA, Preisch J, Casamassimo PS. Epidemiology of dental trauma treated in an urban pediatric emergency department. Pediatr Emerg Care 1997;13(1):12-5.
9. O'Neil DW, Clark MV, Lowe JW, Harrington MS. Oral trauma in children: a hospital survey. Oral Surg Oral Med Oral Pathol 1989;68(6):691-6.
10. Bae J-HH, Kim Y-KK, Choi Y-HH. Clinical characteristics of dental emergencies and prevalence of dental trauma at a university hospital emergency center in Korea. Dent Traumatol 2011;27(5): 374-8.
11. Chou J, Wu C-H, Tu H-F, Kao S-Y. Analysis of dental emergencies at Taipei Veterans General Hospital in 2003. Chin J Oral Maxillofac Surg 2004; 15:7-17.
12. Lin Y-T, Tsai AI, Chen JC-M, Chang Y-L, Huang P-Y. A Retrospective analysis of dental emergencies presenting to a medical center in Taiwan. Taiwan J Oral Maxillofac Surg 2016;27:101-10.
13. Andreasen JO, Andreasen FM, Skeie a, Hjørting-Hansen E, Schwartz O. Effect of treatment delay upon pulp and periodontal healing of traumatic dental injuries: a review article. Dent Traumatol 2002;18(3):116-28.
14. Holan G, Shmueli Y. Knowledge of physicians in hospital emergency rooms in Israel on their role in cases of avulsion of permanent incisors. Int J Paediatr Dent 2003;13(1):13-9.
15. Díaz J, Bustos L, Herrera S, Sepulveda J. Knowledge of the management of paediatric dental traumas by non-dental professionals in emergency rooms in South Araucanía, Temuco, Chile. Dent Traumatol 2009;25(6):611-9.
16. Ulusoy AT, Önder H, Çetin B, Kaya Ş. Knowledge of medical hospital emergency physicians about the first-aid management of traumatic tooth avulsion. Int J Paediatr Dent 2012;22(3):211-6.
17. Pani SC, Eskandrani RM, Al-kadhi K, Al-hazmi A. Knowledge and attitude toward dental trauma first aid among a sample of emergency room personnel across Saudi Arabia. Saudi J Oral Sci 2015;2(1): 30-4.
18. Raoof M, Vakilian A, Kakoei S, Manochehrifar H, Mohammadalizadeh S. Should medical students be educated about dental trauma emergency management? A study of physicians and dentists in Kerman Province, Iran. J Dent Educ 2013;77(4): 494-501.
19. Yigit Y, Helvacioglu-Yigit D, Kan B, Ilgen C, Yilmaz S. Dentofacial traumatic injuries: a survey of knowledge and attitudes among emergency medicine physicians in Turkey. Dent Traumatol 2019;35(1): 20-6.
20. Needleman HL, Stucenski K, Forbes PW, Chen Q, Stack AM. Massachusetts emergency departments' resources and physicians' knowledge of management of traumatic dental injuries. Dent Traumatol 2013;29(4):272-9.
21. Lin S, Levin L, Emodi O, Fuss Z, Peled M. Physician and emergency medical technicians' knowledge and experience regarding dental trauma. Dent Traumatol 2006;22(3):124-6.
22. Aren A, Erdem AP, Aren G, et al. Importance of knowledge of the management of traumatic dental injuries in emergency departments. Ulus Travma Acil Cerrahi Derg 2018;24(2):136-44.

23. Bahammam LA. Knowledge and attitude of emergency physician about the emergency management of tooth avulsion. BMC Oral Health 2018;18 (1):57.
24. Trivedy C, Kodate N, Ross A, et al. The attitudes and awareness of emergency department (ED) physicians towards the management of common dentofacial emergencies. Dent Traumatol 2012;28 (2):121-6.
25. Jung C-P, Tsai AI, Chen C-M. A 2-year retrospective study of pediatric dental emergency visits at a hospital emergency center in Taiwan. Biomed J 2016;39(3):207-13.
26. Government of Dubai. Dubai Annual Health Statistical Report. Available at: "https://www.dha.gov.ae/DHAOpenData/Annual%20Statistical%20Books/Annual%20Statistical%20Report%202017.pdf". Accessed February 6, 2019. (Archived by WebCite® at: "http://www.webcitation.org/75z0cORVx")
27. Hashim R. Physicians' knowledge and experience regarding the management of avulsed teeth in United Arab Emirates. J Int Dent Med Res 2012; 5(2):91-5.
28. Qazi SR, Nasir KS. First-aid knowledge about tooth avulsion among dentists, doctors and lay people. Dent Traumatol 2009;25(3):295-9.
29. DiAngelis AJ, Andreasen JO, Ebeleseder KA, et al. Guidelines for the management of traumatic dental injuries: 1. Fractures and luxations of permanent teeth. Pediatr Dent 2017;39(6):401-11.