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Dentists' knowledge of the guidelines of traumatic dental injuries in the United Arab Emirates

ABSTRACT

Aim This study aimed to assess general dental practitioners' (GDPs) knowledge within the United Arab Emirates (UAE) regarding the management of traumatic dental injuries (TDIs), and to compare their level of knowledge with that of paediatric dentists (PDs).

Methods Dentists were asked to complete a two-part questionnaire (seven questions covering demographic data and 13 questions about trauma cases scenarios) in electronic and paper format. A total of 296 returned questionnaires were analysed to identify GDPs' knowledge in managing TDIs, and to compare the score of GDPs' knowledge with that of PDs'.

Results Out of a total score of 13, the mean knowledge score (MKnS) for GDPs was 4.87 ± 1.82 (only 37.5% of the 13 questions were answered correctly) while the MKnS of paediatric dentists was 5.56 ± 1.47 (with 42.8% correct answers); both scores indicated poor knowledge and the difference was statistically significant ($p=0.005$).

Conclusions There was poor knowledge of TDIs among the surveyed UAE GDPs as well as the PDs, although PDs scored higher, indicating the need for further training.

Keywords General dental practitioners, IADT guidelines, Knowledge, Paediatric dentists, Traumatic dental injuries, United Arab Emirates.

Introduction

Owing to the multiple types of trauma that affect both the primary and the permanent dentition, the diagnosis and treatment of Traumatic Dental Injuries (TDIs) is very complex [Andreasen et al., 2012]. In order to fulfil the treatment needs, the large variety of cases require multiple treatment sequences beginning with general dental practitioners (GDPs) and subsequently involving other dental specialities, such as paediatric dentists (PDs) [De Amorim et al., 2011]. The majority of registered TDIs are treated in primary care centres [Brauer, 1950; Rajab, 2003; Glendor, 2008]. The GDP plays a fundamental role in treating TDIs. Therefore adequate knowledge about the most current dental trauma management guidelines is very important.

TDIs nowadays are considered a public dental health problem, and GDPs should be familiar with the evidence-based guidelines, such as those of the International Association of Dental Traumatology (IADT) [DiAngelis et al., 2012], in order to provide appropriate first-aid intervention and care. This would improve the success rate of TDIs management. Various previous studies have highlighted that GDPs have insufficient knowledge in treating dental trauma [Kostopoulou and Duggal, 2005; Ravikumar et al., 2017]. Recently, Zaleckienė et al. [2018] and Buldur and Kapdan [2018] reported that Lithuanian and Turkish general dentists respectively have insufficient dental traumatology knowledge. Furthermore, Re et al., [2014] concluded that the level of knowledge in a group of Italian dentists was heterogeneous with problems mainly restricted in the management of traumatic dental injuries of specific clinical cases and topics. In the UAE, there are no published data with regards to TDIs registration, nor GDPs level of knowledge in the management of TDIs. For this reason, this study was conducted in order to assess the level of GDPs' knowledge in the UAE about how to manage traumatic dental injuries, and compare the level of knowledge with that of PDs. Thus the aim of this UAE study was to assess the level of GDPs knowledge and application of IADT guidelines in the management of TDIs and to compare the GDPs' knowledge with the PDs knowledge.

Methods

A two-part self-administered questionnaire consisted of seven questions relating to the

participants' demographic data alongside thirteen questions demonstrating trauma case scenarios. The questionnaires were distributed via e-mail as well as at two local conferences. The questionnaire was adopted from a previous study (with authors' consent) and was validated and tested for reliability [Akhlaghi et al., 2014]. The questionnaire was anonymous, neither names nor numbers identifying members were mentioned on the questionnaire sheets. The questions covered aspects of knowledge of TDIs in the primary and permanent dentition. A total of 500 questionnaires were distributed; the dentists were contacted to request their participation in this study over a period of four months starting in November 2015. One investigator who participated in the data collection process approached each of the prospective participant's individually, in person or through personal e-mail. Assurances were made to prevent any repetition and questionnaire duplication. The eligibility criteria were GDPs and PDs working in the UAE. Exclusion criteria were: dental professionals working outside the UAE, other dental specialties working inside the UAE and dental students.

All data from the completed questionnaires were transferred to a data sheet using Windows Excel 2010 and analysed using the computerised Statistical Package for Social Sciences (SPSS, version 20, Chicago, SPSS Inc). Descriptive statistics were performed to identify GDPs' and PDs' knowledge using T-Test and Odd-ratio test. The Kolmogorov-Smirnov test was used to compare the score of GDPs' knowledge and PDs' knowledge. The level of statistical significance was set at $p < 0.05$. The ethical approval was obtained from the Research and Ethics Committee of the Hamdan Bin Mohammad College of Dental Medicine (HBMCDM), Mohammad Bin Rashid University of Medicine and Health Sciences (MBRU) in Dubai Healthcare City (DHCC). This study was conducted in full conformance with the principles of the "Declaration of Helsinki", Good Clinical Practice (GCP), and within the laws and regulations of the UAE/DHCC.

Results

A total of 332 questionnaires were received (response rate 66%). However 36 questionnaires were excluded because completed by other dental specialists or with incomplete fields. Therefore, a total of 296 questionnaires completed by dentists had data suitable for statistical analysis. The number of GDPs was 246 (83.1%) while the PDs were 50 (16.9%). The results revealed no statistically significant difference between gender, age groups, frequency of patients with dental trauma in the practice, attendance to continuing educational courses of dental trauma or traumatology knowledge.

Demographic variables	N (%)	Mean knowledge (SD)	P- Value
Gender			
Female	200 (68%)	5.04 (1.79)	0.488
Male	94 (32%)	4.87 (1.80)	
Age			
20-29	103 (34.8%)	5.11 (0.15)	0.485
30-39	118 (39.9%)	4.81 (0.17)	
40-49	47 (15.9%)	5.23 (0.29)	
50-59	23 (7.8%)	4.96 (0.43)	
Specialisation			
GDPs	246 (83.1%)	4.87 (1.82)	0.005
PDs	50 (16.9%)	5.56 (1.47)	
Frequency of patients with dental trauma in the practice			
Frequent	48 (16.7%)	4.92 (2.0)	0.872
Occasional	122 (42.4%)	5.00 (1.71)	
Very rare	118 (41%)	5.07 (1.76)	
Attendance to continuing educational courses on dental trauma			
No	122 (41.9%)	4.96 (1.69)	0.826
Yes	169 (58.1%)	5.01 (1.86)	

TABLE 1 The demographic characteristics of the study population.

The demographic characteristics and the mean knowledge score (MKnS) of the participants (out of a total of 13 questions) are shown in Table 1. The results showed that specialty was the only variable with a statistically significant effect on the mean knowledge score (MKnS) ($p=0.005$).

The summary of the questions, correct management answers and mean knowledge scores (SD) of the responders to the scenario questions regarding the management of TDIs are shown in Table 2. All participants correctly responded to the best storage medium of an avulsed tooth scoring ($n=296$; 100%), followed by questions regarding the immediate treatment of both intrusion and extrusion luxation injuries ($n=281$; 94.9%). As for the question regarding the type of medication to use in the case of a 2-day old complicated crown fracture, the score of the correct answer was the lowest of the survey ($n=45$; 15.2%).

The mean score for the knowledge of correct management of TDIs according to demographic variables is shown in Table 3. This measure was based on question 13: "What is the management of an avulsed primary incisor in a 4 year old child?". This control question was chosen as representative of the basic knowledge needed for dealing with TDIs. The overall average of knowledge among participants who answered all questions correctly was 5.54, while the participants who missed answering the aforementioned

Summary of the 13 clinical scenario questions	Correct management answers	N(%)	Knowledge *
Immature permanent tooth with pinpoint pulp exposure within 2 days after trauma	Partial pulpotomy	98 (33.1)	0.69 (0.47)
Pulp therapy medication(s) for the above patient	Calcium hydroxide or MTA	45 (15.2)	0.85 (0.36)
Restorative material(s) to restore mature permanent incisor with uncomplicated crown fracture and no other associated injuries	GIC or composite	151 (51)	0.49 (0.50)
Immediate treatment of mature permanent incisor with slight mobility and palatal displacement	Repositioning, splint and follow-up	262 (88.5)	0.11 (0.32)
Splint duration for the above patient	3-4 weeks	145 (49)	0.51 (0.50)
Immediate treatment of permanent incisor in a 7-yr old with 4 mm intrusion with dull percussion sound	Allow for spontaneous eruption	281 (94.9)	0.05 (0.22)
Immediate treatment of extruded and mobile mature permanent incisor	Immediate repositioning and splint	281 (94.9)	0.05 (0.22)
Mature avulsed permanent incisor with 7 hours extra-oral time	Immerse in a 25% sodium fluoride, RCT, replant and splint, antibiotic therapy	246 (83.1)	0.17 (0.38)
Instructions to a school nurse dealing with an avulsed permanent incisor in a 16-year old student	Immediate replantation if possible or store in milk and go to dentist	296 (100)	0.00
The above patient came to your office. What is the next procedure to be done?	Replantation if not performed before and splint	93 (31.4)	0.69 (0.47)
For the above patient, what is the recommended splint duration	7-10 days	207 (69.9)	0.30 (0.46)
When should endodontic treatment be performed for the above patient	7-10 days after replantation and before removal of the splint	190 (64.2)	0.36 (0.48)
Management of an avulsed primary incisor in a 4 years old child	Do not replant	78 (26.4)	0.74 (0.44)
MTA = mineral trioxide aggregate GIC = glass ionomer cement RCT = root canal treatment * Knowledge mean per 1 question (SD)			

TABLE 2 Distribution of correct answers by participants for each clinical scenario question about management of traumatic dental injuries.

question scored an average of knowledge of 3.2 (range 0-13). Hence, we had used the cut off-point of 6 as an indicator, to distinguish between adequate and poor respondents' knowledge. While, on the other hand, those who attended continuing educational courses on dental trauma had adequate knowledge (n=80; 47.3%) a higher percentage of dentists did not attend such courses (n=52; 42.6%). Regardless, the difference was not statistically significant (p= 0.249). The difference of knowledge between GDPs and PDs was statistically significant.

PDs who scored adequate knowledge were 32 (64%), while GDPs who scored adequate knowledge were 101 (41.1%) (p= 0.002). There was no statistically significant correlation between genders of the participants, different age groups, frequency of TDIs in the practice, attendance to continuing educational courses of dental trauma and their level of adequate knowledge.

Regarding factors influencing level of knowledge, 9.3% of the knowledge was influenced by age and

specialisation, while gender, frequency of dental trauma cases and the attendance of the participants to continuing educational courses about dental trauma had no effect on the knowledge of dental trauma management among dental practitioners. In addition, the logistic regression analysis test revealed that knowledge of PDs was 2.95 times higher than that of GDPs (p= 0.004).

Discussion

The appropriate management of TDIs, some of which are considered immediate dental emergencies, can reduce stress and anxiety for both patients and dentists. Akhlaghi et al. [2014] and Bendo et al. [2014] reported that knowledge of the appropriate treatment for TDI can reduce stress and anxiety for both patients and dentists and improve the patients' quality of life. Importantly, accurate and immediate post-traumatic management protocols showed to improve both the

Demographic variables	Adequate knowledge (%)	Poor knowledge (%)	P-value
Gender			
Female	96 (48%)	104 (52%)	0.103
Male	37 (39.4%)	57 (60.6%)	
Age			
20-29	44 (42.7%)	59 (57.3%)	0.058
30-39	49 (41.5%)	69 (58.5%)	
40-49	30 (63.8%)	17 (36.2%)	
50-59	10 (43.5%)	13 (56.5%)	
Specialisation			
GDPs	101 (41.1%)	145 (58.9%)	0.002
PDs	32 (64%)	18 (36%)	
Frequency of patients with dental trauma in the practice			
Frequent	22 (45.8%)	26 (54.2%)	0.857
Occasional	57 (46.7%)	65 (53.3%)	
Very rare	51 (43.2%)	67 (56.8%)	
Attendance to continuing educational courses of dental trauma			
No	52 (42.6%)	70 (57.4%)	0.249
Yes	80 (47.3%)	89 (52.7%)	

TABLE 3 The percentage of the quality of knowledge of TDIs management according to demographic variables.

short- and long-term prognosis of the traumatised tooth [Flores et al., 2001]. The aim of this cross-sectional study was to assess the level of knowledge of GDPs and PDs working in the UAE with regards to the management of TDIs.

TDIs management knowledge according to demographic variables

The results show that the specialty had a significant effect on the mean knowledge ($p=0.005$), while no statistically significant difference was found between traumatology knowledge, gender, age group, the attending of educational courses in dental trauma and the frequency of trauma cases. The results were inconsistent with the study by Akhlaghi et al. [2014] conducted in Tehran, Iran. The authors found that the frequency of patients in dental practice and the attendance of the participants to educational courses regarding dental traumatology did in fact have statistically significant effect on the participants' knowledge. However, the current study's data indicated that specialisation in paediatric dentistry was an influencing factor in the knowledge about the emergency management of dental trauma cases. This was consistent with a study done by Kostopoulou and Duggal [2005] in the UK, who observed that specialisation played a role in the knowledge of emergency management of dental trauma. A general

conclusion drawn from that study was that the older the practitioner, the lower is the level of knowledge of the latest TDI guidelines.

TDI management knowledge according to case scenarios

In the current study only about half of the participants ($n=151$, 51%) suggested a restorative treatment in uncomplicated crown fracture in mature teeth. Kostopoulou and Duggal [2005] observed that 69% of dentists always provided emergency treatments for uncomplicated crown fractures in the permanent dentition. However, only half of the participants would perform an immediate permanent restoration; this, for Kostopoulou and Duggal [2005] indicated insufficient knowledge. A recent Turkish study reported that participants showed a higher level of knowledge in crown fractures [Buldur and Kapdan, 2018].

Long term clinical studies have shown very little pulpal response to uncomplicated crown fractures [Andreasen et al., 1995; Robertson et al., 1997] and that when irritation was eliminated by the restorative procedure, the localised pulp inflammation resolved [Warfvinge, 1986].

Regarding the management of complicated crown fracture of immature teeth in the present study, the participant's demonstrated insufficient knowledge as only 33.1% answered this question correctly. This was in agreement with the Buldur and Kapdan [2018] study, which reported that only 30.9% of participants gave correct answers. Cvek in 1978 found a favourable outcome of complicated fractures with exposed pulp treated with conservative pulp therapies, and that partial pulpotomy has a high rate of success and is the most successful treatment in preserving the vitality of the pulp [Cvek, 1978]. This was consistent with the recommendation of the IADT guidelines [DiAngelis et al., 2012].

Based on the literature on the management of root fracture in mature teeth, the prognosis can be improved with rapid treatment and close adaptation of the root segments [Cvek et al., 2004]. In this study 88.5% ($n=262$) of the participants gave the correct answer. This is consistent with another study done by Krastl et al. [2009] in Germany, which revealed that almost half of the dentists correctly answered that, in most cases, only splinting of the tooth with a fractured root is required. On the other hand, while there is evidence that supports short-term splinting of root-fractured teeth, no specific duration of splinting for root-fractured teeth has been found to be significantly related to the outcome [DiAngelis et al., 2012]. In this study, 49% of participants ($n=145$) answered correctly about the duration of splinting of root-fractured teeth. This is in agreement with the IADT guidelines.

A large proportion of participants showed adequate knowledge of the treatment of intrusion and extrusion

luxation injuries (n=281, 94.9%). Andreasen et al. [2006] reported that repositioning of an intruded immature tooth with either orthodontic or surgical forces can affect the healing outcome of the tooth. In the case of an immature tooth, spontaneous re-eruption should be allowed, and if no movement occurs during a 3 weeks period, an intervention should be conducted. In case of extrusion of mature teeth, the IADT guidelines suggested immediate repositioning and splinting of the extruded tooth [DiAngelis et al., 2012].

The most important factor in managing avulsed teeth is time: the extra-alveolar period is considered to be the most critical factor for optimal healing [Andreasen et al., 1995; Barrett and Kenny, 1997]. A majority of participants (n=246, 83.1%) correctly recognised the management of an avulsed tooth with extra-alveolar dry time as >60 min. This response is in agreement with the current guidelines and recommendations suggested by the IADT [DiAngelis et al., 2012]. On the other hand, the participants showed poor knowledge of the immediate treatment of a recently avulsed mature permanent tooth (n=93, 31.4%). Confusion in reading or interpreting the question might have led to this peculiar irregularity in knowledge between the management of avulsed teeth and the extra-oral dry time. In another study done by Cohenca et al. [2006], it was shown that some confusion exists among study participants regarding the immediate treatment of the avulsed tooth and only <25% correctly recommended replanting the tooth back into its socket as soon as possible.

For the long-term success of a replanted avulsed tooth, the means and method of storage is crucial [Andreasen, 1990; Traebert et al., 2004]. Although research has shown that fresh cold milk is superior to saliva in maintaining vitality, most dentists preferred saliva or saline solution as storage medium [Zhao and Gong, 2010], both *in vitro* and *in vivo* [Oikarinen, 1987]. In this study, 100% of dentists correctly agreed to store the avulsed tooth in milk instead of water if replantation could not be done at the accident site. Our study was consistent with that of Hamilton et al. [1997] who reported in their study that more than 90% of participants suggested milk as the best storage medium for avulsed teeth.

A splinting technique should allow physiologic movement of an avulsed tooth after replantation and during the healing period; this should follow the course of a maximum period of two weeks, and should ideally lead to a lower risk for ankylosis [Trobe, 2002; Glendor and Marcenes, 2013]. In this study 70.1% of the participants agreed to splint the avulsed teeth for 7-10 days, and this percentage is higher compared to previous studies that reported that only 10-30% of clinicians would splint the tooth for that duration [Hamilton et al., 1997; Kostopoulou and Duggal, 2005].

Our results mirror those of Akhlaghi et al. [2014], and both were consistent with the current guidelines and recommendations of the IADT [DiAngelis et al., 2012].

The IADT guidelines [DiAngelis et al., 2012] recommend a root canal treatment (RCT) for an avulsed tooth with completed root development, with the ideal time to start treatment being 7-10 days after replantation. This was agreed by 64.2% of the participants in this study. Another study by Krastl et al. [2009] reported that 61.9% of participants agreed that RCT must be performed within 7-14 days for an avulsed permanent tooth.

This study showed that this sample of dentists in the UAE had poor knowledge about replantation of primary teeth: only 26.4% reported that they would not replant an avulsed deciduous tooth, which is inconsistent with the current guidelines and recommendations of the IADT [DiAngelis et al., 2012]. Other studies had reported that 83% of dentists were unwilling to replant primary teeth [Stokes et al., 1992; Cohenca et al., 2006].

Above all, the results revealed an uneven knowledge among dentists regarding the emergency management of dental injuries; dental professionals had good knowledge in some parts of dental traumatology while they had poor knowledge in some other areas. This was in agreement with the findings of Re et al. [2014]. Lack of awareness and knowledge of standard guidelines may be one of the reasons. In agreement with the above findings, Yeng and Parashos [2008] reported a lack of information concerning the level of knowledge of treatment for dental trauma by dental professionals worldwide.

Although our results may be similar to those of other studies, a limitation to the present study was the failure to assess the source of the knowledge of the dental professionals. This would have been useful in standardising the dental professionals' knowledge and ascertaining which guidelines they followed. It would also highlight the need to develop strategies to improve the knowledge base in dental traumatology. Since most of the participants were attending dental conferences, another limitation could be selection bias. Also, ideally we would have liked the sample of PDs to be the same size of GDPs. However, it is known that there are fewer PDs per paediatric dental population, with an average of 7 PDs every 100,000 people in the USA compared to 60 GDPs for every 100,000 persons in the USA [James and Morgan, 2003]. Therefore, our study sample effectively reflected the relative proportions of the said groups in the UAE.

Conclusions

The survey demonstrated a generally poor knowledge of different scenarios of TDIs management among GDPs, and PDs in the UAE. PDs demonstrated only a

slightly better knowledge compared to GDPs, despite this topic being a core PD specialist area.

Recommendations

- UAE-wide strategies are needed to improve the knowledge base of dental traumatology
- Continuous medical/dental education courses in dental traumatology are needed.
- Increasing the awareness of dental practitioners to the availability of online support by using the IADT website (www.dentaltraumaguide.com).

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Declaration of Interests

The authors have no financial or other interests to declare.

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