

Knowledge, Attitude, and Practice of Emergency Management of Tooth Avulsion among Medical Students in Melaka, Malaysia: A Cross-sectional Study

¹Eby Varghese, ²Jillian N Zhen-Ying, ³Li L Law, ⁴Renu S Samson, ⁵Htoo HK Soe

ABSTRACT

Introduction: Dentofacial injuries are usually the result of sporting activities, falls at home, road traffic accidents, fights, or intentional assaults. Tooth avulsion among the victims of such accidents is quite common. Soon after the accident, most victims seek help from medical professionals.

Aim: This study was designed to evaluate the knowledge, attitude, and practice of emergency management of avulsed teeth among medical students in Melaka, Malaysia, and the need to include dental trauma emergency management as a part of their undergraduate training.

Materials and methods: A self-administered questionnaire was distributed among medical students to gather data on their profile and self-assessed perceived knowledge of dental avulsion and its emergency management.

Results: Of the 190 students, 187 (98.4%) had low knowledge and 3 (1.6%) had some knowledge on the emergency management of tooth avulsion.

Conclusion: Medical students in Melaka have low knowledge regarding dental avulsion and its emergency management. Therefore, it is recommended to introduce dental trauma emergency management as a part of their undergraduate training.

Clinical significance: Introducing dental trauma emergency management as a part of the medical curriculum can help educate and train the students to be competent future medical professionals with sound knowledge on first-aid management of avulsed teeth. They would be able to act efficiently and effectively, thereby reducing the extra-alveolar time and, hence, contributing to the better prognosis of such teeth.

Keywords: Avulsion, Dental trauma, Emergency management, Medical students, Survey.

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INTRODUCTION

Dental injuries are considered as a real public dental health problem, especially in children and adolescents. Studies have shown a high incidence of oral injuries in comparison with nonoral injuries, especially during their first 10 years of life.^{1,2} Injuries to the tooth structures and the face are usually the result of sporting activities, falls at home, car accidents, fights, or intentional assaults that occur more frequently in children than adults.³⁻⁷ Blows to the face often affect the teeth, especially the maxillary incisors, because of their normal labial projection relative to the mandibular incisors.⁸

DaSilva et al⁹ verified that the occurrence of dental trauma was 15.29% in 340 patients with facial trauma in a period of 1 year. With reference to a single tooth, the most serious trauma is avulsion (knocking out) representing 16% of dental injuries.¹⁰ According to the Ministry of Health, Malaysia, overall 6.7% of all erupted permanent anterior teeth were traumatized, majority of which involved the maxillary central incisors.¹¹ Parents generally seek care from their dentist for the management of traumatic dental injuries (TDIs). Those without dental homes usually seek advice from children's physicians who in turn often refer the family to the emergency department of local hospitals.¹² Therefore, medical professionals are often the first to treat patients who sustain traumatic injuries and, thus, physicians, emergency medical technicians, nurses, etc., play a crucial role in the provision of primary care including that of dental trauma, especially avulsed teeth. If such professionals are not well equipped to handle dental avulsion injuries, there could be a delay in delivering appropriate treatment, which could adversely affect the prognosis of the avulsed tooth, and in worse situations, the only treatment option would be to discard the tooth and provide a suitable dental prosthesis.

¹Department of Pediatric Dentistry, Faculty of Dentistry, Melaka-Manipal Medical College, Melaka, Malaysia

²Department of Dentistry, Kementerian Kesihatan, Klinik Pergigian Tanjung Malim, Jalan Besar, Tanjung Malim, Perak Malaysia

³Department of Dentistry, Kementerian Kesihatan, Klinik Pergigian Kluang Jalan Hospital, Kluang, Johor, Malaysia

⁴Department of Orthodontics, Faculty of Dentistry, Melaka-Manipal Medical College, Melaka, Malaysia

⁵Department of Community Medicine, Faculty of Medicine Melaka-Manipal Medical College, Melaka, Malaysia

Corresponding Author: Eby Varghese, Department of Pediatric Dentistry, Faculty of Dentistry, Melaka-Manipal Medical College Melaka, Malaysia, Phone: +0060105420047, e-mail: varghese_eby@hotmail.com

The most appropriate treatment of an avulsed tooth is its immediate replantation into its socket or transfer of the child to a dentist or emergency unit staff with the tooth stored in a proper medium.¹² According to the guidelines of the International Association of Dental Traumatology (IADT), the best transport medium is special storage solutions, such as Hank's balanced salt solution (HBSS), milk, or patient's saliva.^{13,14} The appropriate management within the first 15 minutes after avulsion is critical for long-term success of the treatment.^{8,15-19} The extraoral dry time should be no longer than 60 minutes.¹³ Furthermore, it has been documented that prognosis of traumatized teeth depends on both time and appropriate emergency management.¹⁹ Therefore, emphasis should be given to medical professionals to improve their knowledge and awareness regarding emergency management of dental trauma.

The purpose of this study was to assess the knowledge, attitude, and practice of emergency management of tooth avulsion among medical students in Melaka, Malaysia, as well as the need to include dental trauma emergency management in their undergraduate training.

MATERIALS AND METHODS

A cross-sectional observational study was conducted among 190 4th and 5th year medical students in Melaka, Malaysia. The student population mainly comprised Chinese, Indian, and Malay ethnic groups. There were also a small number of students from Sri Lanka, Seychelles, Maldives, Australia, New Zealand, and Singapore. Only 4th and 5th year students were included in this study because the medical students in Malaysia have maximum clinical exposure during these 2 years of study. At the time of the survey, the 4th and 5th year students had been exposed to general surgery, general medicine, orthopedics as well as accident and emergency apart from the other medical subjects. These subjects were taught to the students by means of lectures, workshops, case-based learning (CBL), and clinical bedside teaching. The students also present a portfolio based on the cases they have been exposed to. The sample size was calculated by keeping the study done by Qazi and Nasir²⁰ as the reference. It was calculated to be 186 including an anticipated dropout of 30%. Sampling method followed was purposive sampling. The collection of data was done by distributing questionnaire forms (Appendix 1) to the target group. Ethical approval was obtained before the study was conducted. The survey was voluntary, and participants' consent was obtained. The questionnaire was adapted from that used in the study done by Abu-Dawoud et al²¹ and was distributed under the supervision of the authors. The participants were not allowed to discuss or search Internet resources while answering the questionnaire. Instructions on how

to answer the questionnaire were also provided along with the forms. The questionnaire was collected once the participants had completed answering all the questions. The confidentiality of all the participants was maintained throughout the study.

The questionnaire was designed to collect information in three sections, namely, a sociodemographic profile of the participants, self-assessed perceived knowledge regarding dental trauma, and situation-based questions on the emergency management of dental trauma. All questions were close ended (multiple choice questions) except for the sociodemographic profile of the participants and their opinion regarding the need for including emergency management of dental trauma as a part of their undergraduate training.

Responses were entered into Microsoft Excel sheet using a personal computer, and the data were processed and analyzed using EpiInfo version™ 3.5.1. Each correct response was given a score of 1, and the total score in percentage was calculated to indicate the level of knowledge. Participants were considered to have low knowledge if they obtained a total score of <60%, some knowledge if 60 to 80%, and high knowledge if they scored >80% in the survey. The results of the questionnaire were expressed as frequency and percentage. Descriptive statistical analysis was performed including mean, standard deviation, and median. Analysis of variance and t-test were used to test the association of level of knowledge among the variables with p-value threshold set at 0.05.

RESULTS

A total of 190 medical students took part in this study, of which 108 were 5th year students and 82 were 4th year students. The response rate of the 4th year students was 83.7%, while that of the 5th year students was 79.4%. The respondents comprised 77 males and 113 females belonging to three main ethnic groups – Malay (71), Chinese (69), and Indian (39) as shown in Table 1.

The majority of the participants (87.4%) said that they never received any information on what should be done if a tooth was knocked out (Question 6). Only 24 (12.6%) said they received such information before through sources, such as magazines/Internet (9/24), friends (5/24), dentists (4/24), medical/dental literature (3/24), undergraduate course (2/24), and parents (1/24). Few of the respondents (5.2%) stated that they have received previous training in first aid for dental trauma (Question 7). Meanwhile, 3.2% stated that dental health education was a part of their undergraduate curriculum (Question 8).

The areas of knowledge that were assessed are shown in Table 2. It can be noted that <50% of the participants answered the questions correctly. When asked about the

Table 1: Sociodemographic distribution of the medical students along with the analyses of the association of various demographic factors and knowledge level as measured by mean score of correct responses obtained

Demographic variable	n (%)	Mean knowledge score (SD)	p-value
<i>Year of study</i>			
Year 4	82 (43.2)	3.2 (1.98)	0.1668 [†]
Year 5	108 (56.8)	3.5 (1.76)	
<i>Sponsorship</i>			
Un-sponsored	86 (45.3)	3.4 (1.76)	0.9915 [†]
Sponsored	104 (57.7)	3.4 (1.96)	
<i>Gender</i>			
Male	77 (40.5)	3.1 (1.87)	0.1376 [†]
Female	113 (59.9)	3.5 (1.86)	
<i>Race</i>			
Malay	71 (37.4)	3.4 (2.04)	0.3101 [#]
Chinese	69 (36.3)	3.6 (1.87)	
Indian	39 (20.5)	2.9 (1.44)	
Others	11 (5.8)	3.4 (1.91)	

[†]t-test; [#]Analysis of variance; SD: Standard deviation

Table 3: Responses for the choice of suitable storage medium for avulsed teeth

Choice of storage medium	n (%)
Milk	20 (10.5)
Tap water	1 (0.5)
Isotonic saline	11 (5.8)
Saliva	6 (3.2)
Allow the tooth to dry and cover in sterile gauze	0 (0.0)
No idea what medium to use	152 (80)

method to rule out aspiration of an avulsed tooth, 41.6% of the respondents stated that they would take a chest radiograph of the patient (Question 12). The participants were also asked about situation-based emergency management with regard to first-aid instructions that should be given if they received a telephone call reporting injury and loss of a permanent tooth (Question 15). More than half of them (56.8%) responded that they will advise the parents to wrap the tooth in a clean piece of gauze or handkerchief and look for a dentist quickly. Around 29% said that they did not know what to do and 10% mentioned that they will ask the child's parents to put the tooth in cold fresh milk and look for a dentist. Only 4.2% suggested to replace the tooth back in the mouth as soon as possible and call a dentist.

Another situation was to test what the participants would do if they were present at the site of accident (Question 16). Only 6.8% stated that they would try to stop the bleeding, search for the tooth, and replant it. Around 42% of the respondents were aware of the critical extra-alveolar time and that the avulsed tooth requires professional help within 30 minutes.

The knowledge of participants regarding the proper cleaning of grossly contaminated avulsed tooth was also

Table 2: Areas of knowledge tested along with the number of correct responses obtained

Area of knowledge tested	Correct responses n (%)
Ruling out aspiration of avulsed teeth (Question 12)	79 (41.6)
Importance of not replanting avulsed primary teeth because of the potential risk of damaging the permanent teeth (Question 13)	40 (21.1)
Importance of immediate and timely management of avulsed permanent teeth (Question 14)	68 (35.8)
Emergency management with first aid instructions over phone call (Question 15)	8 (4.2)
Emergency management at the site of accident (Question 16)	13 (6.8)
Critical extra-alveolar time of an avulsed tooth (Question 17)	79 (41.6)
Proper cleaning technique of grossly contaminated avulsed teeth before replantation (Question 18)	54 (28.4)
Proper handling of avulsed teeth (Question 19)	69 (36.3)
Choice of storage medium (Question 20)	26 (13.7)
Management of avulsed teeth with replantation into the socket (Question 21)	9 (4.7)

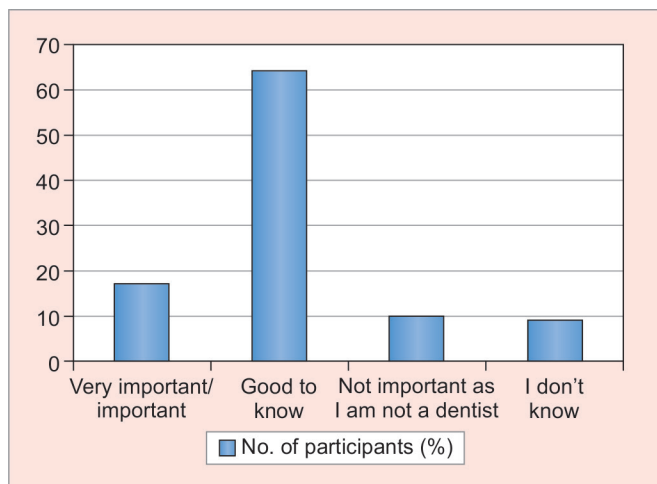
Table 4: Tooth avulsion and its emergency management: knowledge level among medical students

Knowledge level	n (%)
Low (<60% correct responses)	187 (98.4)
Some (60–80% correct responses)	3 (1.6)

evaluated (Question 18). Participants were asked what they would do if they found the avulsed tooth, but in a dirty state. About 35% of the participants did not know what was to be done, 28% said that they would rinse the tooth under tap water gently without scrubbing it, while 19% responded that they would clean the tooth with isopropyl alcohol or soap and water and a brush. Around 11% of the respondents said that they will wipe the tooth with tissue paper or towel and 5.8% stated that they would throw it because it was dirty.

When asked about the proper way of handling an avulsed tooth (Question 19), 37.4% of the respondents stated that they would hold the tooth by its crown. Majority of the participants (80%) had no idea of the choice of a suitable storage medium for avulsed teeth (Question 20) as shown in Table 3.

As for knowledge level, only 3 (1.6%) had some knowledge, while the majority (n = 187, 98.4%) had low knowledge regarding dental trauma and its emergency management (Table 4). Within the limits of the present study, there was no significant association between the level of knowledge regarding emergency management of tooth avulsion and year of study, race, gender, or sponsorship (Table 1). The



Graph 1: Distribution of the attitudes toward perceived importance of dental trauma emergency management in clinical practise

4th and 5th year students had a mean score of 3.2 and 3.5 respectively. Both sponsored and unsponsored students had a mean score of 3.4.

As seen in Graph 1, 10% of the participants gave the opinion that knowledge of dental trauma management is not important in their clinical practice because they are not dentists (Question 22). However, 63.7% of participants said that it is good to know, while 17.4% felt that it is important, and 9% were unaware of its importance.

DISCUSSION

Dental trauma can present as an isolated injury or as multiple extended injuries. In either case, they are frequently first attended by medical professionals in the Emergency Services Department.²² Many studies were done to evaluate the knowledge of dental professionals and nondental professionals and lay people regarding the management of either TDI in general or specifically in avulsion.^{10,12,22} However, only a few studies have been done among medical students. No previous data of such study are available in Malaysia. In Malaysia, undergraduate medical programs extend over 5 years. Basic sciences, such as anatomy, physiology, biochemistry, microbiology, pharmacology, forensics, and pathology are covered during the first 2 years of preclinical training. The clinical training, which is done over the latter 9 years, includes clinical disciplines, such as community and family medicine, general medicine, general surgery, ophthalmology, ear, nose, and throat, gynecology, psychiatry, orthopedics, pediatrics as well as accident and emergency care. These subjects are usually taught through lectures, CBL, seminars, group discussions, and clinical/bedside teaching. Most Malaysian medical school curricula do not cover first-aid management of dental trauma. However, a small percentage of students would have received basic information on normal oral cavity and structures during

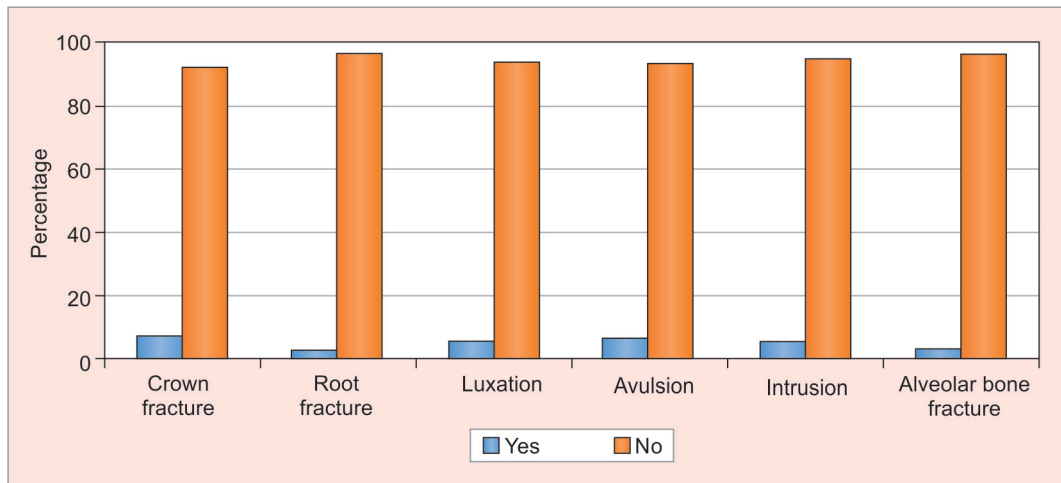
their premedical or foundation in science course. The only exposure to dental trauma patients that the medical student receives is during general surgery, orthopedics or accident, and emergency clinical postings when patients report with injuries to the head and neck region. However, most often due to the gravity of other injuries, dental traumatic injuries are usually overlooked.

The participants in the present study showed a low level of knowledge regarding emergency management of dental trauma. The findings presented here were consistent with those of other previously published studies.^{20,22-25} The main reason for the lack of knowledge in this area might be due to the high percentage of participants (87.4%) who stated that they never received any information on what to do if a tooth is knocked out. This is in accordance with the study by Díaz et al.²³ They reported 90.2% of nondental professionals in the emergency room had not received any formal training on diagnosis and emergency treatment of dental injuries. Lin et al²⁵ found that only 5.9% of physicians who took part in the study had received education regarding dental trauma. Similarly, Abu-Dawoud et al²¹ showed that the majority of the physicians (83.3%) surveyed had not received information on what to do if a tooth was avulsed. Among those who received such information, the main source of information was from magazines or the Internet (37.5%). In the present survey, a vast majority of the participants stated that dental trauma emergency management was neither a part of their undergraduate course (96.8%) nor did they undergo any first-aid course on the same (94.8%).

More than 90% of the participants in the present study stated that they did not have the knowledge or skill to diagnose various TDIs as depicted in Graph 2. Around 41.6% of the participants knew that to rule out aspiration of an avulsed tooth, a chest radiograph would be needed. This could be because chest radiographs are also needed in case of other traumatic injuries to the body or foreign body aspiration, which the medical students would have been exposed to during clinical postings. Majority of the participants (79%) were not aware that replantation of avulsed deciduous teeth could cause damage to the permanent successors.

The participants were also asked situation-based questions. The first situation was based on what first-aid advice they would give the parent of an injured child over the telephone. Majority of the respondents would either advise the parent to wrap the tooth in a clean piece of gauze and go to a dentist (56.8%) or were unaware of what should be done (29%). This indicates that the medical students were not adequately trained to give proper first-aid advice in such situations.

The second situation was what they would do if they were present at the site of accident where a tooth was avulsed. Majority of the respondents (67.7%) stated that



Graph 2: Response regarding the ability to diagnose various traumatic dental injuries

they would stop the bleeding, but only 6.8% were confident to place the tooth back into the socket. This may be because they were trained in emergency management of bleeding, but not for dental trauma. Although they were aware that avulsed teeth need professional help within 30 minutes of injury, most of them did not know the best way to hold the tooth or how to clean it (71.6%) (Table 2).

Around 80% of the respondents were unaware of the most suitable transport medium for avulsed teeth (Table 3). According to the IADT guidelines, HBSS, isotonic saline, milk, or saliva can be used as transport media. However, HBSS is omitted from the questions that were used in this survey as it is rarely available at the site of accident. A similar opinion is also shared by other authors who felt that HBSS may be not a feasible option since it is mostly unavailable at the site of accidents.^{10,26} Only 9 (4.7%) of the respondents were confident enough to replant the tooth back into its socket. The remaining respondents (95.3%) were either scared, not confident, or lacked adequate training in this area.

The curriculum for the medical students in each medical school in Malaysia is assessed by a central qualifying agency that makes sure that a similar standard is followed across all medical schools in the country. Various oral manifestations of systemic diseases and deficiency states are covered in their lectures related to the medical specialties. However, the medical students in Melaka had not received any lectures or training associated with dental trauma. Out of the 190 participants, 63.7% felt that it would be good to know the management of dental trauma in their clinical practice (Graph 1). However, when asked about making dental trauma management a part of their undergraduate course, their opinion was almost equally divided, with 48.4% of the participants stating their opinion of not wanting the management of TDIs to be covered in their undergraduate course since they already felt burdened by the heavy workload and vast

syllabus coverage. This is contrary to the study by Ulusoy et al²⁷ concerning the knowledge of Turkish physicians in emergency departments about the first-aid management of traumatic tooth avulsion, in which 78.3% reported that they would like further education. The present study had its limitations, the main one being that it cannot be generalized to other populations. Hence, further studies need to be planned in other parts of the country.

CONCLUSION

It can, therefore, be concluded that the participating medical students in the present study had low knowledge on the first-aid management of dental trauma. Medical professionals and paramedical personnel are most often the first to attend to victims of traumatic injuries at the site of accident or at the hospital emergency departments. Since most traumatic injuries involve trauma to dentofacial structures, it is of utmost importance that they have sound knowledge on the emergency management of dental trauma, especially of avulsed teeth. Various studies including the present study have shown that medical professionals/students have low knowledge in this area. Therefore, the authors would recommend that information on emergency management of dental trauma could be incorporated into their undergraduate curriculum. Such information may be delivered as lectures, CBL, clinical postings in hospital-based dental clinics, or first-aid workshops.

CLINICAL SIGNIFICANCE

Introducing dental trauma emergency management as a part of the medical curriculum can help educate and train the students to be competent future medical professionals with sound knowledge on first-aid management of avulsed teeth. They would be able to act efficiently and effectively, thereby reducing the extra-alveolar time and, hence, contributing to the better prognosis of such teeth.

APPENDIX 1

Questionnaire on Emergency Management of Tooth Avulsion

Instructions

1. Choose the best answer with a “√” mark.
2. Only one option per question should be ticked.
3. All the questions given in the questionnaire are to be answered.
4. Kindly do not take help from other sources to answer.

1. Roll number _____ Batch _____ Semester _____
2. Gender Male Female
3. Race Malay Chinese Indian Others: _____
4. Sponsorship Un-sponsored Sponsored
5. Did you have any first-aid course covering management of dental trauma during your study or training?
 Yes No
6. Have you ever received information on what to do if a tooth is knocked out?
 Yes No
7. If yes, then what is your source of information?
(a) Taught during undergraduate course
(b) Consultation with dentist
(c) Medical/dental literature
(d) Magazines/internet
(e) Friends
(f) Other sources. Specify _____
8. Is dental trauma emergency management a part of your undergraduate curriculum?
 Yes No
9. Can you differentiate between a primary and permanent tooth?
 Yes No
10. Upper permanent central incisor can usually be seen in the mouth from age...
(a) 5 years
(b) 7 years
(c) 9 years
(d) Do not know
11. Do you have sound knowledge and skill to diagnose the following:

<i>Clinical situation</i>	Yes	No
Crown fracture		
Root fracture		
Luxation of tooth		
Avulsion		
Intrusion of tooth		
Alveolar bone fracture		

12. In order to rule out aspiration of an avulsed tooth
(a) It is enough to check if the child has begun coughing
(b) It is enough to check lung ventilation with a stethoscope
(c) A chest radiograph should be taken
(d) Bronchoscopy is required
(e) Do not know
13. What is your opinion on replantation of avulsed primary teeth?
(a) Yes, in any circumstances.
(b) Yes, except in the case of an unconscious patient.

- (c) Yes, except in the case of avulsion of multiple teeth.
 - (d) Yes, depending on certain circumstances.
 - (e) No, in any circumstances.
 - (f) No opinion.
14. What is your opinion on replantation of avulsed permanent teeth?
- (a) Yes, in any circumstances.
 - (b) Yes, except in the case of an unconscious patient.
 - (c) Yes, except in the case of avulsion of multiple teeth.
 - (d) Yes, depending on certain circumstances.
 - (e) No, in any circumstances.
 - (f) No opinion.
15. You are informed by telephone that a child was injured and permanent tooth is missing. Which of the following will you recommend to the parents?
- (a) Wrap the tooth in a clean piece of gauze or handkerchief and look for a dentist quickly
 - (b) Replace the tooth back in the mouth as soon as possible and call a dentist
 - (c) Put the tooth in cold and fresh milk and look for a dentist
 - (d) Do not know
16. If you are present at a site of an accident where a 12-year-old boy knocked out one of his upper front teeth, what do you think is the most apt action?
- (a) Try and stop the bleeding
 - (b) Stop the bleeding and search for the tooth and put it back into the socket
 - (c) Stop the bleeding, search for the tooth, and call for help
 - (d) Ignore the tooth, stop the bleeding, and search for help
17. How fast do you think professional help should be sought in case of a tooth avulsion?
- (a) Within 30 minutes
 - (b) Within a few hours
 - (c) Within a day
 - (d) No need to seek professional help if bleeding is stopped
18. You found the avulsed tooth and it is dirty. What would you do?
- (a) Throw it because it is dirty
 - (b) Wipe the tooth with tissue paper or towel
 - (c) Clean the tooth with isopropyl alcohol or soap and water and a brush
 - (d) Rinse the tooth under tap water gently without scrubbing it
 - (e) Do not know
19. If you find an avulsed tooth, how would you handle the tooth?
- (a) By the crown
 - (b) By the root
 - (c) Anywhere
 - (d) Not sure
20. What would be the most suitable medium for storage?
- (a) Milk
 - (b) Tap water
 - (c) Isotonic saline
 - (d) Saliva
 - (e) Allow the tooth to dry and cover in sterile gauze
 - (f) No idea what medium to use
21. If you were at a site when someone has an avulsed tooth, you would
- (a) Call for help and take no other action because you lack knowledge and training
 - (b) Call for help and take no other action because you are scared
 - (c) Be confident and replant the tooth
 - (d) Not confident but still would attempt to replant the tooth

22. How important do you think is the knowledge of dental trauma management in your clinical practise?
 (a) Very important/important
 (b) Good to know
 (c) Not important as I am not a dentist
 (d) I do not know
23. Do you think dental trauma management should be covered in your undergraduate course?
 Yes No, because _____

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