Current Practices in the Management and Treatment of Avulsed Teeth: A Survey of Dentists in Manitoba, Canada

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Erin Roloff [1]

1 - Fourth-year DMD Student, B. Sc. (Dent) Applicant, Rady Faculty of Health Sciences, University of Manitoba, Canada

Abstract

Purpose: To evaluate current trends in the management and treatment of avulsed permanent teeth by dental practitioners in Manitoba and to compare these practices to current guidelines outlined by the International Association of Dental Traumatology (IADT).

Materials and Methods: A two-part questionnaire was distributed to members of the Manitoba Dental Association. The purpose of the first part of the questionnaire was to collect personal information. The second part of the questionnaire consisted of questions regarding the management and treatment of avulsed teeth based on the IADT guidelines. Responses from 120 participants were evaluated.

Results: 103 (85.83%) dentists surveyed were general dentists, while 17 (14.17%) were specialists. The number of avulsions treated by the practitioners surveyed ranged from zero to greater than ten cases. The responses were evaluated for adherence with the current IADT guidelines. Protocols in which the majority of responses were in agreement with IADT guidelines were: 1) storage time; 2) over-the-phone recommendation to parents of a child immediately following avulsion; 3) intra-canal medicament; 4) type of splint; 5) splinting time for avulsion without alveolar fracture; 6) most critical factors for avulsion management; 7) modifications for open versus closed apex; 8) management of avulsed primary teeth; and 9) antibiotic of choice for pediatric patients. Protocols in which a high number of responses were not in agreement with IADT guidelines were: 1) storage medium; 2) splinting time for avulsion with alveolar fracture; and 3) antibiotic of choice for adult patients. Non-adherence to the current IADT guidelines was evident in the latter three protocols. The responses in

these three focus areas were further analyzed to distinguish level of knowledge of general dentists versus specialists. It was found that adherence to the IADT guidelines by those respondents who identified as specialists surpassed that of those who identified as general dentists.

The study found that current practices by Manitoba dentists regarding the management and treatment of avulsions varies. In general, those respondents identifying as specialists showed greater knowledge and adherence to the IADT guidelines compared to those respondents identifying as general dentists. In nine of the 12 protocols assessed, the majority of participants' responses were in agreement with current IADT guidelines, whereas the majority of participants' responses were not in agreement with the other three. Thus, insufficient knowledge of the IADT exists in these focus areas. Continuing education and specialization were both found to be positively correlated with increased adherence to IADT guidelines.

Conclusion: The study highlighted the need for continuing education for dentists in Manitoba to improve the management and treatment of avulsed teeth. Three areas of insufficient knowledge as identified by the study were: 1) storage medium; 2) splinting time for avulsion with alveolar fracture; and 3) antibiotic of choice for adult patients. Compared to general dentists, specialists demonstrated improved knowledge of currently accepted guidelines for the treatment and management of avulsed teeth.

Keywords

Avulsion, Dental Trauma, Knowledge

Avulsion of permanent teeth is a critical dental injury. Knowledge and execution of appropriate emergency treatment is a key factor in successful outcomes of dental trauma (1). In 2012 the International Association of Dental Traumatology (IADT) facilitated the review of current best evidence-based and practice-based literature on the management of dental trauma by a group of experienced researchers and clinicians. This review lead to the 2012 publication of the IADT guidelines for the management of traumatic dental injuries, including the avulsion of permanent teeth (Appendix 3) (2).

This study was designed to evaluate current trends in the management and treatment of avulsed teeth and to compare these practices to guidelines outlined by the IADT. To date, no studies of this kind among dentists in Canada have been found. A literature review revealed similar studies in other countries highlighting the need for improved education regarding dental trauma (3, 4, 5, 6). Dentists recently surveyed in Beijing demonstrated the need for continuing education in the management of avulsed teeth (5). Studies recently conducted in the USA, Brazil, and China consistently revealed an insufficient level of knowledge regarding emergency treatment of tooth avulsion among those surveyed (3, 5, 7, 8). A survey of Polish dentists found that 63.2% of respondents had never treated an avulsed tooth, 68.45% had never taken continued education courses on the subject, and concluded that the dentists surveyed did not have the appropriate level of knowledge to manage avulsed teeth (6). Hamilton et al., (1997) showed that knowledge about splinting time of avulsed teeth and correct treatment of traumatized teeth was inaccurate (9). A recent Swedish study determined that the intervention of choice identified by most dental professionals was not consistent with accepted guidelines for the management of dental avulsion (7). The level of

knowledge with regard to avulsed teeth among health professionals in the United States was recently determined to be variable; statistically significant variations associated with relevant continuing education experience as well as the age of the practitioner were observed (8). A survey of general dentists in Brazil found that communication regarding avulsions between dentists and the general population, especially those involved in high risk and contact sports, is poor (4).

Outside the field of dentistry, knowledge on the subject of avulsions is also deficient (10). It is important that other health-providers and members of the public who are likely to encounter traumatic avulsions be educated. In 2009, a study conducted in Pakistan found that non-dentists, including medical doctors, do not have a sufficient level of knowledge to manage avulsed teeth (11). Although dentists demonstrated higher level of knowledge than other health care providers, deficiencies still exist thus more specific training is required. A survey comparing dentists and physicians found the majority of physicians surveyed had not been trained in the management of avulsions. Furthermore, most physicians reported no training whatsoever in the field of dental health during their education (11). A 1992 study of laypersons and professionals found that coaches of college sports teams had more personal experience with avulsed teeth than the dental professionals surveyed (12). This information highlights the importance of educating those individuals of the public who are more likely to encounter traumatic dental injuries, in addition to educating dental professionals.

The effectiveness of training on the subject of avulsions was demonstrated by a 2014 study, which showed that dental interns with prior experience and relevant continuing education had significantly better scores on a questionnaire regarding

treatment and management of dental avulsions (13). General dentists in Brazil with trauma experience and who had attended postgraduate courses had a significantly higher mean knowledge score as compared with those who received no additional training. Despite this result, the mean score was moderate (6.82 of 10), with a slightly higher mean for endodontists (3). This survey demonstrated generally poor knowledge among dentists, especially among general dentists. A Brazilian study regarding the effect of education was conducted on groups of professionals (i.e., elementary school teachers, physical education professionals, bank employees, dental doctors, and pediatricians). The results demonstrated a significant improvement in performance for all groups of professionals on questionnaires regarding the management of avulsions after a single lecture on the topic was given (14). Similar conclusions were made by a study evaluating the effectiveness of an educational session on avulsions given to emergency medical responders in Brazil (15). A study of schoolteachers in India enforced the hypothesis that educational intervention is an effective way to improve awareness of emergency management of tooth avulsion (16). Overall, the vast majority of literature reviewed found that the level of knowledge of the treatment and management of avulsed teeth is inadequate, and that further training for dental professionals, other health professionals, and laypeople is effective and necessary to improve awareness in this area.

Due to frequent revisions of guidelines, new research, and improvements in the management of dental trauma, it is expected that the knowledge of dental practitioners regarding this subject vary depending on years in practice and relevant continuing education experience. The objective of this study was to compare current practices of

dental professionals in Manitoba, Canada to the 2012 IADT guidelines and evaluate the need for continuing education, with the intention to apply the findings for strategic planning purposes in educational programs for both dental students and practitioners.

Materials and Methods

This study was reviewed and approved on July 2, 2015 by the Health Research Ethics, Ethics #HS18637 (H2015:225). A two-part, closed-ended questionnaire was developed for this study. The first part of the survey was designed to collect demographic data, including years of professional experience, avulsion cases treated, and relevant continuing education experience. The second part of the survey consisted of 12 questions to assess participants' current practices in the emergency treatment of avulsed teeth. An education specialist was employed to complete a review of each survey question for content validity, coherence and effectiveness. The survey was launched using the online platform SurveyMonkey™ (see Appendix 1). All the responses obtained were anonymous and confidential. Potential participants were assured that there exist no right or wrong answers, and advised to answer honestly to allow researchers to determine current practices in the management of avulsions.

Dentists and specialists registered with the Manitoba Dental Association (MDA) were employed as a sample population. An invitation to participate in the voluntary study and a link to the online questionnaire was distributed via email to all those dental practitioners registered with the MDA on three separate occasions over the course of three months. Of 700 MDA members, 122 responses were received, resulting in a response rate of 17.4%. Inclusion criteria for this study are individuals who are dental practitioners registered with the MDA, including general dentists, specialists, and

graduate students practicing dentistry in Manitoba, Canada. The number of responses determines the sample size. This population serves as a representative sample of the population of dentists currently practicing in Manitoba, Canada. Of interest to the present study are responses by general dentists and specialists regarding the management of dental avulsion. In order to replicate previous findings, correlations among variables were conducted to determine relationships among education, years of experience, number of continuing education courses take and expertise level. Alpha levels for the correlation were set at $p = 0.05$. Moreover, differences in responses in terms of frequency and percentages were compared to the IADT guidelines. Finally, of interest to the study were the differences in responses between general dentists and specialists. Differences between these two groups were measured using Chi square with alpha set at $p = 0.01$.

Results

Participant Demographics: A total of 122 participants responded to the survey. Two respondents were removed from the survey because they did not fit the eligibility criteria (e.g., a graduate student and a dental assistant). Of the remaining 120 participants, 103 (85.83%) were general dentists and 17 (14.17%) were specialists. Of the 17 specialists, seven (41.18%) were endodontists, five (29.41%) were oral and maxillofacial surgeons, three (17.63%) were orthodontists, and two (11.76%) were pediatric dentists. Only two (1.69%) of the respondents were IADT members.

Correlational Findings: Pearson's Correlation (see Table 1) was conducted on specialization, years since general dentist graduation, years since specialization graduation, total years of professional experience, number of CE hours specific to

dental trauma, avulsions treated, open versus closed apex treatment, replantation of primary teeth, and total IADT score (i.e., level of adherence to IADT guidelines). Binary variables (i.e., general dentist vs. Specialist, yes or no modification of treatment for open versus closed apex, and yes or no replantation of avulsed primary teeth) were converted to dummy variables and included in the correlations. Findings revealed positive correlations between years since graduation and number of CE courses taken; years of experience and number of CE courses taken; being a specialist versus a general dentist and number of dental avulsion treated; years since graduation and cases of dental avulsion treated; years of experience and the number of dental avulsion treated; CE courses taken specifically related to trauma and number of dental avulsions treated; CE courses taken specifically related to trauma and modifying treatment depending on open or closed apex; IADT guideline agreement and specialization; and finally, management primary avulsed teeth with total IADT scores.

Table 1: Pearson's Correlation among variables.

		1.	2.	3.	4.	5.	6.	7.	8
1. I am a: 1= general dentist; 2=specialist									
2. Years since general dentist graduation	PC	0.105							
	p	0.255							
	N	119							
3. Years since specialization graduation	PC	-0.179	.952**						
	p	0.381	0.000						
	N	26	26						
4. Total years of professional experience	PC	-0.044	.929**	.824**					
	p	0.633	0.000	0.000					
	N	120	119	26					
5. Number of continuing education hours specific to the treatment of traumatic dental injuries	PC	0.169	.442**	0.276	.436**				
	p	0.065	0.000	0.173	0.000				
	N	120	119	26	120				
6. Number of avulsions treated	PC	.370**	.482**	0.311	.402**	.473**			
	p	0.000	0.000	0.122	0.000	0.000			
	N	120	119	26	120	120			
7. Do you modify your treatment of the avulsed tooth depending on whether it has an open apex or a closed apex? 1=No;2=Yes	PC	0.126	-0.028	-0.142	-0.015	.211*	0.121		
	p	0.185	0.766	0.500	0.875	0.025	0.201		
	N	113	112	25	113	113	113		
8. Do you replant primary avulsed teeth? 1=No; 2=Yes	PC	0.084	-0.116	-0.282	-0.130	0.056	-0.105	0.025	
	p	0.379	0.225	0.172	0.171	0.559	0.268	0.795	
	N	112	111	25	112	112	112	112	
9. Total IADT Score (12 items)	PC	.231*	-.121	-.160	-.057	.023	.094	.382**	-.078

	p	.011	.190	.434	.539	.799	.309	.000	.413
	N	120	119	26	120	120	120	113	112

Note: PC = Pearson Correlation
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Descriptive Statistics: 12 (21.47%) of respondents reported they had received no continuing education specific to the treatment of traumatic dental injuries. 109 (90.83%) of respondents reported they had treated at least one case of dental avulsion during their career, while 35 (29.17%) reported they had treated more than 10 cases.

Overall Agreement with IADT Guidelines: Protocols in which the majority of responses were in agreement with IADT guidelines were: 1) storage time; 2) over-the-phone recommendation to parents of a child immediately following avulsion; 3) intra-canal medicament; 4) type of splint; 5) splinting time for avulsion without alveolar fracture; 6) most critical factors for avulsion management; 7) modifications for open versus closed apex; 8) management of avulsed primary teeth; and 9) antibiotic of choice for pediatric patients. Protocols in which a high number of responses were not in agreement with IADT guidelines were: 1) storage medium; 2) splinting time for avulsion with alveolar fracture; and 3) antibiotic of choice for adult patients.

Storage Medium: According to IADT guidelines, Hank's balanced salt solution (HBSS) and milk are acceptable for the short-term storage of an avulsed tooth (2). 49.11% of respondents selected an acceptable medium. 47.32% selected an unacceptable medium. 3.57% were unsure. 82.35% of specialists selected an acceptable medium while only 43.16% of general dentists selected an acceptable medium. The immediate storage of an avulsed tooth in an appropriate physiologic medium has been identified as the most important factor for healing after replantation (17, 18,19).

Splinting Time for Avulsion with Alveolar Fracture: According to IADT guidelines, four week is the recommended splinting time for an avulsed tooth with alveolar fracture (2). In contrast, only two weeks of splinting is recommended in simple avulsions (without fracture of the root or alveolus) (2). 22.12% of respondents selected the appropriate response in accordance with current IADT guidelines. 60.18% of respondents selected an inappropriate response. 17.70% were unsure. 41.18% of specialists selected the appropriate response, while 18.75% of general dentists selected the appropriate response. 20.83% of general dentists were unsure of the acceptable splinting time. No evidence was found to support the four-week splinting protocol for avulsion with alveolar fracture. In a recent study, the duration of splinting was found to have no effect on healing outcomes (specifically pulp necrosis) of teeth involved in dentoalveolar fracture (20). Four to eight weeks of fixation was found to be the accepted protocol for the management of alveolar fracture or other facial fractures (21, 22).

Antibiotic of Choice for Adult Patients: According to IADT guidelines, the value of systemic antibiotics for the management of dental avulsion is still in question. However, in most situations tetracycline is the recommended systemic antibiotic for adult patients undergoing replantation following traumatic avulsion (2). This indefinite recommendation may account for variation of responses among those individuals surveyed. However, adhering strictly to the 2012 IADT guidelines, tetracycline was accepted as the most appropriate response. The use of systemic tetracycline after replantation of avulsed teeth has been shown to decrease the incidence of root resorption and increase the success of revascularization of the pulp in animal studies (23). In addition to their antimicrobial effect, tetracyclines inhibit matrix metalloproteinases to reduce pathologic

resorption (23, 24). Animal studies have shown improved healing and survival of replanted teeth with systemic tetracycline administration compared to amoxicillin (penicillin) and no systemic antibiotics (25). 9.73% of respondents selected tetracycline. 35.40% of respondents selected other antibiotics. 38.05% of respondents selected no need for antibiotics. 16.81% of respondents were unsure. 23.53% of specialists and 7.29% of general dentists selected tetracycline as the most appropriate response.

A survey of military dental practitioners' knowledge of 2007 IADT guidelines conducted in 2009 showed the same deficiency, with highest proportion of incorrect responses related to the use of tetracycline as an antimicrobial agent in the management of avulsion (26). Consistent lack of knowledge related to this protocol warrants further education about the use of systemic antibiotics following replantation

Differences in Alignment between General dentists and Specialists: In order to better understand the differences between general dentists and specialists in terms of adherence to IADT guidelines, Chi square analyses were conducted on 12 items related to avulsion management according to the IADT. The participant responses were converted to a binary code as either aligning with or not aligning with the IADT guidelines. A total of three statistically significant Chi square results were found. Compared to general dentists, specialist were more likely to align with the IADT guidelines on the optimal medium for an avulsed tooth (X^2 (1, N = 120) = 10.64 p <.001); on the type of splint used (X^2 (1, N = 120) = 6.93 p <.008); and on the recommend splinting time for avulsion without alveolar fracture (X^2 (1, N = 120) = 11.72 p <.001). Finally, a total score was generated based on the number items in which each participant aligned with IADT guidelines. The total IADT alignment scores revealed

statistically significant results such that specialist had higher IADT alignment scores (M = 8.29, STD = 1.45, N = 17) than general dentists (M = 6.60, STD = 2.63, N = 103), $F(1,118)=6.61$, MSE = 41.78, $p < .01$.

Discussion

Appropriate emergency management is critical to the successful treatment of permanent tooth avulsion (1). Guidelines published by the IADT based on the current best evidence-based and practice-based literature aim to reduce the morbidity of dental trauma through education (2).

The study found that avulsion is a traumatic dental injury encountered by most dentists surveyed on one or more occasions during their career. However, nearly one quarter of dentists surveyed had not received continuing education relevant to the management and treatment of avulsions. The vast majority of respondents were not members of the IADT. There is a lack of knowledge of certain protocols according to the currently accepted IADT guidelines for the management avulsions among dentists surveyed.

The study found that most practices by Manitoba dentists surveyed regarding the management and treatment of avulsions are in agreement with most IADT guidelines. Three focus areas revealed treatment protocols not in accordance with current guidelines - storage medium, splinting time with alveolar fracture, and antibiotic choice for adult patients. Further education and awareness is necessary to increase dentists' adherence to IADT guidelines within these areas.

Findings revealed higher adherence to IADT guidelines is positively correlated to a higher level of education and knowledge (i.e., CE hours, years of experience, number

of avulsions treated, and specialization). Compared to general dentists, specialists were more likely to align with IADT guidelines regarding storage medium, type of splint, and splinting time. Overall, specialists reported management protocols that were more aligned with current IADT guidelines compared to general dentists.

Conclusions

The purpose of this study was to evaluate current trends in the management and treatment of avulsed permanent teeth by dental practitioners in Manitoba and to compare these practices to current guidelines outlined by the IADT. The study highlighted the need for continuing education for dentists in Manitoba to improve the management and treatment of avulsed teeth. Three areas of insufficient knowledge as identified by the study were: 1) storage medium; 2) splinting time for avulsion with alveolar fracture; and 3) antibiotic of choice for adult patients. Compared to general practitioners, specialists demonstrated improved knowledge of currently accepted guidelines for the treatment and management of avulsed teeth.

The findings have implications for both education as well as future research. Improved management of dental trauma by practitioners begins with the education of DMD students as well as specialty students while in school. Due to evolving knowledge regarding the management and treatment of dental trauma, continuing education is important for current general practitioners and specialists. Replication of this study with a larger pool of general dentists and specialists from across Canada is recommended to provide a national perspective on current practices in the management and treatment of avulsed teeth. Similar research may be conducted on other Canadian health professionals including medical doctors, nurses, dental hygienists, dental assistants,

and emergency first-responders. A Canadian survey of those laypersons likely to encounter traumatic avulsions (e.g., elementary schoolteachers, sports coaches, parents of young children) would also be beneficial to assess public awareness of management protocols.

Improved education and further research is recommended to assess knowledge and execution of appropriate treatment for avulsed teeth. Emergency protocols are a key factor in the successful management of traumatic dental avulsions.

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Appendices

Appendix 1: Survey Parts 1 & 2 - Practices in the Management and Treatment of Avulsed Teeth

Appendix 2: Preferred Responses for Survey Part 2: Knowledge of Treatment and Management of Avulsed Teeth According to the IADT Guidelines

Appendix 3: 2012 IADT Guidelines

Appendix 1: Survey Parts 1 & 2 - Practices in the Management and Treatment of Avulsed Teeth

Dear Members of the Manitoba Dental Association,

Your participation would be greatly appreciated in a survey regarding current practices in the management and treatment of avulsed teeth.

Fourth-year dental student Erin Roloff, Dr. Dieter Schonwetter (Director, Educational Resources & Faculty Development), and Dr. Rodrigo Cunha (Department of Restorative Dentistry, Endodontology) from the University of Manitoba, Rady Faculty of Health Sciences, College of Dentistry are conducting this survey to help identify current practices among dental practitioners with regard to the management and treatment of avulsed teeth. Your input will be used for strategic planning purposes in educational programs for both dental students and dental practitioners.

Your feedback will be collected through an online survey, which will ask a series of 21 questions and should take 5-8 minutes to complete.

Your participation on this line survey is completely voluntary. You are not required to provide any personal information such as your name, address, or telephone number. You do not have to answer any questions you do not wish to. The survey system will not record your e-mail address or Internet Protocol address.

The risks of participating are extremely low, given the anonymous nature of the data collection process. If you agree to participate, please note that you must complete the survey in one sitting. In other words, the system will not let you save your survey responses and return to complete them later. Also, please note that when you submit your responses, you will not be able to withdraw them, as we cannot link the survey responses back to you.

Your participation is important to us and will help us identify current trends in the management and treatment of avulsed teeth. If you have any questions about this study, please do not hesitate to contact Dr. Cunha at 1-204-789-3239 or rrodrigo.endodontics@gmail.com.

This study has been approved by the University of Manitoba Health Research Ethics Board.

By completing the online survey you are consenting to participate in the study.

We are grateful for a few minutes of your valuable time.

Instructions:

Please note that there are no right answers. This study focuses only on identifying current trends in terms of the management and treatment of avulsed teeth. Please answer each question. The survey is completely anonymous and results for groups, not individuals, will be used to help guide the strategic planning.

Thank you in advance,

Best regards,

Erin Roloff, B.Sc. Student

Dieter J. Schönwetter BTh BA MA PhD
Professor
Director, Educational Resources and Faculty Development
College of Dentistry and School of Dental Hygiene
Rady Faculty of Health Sciences

Rodrigo Sanches Cunha, DDS MSc PhD FRCD(C)
Department of Restorative Dentistry, Endodontology
(204) 789-3239
rodrigo.endodontics@gmail.com

1. I am a:

- ◯ General Dentist
- ◯ Specialist
- ◯ Dental Assistant
- ◯ Other (please specify)

2. When did you complete your DMD, DDS or Dental Assistant training?

3. When did you complete your postgraduate training?

4. If you are a specialist, what's your area of expertise:

- ◯ Dental Public Health
- ◯ Endodontics
- ◯ Oral and Maxillofacial Surgery
- ◯ Oral Medicine and Pathology
- ◯ Oral and Maxillofacial Radiology
- ◯ Orthodontics and Dentofacial Orthopedics
- ◯ Pediatric Dentist
- ◯ Periodontics
- ◯ Prosthodontics
- ◯ Restorative Dentist
- ◯ Other (please specify)

5. Total years of professional experience (number of years practicing as a dentist):

- ◯ Less than 5 years
- ◯ 5 to 10 years
- ◯ 11 to 14 years
- ◯ 15 to 20 years
- ◯ 21 to 25 years
- ◯ 26 to 30 years
- ◯ More then 30 years

6. Years of "specialized" professional experience (number of years practicing within your specialty)

- ◯ Less than 5 years
- ◯ 5 to 10 years
- ◯ 11 to 14 years
- ◯ 15 to 20 years
- ◯ 21 to 25 years
- ◯ 26 to 30 years
- ◯ More then 30 years

7. Approximately how many continuing education hours specific to the treatment of traumatic dental injuries have you received?

8. How many case(s) of dental avulsion have you treated in your dental career?

9. Are you a member of the International Association of Dental Traumatology (IADT)?

- ◯ No
- ◯ Yes

Part 2: Knowledge of Treatment and Management of Avulsed Teeth According to the IADT Guidelines

Please select the best answer for the following eleven questions. Select the option that best describes the treatment you prescribe for permanent tooth avulsion (only ONE answer). All questions refer to permanent tooth avulsion, except question 19, which addresses primary tooth avulsion.

10. What is considered the critical time for treatment of an avulsed tooth?

- ◯ 20 minutes
- ◯ 20-60 minutes
- ◯ 60-120 minutes
- ◯ Unsure

11. When parents of a child are calling you reporting tooth avulsion that just happened few minutes ago, what will be the most preferable (#1) recommendation you will instruct over the phone?

- ◯ Rinse the tooth under water and come to the practice
- ◯ Rinse the tooth under water and replant at the site of injury and come to the practice
- ◯ Place the tooth in milk and come to the practice
- ◯ Grab the tooth, place into a dry cup and come to the practice
- ◯ It is contraindicated to replant avulsed teeth, so just control the bleeding with pressure
- ◯ Unsure

Other (please specify)

[ ]

12. What is the optimal storage medium for an avulsed tooth?

- ◯ Hank's balanced salt solution (HBSS)
- ◯ Patient's mouth (saliva)
- ◯ Saline solution
- ◯ Dry paper towel
- ◯ Milk
- ◯ Calcium hydroxide
- ◯ Unsure

Other (please specify)

13. What intra-canal medicament is recommended for root canal treatment of an avulsed tooth?

- ◯ Antibiotic paste
- ◯ Zinc oxide paste
- ◯ Calcium hydroxide paste
- ◯ Corticosteroids paste
- ◯ Unsure

Other (please specify)

14. What type of splint is recommended to stabilize a replanted tooth?

- ◯ Rigid
- ◯ Flexible
- ◯ Does not matter if the splint is rigid or flexible
- ◯ Unsure

15. What is the recommended splinting period for an avulsed tooth**with** alveolar fracture?

- ◯ Up to 2 weeks
- ◯ 4 weeks
- ◯ 6 weeks
- ◯ 8 weeks or longer
- ◯ Unsure

16. What is the recommended splinting period for an avulsed tooth**without** alveolar fracture?

- ◯ Up to 2 weeks
- ◯ 4 weeks
- ◯ 6 weeks
- ◯ 8 weeks or longer
- ◯ Unsure

17. What is considered the most critical factor that influences the outcome of replantation of an avulsed tooth?

- ◯ Storage medium only
- ◯ Storage medium and duration of extra-oral dry time
- ◯ Duration of extra-oral dry time
- ◯ Splinting period
- ◯ Timing of initiating root canal treatment
- ◯ Accuracy of replacement of the avulsed tooth
- ◯ Unsure
- ◯ Other (please specify)

18. Do you modify your treatment of the avulsed tooth depending on whether it has an open apex or a closed apex?

- ◯ Yes
- ◯ No
- ◯ Unsure

19. Do you replant primary avulsed teeth?

- ◯ Yes
- ◯ No
- ◯ Unsure

20. What is the antibiotic (systemic) of choice for treatment of an avulsed tooth in an adult patient?

- ◯ Tetracycline
- ◯ Amoxicillin/Penicillin
- ◯ Clindamycin
- ◯ Azithromycin
- ◯ No need for antibiotics
- ◯ Unsure
- ◯ Other (please specify)

21. When antibiotics are indicated, what is the antibiotic of choice for treatment of an avulsed tooth in a patient less than 12 years of age?

- ◯ Tetracycline
- ◯ Amoxicillin/Penicillin
- ◯ Clindamycin
- ◯ Azithromycin
- ◯ No need for antibiotics
- ◯ Unsure
- ◯ Other (please specify)

Please click on the "Done" button at the lower left bottom of the screen.

Thank you for participating in this study. If you wish to have a copy of the results, please send an email request to:

Rodrigo Sanches Cunha, DDS MSc PhD FRCD(C)
Department of Restorative Dentistry, Endodontology
(204) 789-3239
rodrigo.endodontics@gmail.com

Appendix 2: Preferred Responses for Survey Part 2: Knowledge of Treatment and Management of Avulsed Teeth According to the IADT Guidelines

10. What is considered the critical time for treatment of an avulsed tooth?

(b) 20-60 minutes

11. When parents of a child are calling you reporting tooth avulsion that just happened few minutes ago, what will be the most preferable (#1) recommendation you will instruct over the phone?

(b) Rinse the tooth under water and replant at the site of injury and come to the practice

12. What is the optimal storage medium for an avulsed tooth?

(a) Hank's balanced salt solution (HBSS) or (d) Milk

13. What intra-canal medicament is recommended for root canal treatment of an avulsed tooth?

(c) Calcium hydroxide paste

14. What type of splint is recommended to stabilize a replanted tooth?

(b) Flexible

15. What is the recommended splinting period for an avulsed tooth **with** alveolar fracture?

(b) 4 weeks

16. What is the recommended splinting period for an avulsed tooth **without** alveolar fracture?

(a) Up to 2 weeks

17. What is considered the most critical factor that influences the outcome of replantation of an avulsed tooth?

(b) Storage medium and duration of extra-oral dry time

18. Do you modify your treatment of the avulsed tooth depending on whether it has an open apex or a closed apex?

(a) Yes

19. Do you replant primary avulsed teeth?

(b) No

20. What is the antibiotic (systemic) of choice for treatment of an avulsed tooth in an adult patient?

(a) Tetracycline

21. When antibiotics are indicated, what is the antibiotic of choice for treatment of an avulsed tooth in a patient less than 12 years of age?

(b) Amoxicillin/Penicillin

Appendix 3: 2012 IADT Guidelines

https://www.iadt-dentaltrauma.org/1-9%20%20iadt%20guidelines%20combined%20-%20lr%20-%2011-5-2013.pdf