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Knowledge of lay people and dentists in emergency management of dental trauma

Jefferson Traebert¹, Maria Luiza Traiano², Ricardo Armênio², Dayse Bortoluzzi Barbieri², Josimari Telino de Lacerda³, Wagner Marcenes⁴

¹Grupo de Pesquisa em Saúde Bucal Coletiva – Universidade do Sul de Santa Catarina, Tubarão, SC, Brazil; ²Faculdade de Odontologia – Universidade do Oeste de Santa Catarina, Joaçaba, SC, Brazil; ³Departamento de Saúde Pública – Universidade Federal de Santa Catarina, Florianópolis, SC, Brazil; ⁴Centre for Oral Biometrics, Dental Institute, Barts and The London, QMUL University of London, London, UK

Correspondence to: Dr Jefferson Traebert, Rua Dr Armínio Tavares, 111/302, Florianópolis-SC, Brazil, 88015-250 Tel.: +55 48 36213363 Fax: +55 48 32434390 e-mail: jefferson.traebert@unisul.br Accepted 22 January, 2009 Abstract - The multidisciplinary nature of the follow-up evaluations of traumatic dental injuries (TDI) requires that both the lay public and practitioners possess knowledge of the treatment strategies involved. The aim of this paper was to assess the level of knowledge of elementary public schoolteachers, parents and dentists of the city of Joaçaba, Southern Brazil, about the emergency management of TDI. Three independent cross sectional studies were carried out involving samples of elementary public schoolteachers (n = 245), parents (n = 107) and dentists (n = 85) in the city in 2001. Data were collected through structured interviews for schoolteachers and dentists, and questionnaires for parents, containing questions about socio-demographic characteristics and about incidents resulting in TDI. The responses in the three studies showed a wide variability of indicated procedures for the situations of TDI proposed. The results of association studies showed that older schoolteachers (P = 0.003), older dentists (P = 0.013) and dentists who had graduated more recently (P = 0.032) chose significantly more correct answers in some TDI incidents. The answers of schoolteachers, parents and dentists showed a wide variability of indicated procedures for the situations proposed. The great majority of them would not follow the approaches most recommended in the literature. A greater importance should be placed on TDI through educational campaigns aiming schoolteachers and parents and also through undergraduation and postgraduation dental curricula in order of improving its management.

It is important to provide appropriate immediate emergency care in cases of traumatic dental injuries (TDI). Favourable healing after an avulsion injury requires quick emergency intervention followed by evaluation and treatment at decisive times during the healing phase (1). Immediate and appropriate treatment, together with long-term follow-up, lead to a favourable prognosis for the traumatized tooth (2, 3). The multidisciplinary nature of the follow-up evaluations requires that both the lay public and practitioners possess knowledge of the treatment strategies involved (1).

As many incidents occur at home and at school, the participation of parents and schoolteachers in the emergency situation is fundamental to provide correct care to the injured child (4). Few studies have investigated the knowledge of schoolteachers about the emergency management of TDI (5, 6). In Hong Kong, only 17.5% of investigated physical education teachers demonstrated the ability to indicate appropriate management for an avulsed tooth (7). In Brazil, elementary schoolteachers answered questions regarding dental avulsion intuitively rather than on an informed basis (4). Another study showed the lack of knowledge of teachers on tooth

avulsion (8). In Jordan, the school health teachers' knowledge with regards to the emergency management of TDI cases was considered to be deficient (9).

Similarly, children's parents have very little knowledge concerning what to do when the incident occurred at home. Indeed, few studies have addressed this question. In Singapore, a study showed that knowledge on some critical aspects of the handling of avulsed teeth by parents was poor (10). A study performed in Nigeria showed that 90% of parents would seek professional help urgently following an avulsion injury, but their knowledge of transport medium for the tooth was poor and the great majority had never received advice on what to do in the event of TDI (11).

Meanwhile, the dentist is another key part of the immediate assistance that can improve the prognosis. However, there are few professionals interested in studying TDI, with the result that the only information available refers to treated cases, and little is known regarding long-term complications resulting from TDI (12). In addition, many problems can arise because of the failure of professionals to make clear to parents the necessary care for the child who has suffered TDI and

the importance of periodic visits after the first consultation. In Britain, dentist's overall knowledge of the emergency treatment of TDI in children was considered inadequate and a greater emphasis on undergraduate and postgraduate education was indicated (13, 14). In Brazil one study reported a wide variability of indicated procedures for the situations of TDI proposed and showed that the great majority of the professionals would not follow the approaches most recommended in the literature (15). The objective of this study was to assess the level of knowledge of public schoolteachers, parents and dentists of the city of Joaçaba, Southern Brazil about the emergency management of TDI.

Material and methods

Three independent cross sectional studies were carried out. For the calculation of the samples, a confidence level of 95% and an accuracy level of 2% were adopted for the studies involving schoolteachers and dentists. An accuracy level of 5% was adopted for the study involving parents. An unknown prevalence of the investigated phenomenon in each study (P = 50%) was also adopted, as this is the value which allows the greater variance. The total number of schoolteachers and dentists working in the city of Joaçaba, Brazil in the year 2001 were 247 and 89, respectively. The total number of 12-year-old schoolchildren enrolled in the same year was 346 and this number was considered for the parent's study sample calculation. Ten per cent was added to the number found in each sample to compensate for possible refusals, giving a total sample size of 224 schoolteachers, 201 parents and 72 dentists.

In the first study, with elementary schoolteachers, it was decided to invite all 247 professionals working at the 19 public schools in the city to participate. The local education authority authorized the study and provided the names and addresses of all the schools in the city and the total number of elementary schoolteachers in each school. Information was collected by means of a structured interview containing questions concerning gender and years of study. In addition, three open questions were asked regarding procedures related to a hypothetical TDI incident at the school involving a student. The teacher was asked how he/she would act in the following situations: (i) if a child showed or told him/her about an anterior permanent tooth which had fallen out after an incident; (ii) if a child showed or told him/her about an anterior permanent tooth which had been fractured after an incident; (iii) if a child showed or told him/her about an incident in which they had hit their mouth on the ground, but was unhurt.

In the second investigation, 201 randomly selected parents of 12 year-old children were invited to participate. As in the first study, the local education authority authorized the investigation and provided the names and addresses of all the schools in the city and the total number of 12 years-old schoolchildren in each school. The parents' level of knowledge regarding the procedures in relation to TDI was determined by means of a questionnaire with open questions addressing three different situations: (i) if your child had an incident that affected only the teeth, for example if a tooth fell out, what action would you take? (ii) if your child had an incident that affected only the teeth, for example breaking a tooth, what action would you take? and (iii) if your child had an incident involving the mouth, for example falling and hitting the mouth on the ground without hurting themselves, what action would you take?

A third cross sectional study was performed involving all 89 dentists practicing in the city in the first semester of 2001. Information was collected by means of a structured interview containing questions concerning gender, time elapsed since initial qualification and attendance on postgraduate courses. In addition, four questions were asked regarding procedures related to the treatment of TDI, in which the dentist was asked how they would act in the following situations: (i) avulsion of the right upper central incisor in a 12 year-old patient, who has brought the tooth with him/her; (ii) avulsion of the right upper central incisor in a 12 year-old patient, who has not brought the tooth with him/her; (iii) fracture of the enamel and dentine of the right upper central incisor in a 12 year-old patient; (iv) a 12 year-old patient who had hit the mouth on the ground, but was unhurt.

In the studies involving schoolteachers and dentists, two trained dentists applied the interviews. In the study involving parents, questionnaires were sent to parents through their children with the schoolteachers' helping. For the classification of the given answers as correct or incorrect, it was used the most recommended approaches in the dental literature (1, 12, 16, 17). Three independent pilot studies were performed involving different populations from the main studies, to test the proposed methodologies. As results, it was showed that the methodologies were applicable in the local situations.

The overall knowledge of schoolteachers, parents and dentists were shown in a descriptive way. For the association studies, the level of knowledge of schoolteachers and dentists regarding TDI, as seen through the proportion of responses considered correct, were considered as dependent variables. Schoolteachers' gender, age and schooling were considered as independent variables in the first study. Dentists' gender, age, time as qualification and postgraduate study were considered independent variables for the third study. To examine possible associations between the independent variables and the responses to each situation, contingency tables were used, employing the chi-squared test or Fisher's exact test, when appropriate. The research projects were submitted to and approved by the Ethics Committee for Research at the Universidade do Oeste de Santa Catarina, Brazil.

Results

Of a total of 247 schoolteachers invited to participate in the study, 245 were interviewed, giving a response rate of 99.2%. Among those interviewed, 34 (13.9%) were male and 211 (86.1%) were female. The mean age was 36.2 years (SD = 9.7) and the median was 36. In relation to level of schooling, the mean years of study was 15.9 (SD = 2.8) and the median was 16. Of all those interviewed, 11.4% chose the response considered

Table 1.	Distribution of schoolteachers' a	answers for	situations
1, 2 and	3. Joaçaba, Brazil		

Table 2. Distribution of parents' answers for situations 1, 2 and 3. Joaçaba, Brazil

Number	Answer	п	%
	Situation 1 – permanent anterior too	oth fallen out	t
1	Call the parents	02	0.8
2	Send to the doctor	11	4.5
3	Send to the dentist	15	6.1
4	Put the tooth in the alveolus,	28	11.4
	call the parents and look for		
	a dentist immediately		
5	Keep the tooth in a dry place and	02	0.8
	call the parents		
6	Keep the tooth in a dry place, call	121	49.5
	the parents and look for a dentist		
	immediately		
7	Store the tooth in milk and look	13	5.3
	for a dentist immediately		
8	Store the tooth in another liquid,	38	15.5
	call the parents and look for a		
	dentist immediately		
9	Keep the tooth in a dry place and	01	0.4
10	look for a doctor.		
10	Other answers	11	4.5
11	Do not know	03	1.2
	lotal	245	100.0
10	Situation 2 – permanent anterior too	of tractured	0.4
12	Do not do anything		0.4
13	Recover the tooth tragment,	211	80.1
	call life parents and look for		
14	a defilist infinediately	14	F 7
14	Send to the denust without the	14	5.7
15		01	0.4
15	Do not know	18	0.4 7.4
10	Total	245	100.0
	Situation $3 - $ bit the mouth	240	100.0
17	Do not do anything	30	12.2
18	Send to the dentist	79	32.2
19	Send to the doctor	09	3.7
20	Send to the nurse	02	0.8
21	Inform the parents	92	37.6
22	Do not know	33	13.5
	Total	245	100.0
Correct answer	rs are italicized in table.		

correct for situation 1 (answer number 4 - Table 1); 86.1% chose the response considered correct for situation 2 (answer number 13 - Table 1), while 32.2% and 37.6% chose the responses considered correct for situation 3 (answers number 18 and 21 - Table 1).

Of a total of 201 randomly selected parents of children aged 12 years enrolled in the schools, 107 parents returned the questionnaires, giving a response rate of 53.2%. Of these, 56 (52.2%) were male and 51 (47.7%) were female. In relation to schooling, the mean number of years of study was 7 (SD 3.8) and the median was 6. For situation 1, only two parents (1.9%) responded that they would re-insert the tooth in the alveolus and look for a dentist (answer 3 – Table 2). Concerning situation 2, 72.9% of the parents would chose the response considered correct (answer 7 – Table 2) and for situation 3, only 12.1% would chose the correct answer (answer 11 – Table 2).

Number	Answer	п	%			
	Situation 1 - incident affecting	only teeth.	Permanent			
	anterior tooth fallen out					
1	Send to the doctor	09	8.4			
2	Send to the dentist without	07	6.5			
3	Place the tooth in posi- tion (in the alveolus) and look for a dentist	02	1.9			
4	Keep the tooth in a dry place and look for a dentist	80	74.8			
5	Store the tooth in any liquid and look for a dentist ¹	09	8.4			
	Total	107	100.0			
	Situation 2 – incident affecting tooth fractured	only teeth.	Permanent			
6	Do nothing	06	5.6			
7	Recover the tooth fragment and look for a dentist	78	72.9			
8	Send to the dentist without the tooth	22	20.6			
9	Keep the tooth in a dry place and look for a dentist	01	0.9			
	Total	107	100.0			
	Situation 3 – falling and hitting the mouth on the ground without hurting					
10	Do nothing	83	77.3			
11	Send to the dentist	13	12.1			
12	Send to the doctor	03	2.8			
13	Call the dentist and talk to them	03	2.8			
14	Seek a radiograph	05	4.7			
	Total	107	100.0			

Of a total of 89 dentists, 85 professionals were interviewed, giving a response rate of 95.5%. Among those interviewed, 50 (58.8%) were male and 35 (41.2%) were female. The age of the dentists interviewed varied from 22 to 65 years and the median was 34 years. In relation to time elapsed since qualification, 45 (52.9%) dentists reported that they had more than 10 years of postqualification experience. In relation to postgraduate education, 41.2% reported attendance on postgraduate courses. Of all those interviewed, 12.9% chose the response considered correct for situation 1 (answer 7 -Table 3) while the remaining professionals said they would adopt alternative approaches or even partially correct approaches. In situation 2, 10.6% of the dentists chose the alternatives considered correct (answers 10, 11 and 12 - Table 3). In situation 3, 21.2% of the dentists chose the alternative considered correct (answer 20 - Table 3) and in situation 4, the percentage of professionals who gave the response considered correct was 4.7% (answer 27 - Table 3).

The results of association studies between proportion of correct answerers for situations 1, 2 and 3 and teachers' gender, age and years of schooling are shown

Table 3. Distribution of dentists' answers for situations 1, 2, 3 and 4. Joaçaba, Brazil

Situation 1 - avuision. Tooth with patient 2 1 Would not re-implant under any conditions and carry out contantion 28 3 3 Would re-implant under any conditions and carry out contention 28 3 4 Would re-implant, carry out contention, medicate the patient and perform 4 5 Would re-implant, carry out contention, medicate the patient and perform 4 6 Would re-implant, carry out contention, with endodotic treatment and follow-up 1 7 The need for care of the avuised tooth, such as washing in saline 11 7 The need for care of the avuised tooth, such as washing in saline 1 8 Would not know how to at 1 7 Total 85 10 9 Would locate the tooth; if conditions were favourable, would re-implant. 18 2 10 Obtain the tooth and reimplant regardless 7 1 1 11 Carry out a clinical exam, with deaning and suture of the alveolus and 31 3 1 13 Would carry out a clinical exam, with deaning and suture of the alveolus; would 11 1 14	Number	Answer	п	%
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		Total	85	100.0
	Correct coourses	re italiaizad in table		

in Table 4. In situation 1, teachers with more than 36 years of age gave a higher proportion of correct responses than their colleagues with up 36 years of age (P = 0.003).

Finally, the results of association studies between proportion of correct answers for situations 1, 2, 3 and 4 and dentists' gender, age, time since qualification and postgraduate study are shown in Table 5. Only in situation 2, older dentists (P = 0.013) and less-experienced dentists (P = 0.032) chose significantly more correct answers than their younger and more experienced colleagues, respectively.

Discussion

The response rates of the studies involving schoolteachers and dentists were excellent. However, for the study involving parents of children, the response rate was lower and the main reason for the lack of response was related by children was forgetfulness of bringing the questionnaire from home.

Authors believe that the immediate treatment for avulsion is reimplantation, even in adverse conditions (1, 12, 16, 17) such as the situation in which many schoolteachers would find themselves in incidents in the

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	Situation 1 – permanent anterior tooth fallen out		Situation 2 – permanent anterior tooth fractured		Situation 3 – hit the mouth	
Variables	Correct n (%)	Incorrect n (%)	Correct n (%)	Incorrect n (%)	Correct n (%)	Incorrect n (%)
Gender						
Male	5 (14.7)	29 (85.3)	28 (82.4)	6 (17.6)	11 (32.4)	23 (67.6)
Female	23 (10.9)	188 (89.1)	183 (86.7)	28 (13.3)	68 (32.2)	143 (67.8)
P*	0.517	、 ,	0.493	· · ·	0.988	
Years of age						
Up to 36	7 (5.6)	119 (94.4)	107 (84.9)	19 (15.1)	36 (28.6)	90 (71.4)
More than 36	21 (17.6)	98 (82.4)	104 (87.4)	15 (12.6)	43 (36.1)	76 (63.9)
P*	0.003	, , , , , , , , , , , , , , , , , , ,	0.576	· · ·	0.206	× ,
Years of schooling						
More than 16	10 (10.2)	88 (89.8)	89 (90.8)	9 (9.2)	30 (30.6)	68 (69.4)
Up to 16	18 (12.2)	129 (87.8)	122 (83.0)	25 (17.0)	49 (33.3)	98 (66.7)
P*	0.623	× ,	0.083	、 ,	0.655	× ,
*Chi-squared test.						

Table 4. Associations between schoolteachers' gender, age and years of schooling and responses to situations 1, 2 and 3. Joaçaba, Brazil

Table 5. Associations between dentists' gender, age, time since qualification and post-graduate study and responses to situations 1, 2, 3 and 4. Joaçaba, Brazil

	Situation 1 – avulsion. Tooth with patient		Situation 2 – avulsion. Tooth not with patient		Situation 3 – fracture of enamel and dentine		Situation 4 – falling and hitting the mouth on the ground without hurting	
Variables	Correct n (%)	Incorrect n (%)	Correct n (%)	Incorrect n (%)	Correct n (%)	Incorrect n (%)	Correct n (%)	Incorrect n (%)
Gender								
Male	6 (12.0)	44 (88.0)	5 (10.0)	45 (90.0)	9 (18.0)	41 (82.0)	1 (2.0)	49 (98.0)
Female	5 (14.3)	30 (85.7)	4 (11.4)	31 (88.6)	9 (25.7)	26 (74.3)	3 (8.6)	32 (91.4)
P*	0.757		1.000		0.392		0.301	
Years of age								
Up to 34	7 (15.9)	37 (84.1)	1 (2.3)	43 (97.7)	11 (25.0)	33 (75.0)	3 (6.8)	41 (93.2)
More than 34	4 (9.8)	37 (90.2)	8 (19.5)	33 (80.5)	7 (17.1)	34 (82.9)	1 (2.4)	40 (97.6)
P*	0.532		0.013		0.371		0.617	
Postgraduate ed	ucation							
Yes	3 (8.6)	32 (91.4)	6 (17.1)	29 (82.9)	9 (25.7)	26 (74.3)	2 (5.7)	33 (94.3)
No	8 (16.0)	42 (84.0)	3 (6.0)	47 (94.0)	9 (18.0)	41 (82.0)	2 (4.0)	48 (96.0)
P*	0.513		0.152		0.392		1.000	
Time since quali	fication							
Up to 10 years	5 (11.1)	40 (88.9)	8 (17.8)	37 (82.2)	9 (20.0)	36 (80.0)	1 (2.2)	44 (97.8)
years > 10	6 (15.0)	34 (85.0)	1 (2.5)	39 (97.5)	9 (22.5)	31 (77.5)	3 (7.5)	37 (92.5)
P*	0.594		0.032		0.778		0.338	

school environment. However, in such situations the reimplantation should be viewed as an attempt to recover functional and aesthetic characteristics of the oral cavity. In this case the tooth would be considered a temporary restoration until the moment at which definitive treatment could be planned. Nevertheless, only 11.4% of schoolteachers gave this answer. Of concern is the fact that almost 50% of the schoolteachers would keep the tooth in a dry place before calling the parents and looking for a dentist. The avulsed tooth should be reimplanted as soon as possible and the use of an appropriate storage medium together with minimal manipulation of the root and alveolar surface will promote the success of the intervention (1, 12, 16, 17). In such a situation being older was demonstrated to be highly associated (P = 0.003) with a higher prevalence of correct answers. Hypothetically, being older would

mean having more experience and even having been through similar situations previously, consequently knowing what to do. This variable was not collected in this study.

Also, a relatively low rate of correct answers was given in situation 3. Only 32.2% and 37.6% would send to the dentist and call the parents even in a situation in which a child showed or told him/her about an incident in which they had hit the mouth on the ground, but was unhurt. The results concerning this question require attention, because a considerable proportion would do nothing or would perform inappropriate procedures. TDI leads to complications whose aetiology and treatment are poorly understood, the long-term prognosis is unclear, showing the necessity for follow-up by a knowledgeable dentist to monitor eventual sequelae resulting from the impact even without explicit fracture or damage. Follow-up is necessary at 1 month, 2 months and 1 year after the fracture of enamel and dentine, and at this point the practitioner should look for signs of pulp necrosis, such as loss of sensitivity, discoloration of the crown and periapical lesion (12).

On the other hand, the majority (86.1%) of the schoolteachers responded in a correct way in situation 2. Recovering the tooth fragment, calling the parents and looking for a dentist immediately would allow the necessary clinical conduct in cases of enamel fractures. This can vary from a simple abrasion and polishing of the acute margins of the enamel to prevent laceration of the tongue and lips, to a more elaborate restoration and gluing of the enamel fragment (1, 12, 16, 17). Follow-up is necessary also here as described in situation 3 (1, 12).

The results of the study involving the parents of the children revealed worrying data. For situation 1, focussing on the avulsed tooth, 74.8% would keep the tooth in a dry place before looking for a dentist, while a further 8.4% would store the tooth in any available liquid, but no respondent cited milk as a storage medium. Milk, saliva, and saline solution are, in this order, the most appropriate media for transport of the tooth in cases where re-implantation does not occur (1). As mentioned previously, appropriate storage medium together with minimal manipulation of the root and alveolar surface will promote the success of the intervention (1, 12, 16, 17).

As in the study involving schoolteachers, the majority of parents gave a correct answer in situation 2. Recovering the tooth fragment and immediately looking for a dentist would allow the necessary clinical conduct. It should be recalled, however, that more than 20.0% of the parents would look for a dentist without taking the fragment, making clear the necessity of including the question also in educational campaigns concerning TDI in their children. Finally, more than 3/4 of the parents would do nothing in situation 3. As cited above, TDI leads to complications whose aetiology and treatment are poorly understood and the long-term prognosis is unclear, showing the necessity for follow-up to monitor eventual sequelae.

The results of the study involving dentists revealed also that the majority of them have only weak knowledge concerning management in cases of avulsed teeth, as referred to in question 1. Around 33% of the dentists would re-implant the tooth under any conditions. As mentioned before, immediate treatment for avulsion is reimplantation, even in adverse conditions, with the advice being that in this situation this procedure should be viewed as an attempt to recover functional and aesthetic characteristics of the oral cavity. In this case the tooth would be considered a temporary restoration until the moment at which definitive treatment can be planned (1, 12, 16, 17). However, our findings mean that a large proportion of the dentists would use other forms of treatment, if they considered the conditions unsatisfactory for re-implantation. Only 12.9% of the dentists indicated the most correct response: the need for care of the avulsed tooth, such as washing in saline solution and handling by the crown, reimplantation, carrying out of contention, endodontic treatment and follow-up.

As cited previously, clinical conduct in cases of enamel fractures such as in situations 2 and 3 can vary from a simple abrasion of acute margins of enamel to complex restorations (1, 12, 16, 17). This approach was mentioned by the majority of dentists in this study, confirming the results of another Brazilian study (15). As also cited above, follow-up is necessary in several moments after the fracture of enamel and dentine and the dentist should look for evidence of pulp necrosis, such as loss of sensibility, discoloration of the crown and periapical lesion (12).

In the association studies involving situation 2, the older dentists presented significantly more correct responses than their younger colleagues. This may be related to the fact that, possibly, they have already experienced situations similar to that described, allowing them to learn from experience. Paradoxically, professionals with fewer years' practice since graduating presented significantly more correct responses than those with more postqualification experience. These results point to the fact that more recently qualified dentists, hypothetically, will have been through a training process that gave some consideration to the management of TDI, at least with respect to fractures. This highlights the possibility that the small sample size may have influenced these results, making them inconsistent, and further reinforcing the need for future studies involving larger samples.

The low level of knowledge of schoolteachers regarding the correct management of TDI revealed in international studies (6, 7, 9) and in Brazil (4, 5, 8) was confirmed in this study. It seems that we will not see any improvement in this situation in the near future as Panzarini et al. (5) reported that among physical education undergraduates about 50% said they did not know what to do in cases of avulsion and about 90% had not received any advice or training about the emergency management of TDI, considering it an important point to be addressed in their formal studies. Such results indicate the need for training on health topics, especially in cases involving TDI. Correct management of TDI by the schoolteachers and child caregivers would enable better management by the dentist and, consequently, a better prognosis in the long term.

Also, the low level of knowledge of dentists regarding the management of TDI revealed in other international studies (13, 14, 18) and in Brazil (15, 19, 20) was confirmed in this study. Such results may indicate neglect of treatment for TDI, which raises the issue of reflection on the reasons for such neglect. The wide variability of methodology applied to the definition of the types of TDI, as well as the lack of standardization in treatment techniques and standard protocols for the follow-up of any future complications may be affecting the preparedness of dentists to deal with the problem.

It can be concluded that the responses of the schoolteachers, parents and dentists of the city of Joaçaba, Brazil about the immediate management of TDI show a wide variability of indicated procedures for the situations of TDI proposed. Also, the great majority of the dentists would not follow the approaches most recommended in the literature. It is important to place

more attention on the importance of TDI for the society through educational campaigns aiming school teachers and parents in order of improving its management. Also a greater importance should be placed on TDI through undergraduation and postgraduation dental *curricula*.

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