

# Emergency management of dental avulsion and replantation: knowledge of undergraduate health care students

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## ABSTRACT

Dental replantation is a major problem in public health. Its prognosis depends on emergency care, but there is a lack of knowledge on it. So, this study aims to evaluate the knowledge of undergraduate students of Dentistry, Speech Therapy, Physical Education, Pedagogy, and Technologist in Radiology. One hundred and fifty-one students answered ten questions about emergency replantation care. Then, an educational lecture was performed. The same questions were asked again to the same students to reevaluate their answers. The statistical tests were employed at a significant level of  $p < 0.05$ . There was a significant difference ( $p < 0.05$ ) in the responses before and after the lecture. The dental students had a higher knowledge of the subject ( $p < 0.05$ ). The educational presentation reached its objective, since there was an improvement in the index of all answers of the post-lecture questionnaire, demonstrating that the people must be informed and trained in the emergency management of dental avulsion.

**Descriptors:** Tooth Avulsion. Tooth Replantation. Education, Dental. First Aid. Interprofessional Education.

## 1 INTRODUCTION

Tooth avulsion, which consists of the total displacement of the tooth from its socket, is a complex dental trauma that requires immediate care to minimize sequelae<sup>1</sup>. Its occurrence may compromise the anterior teeth and the unfavorable

aesthetical, biological, social, and psychological consequences affect the quality of life of the traumatized person<sup>2</sup>.

Immediate dental replantation is the best treatment<sup>3,4</sup>. The shorter the extra alveolar time, the better the result of replantation, since external root

resorption is related to the death of the periodontal ligament cells<sup>5</sup>. Unfortunately, due to lack of information on the correct emergency management of the avulsed tooth from teachers<sup>4</sup>, parents<sup>5</sup>, caregivers, and health care professionals<sup>6</sup> who are close in the moment of the accident, replantation is not performed immediately, and the replanted tooth may have a poor prognosis<sup>7</sup>.

For this reason, this study aimed to evaluate undergraduate students' knowledge about the dental avulsion and replantation emergency care before and after an educational lecture. Besides, to assess the need of introducing dental trauma education in different courses at university for all students in all areas of health care professions.

## 2 METHODS

This research was carried out at Universidade Tuiuti do Paraná, Brazil, with 151 students, male and female, with an age range between 18 and 24 years-old, of the last year in the university before graduation in Physical Education [23 (15.23%) students], Speech Therapy [31 (20.53%) students], Dentistry [38 (25.16%) students], Technologist in Radiology [27 (17.88%) students] and Pedagogy [32 (21.19%) students].

This research was approved by the Human Research Ethics Committee of the Universidade Tuiuti do Paraná (opinion 3.403.333).

All students over 18 years old, signed the Free and Informed Consent Form (ICF), to answer the questionnaire about dental avulsion. The research, of a descriptive and exploratory character, was carried out through a Google Forms questionnaire (figure 1), containing 10 questions, all formulated employing a problematization methodology, composed by 6 questions with alternatives A, B, C and D and 4 questions with yes or no alternatives, on the proper conduct in the case of an accident where a dental avulsion occurs.

Initially, all students answered the questionnaire. Then, a PowerPoint educational

lecture, presented by a trained dental student took 30 minutes to explain the fundamentals of dental avulsion and replantation technique.

After that, the students had more than 10 minutes to answer the related questions. Therefore, the same questionnaire was applied before and after the students attended the lecture, to verify if there was a change in their knowledge. One hundred fifty-one students answered the questions before, and 140 (92.72%) after the lecture, with a loss of 11 (7.28%) students. Data collection was carried out between August and September 2019.

Data were collected and submitted to statistical analysis using the Qui-square test, verifying the distribution of the prevalence of responses obtained in the questionnaires before and after the lecture. The average of correct answers according to the different university courses was verified through the Kruskal Wallis and Mann Whitney tests. All statistical tests were employed at a significant level of  $p < 0.05$ .

## 3 RESULTS

Tables 1 and 2 demonstrates the results obtained from all questions, before and after the lecture. The distribution of the prevalence of responses, obtained through the Chi-square and Mann Whitney tests, concerning the questionnaires before and after the lecture, showed the following results.

There was a significant difference ( $p < 0.05$ ) in the answers to questions 1 to 6. However, there was no statistical difference to the question 9.

There was a significant difference in the correct answers from questions 1 to 6 before and after the lecture, considering the different courses evaluated, and the dentistry students answered most rightly ( $p < 0.05$ ).

One hundred and thirty-nine (92.1%) students had never taken emergency care of tooth avulsion, and 121 (80.1%) of them had never learned about dental trauma in school or university,

but 110 (72.8%) want to receive more information concerning dental avulsion. One hundred and thirty-eight (91,4%) students consider that the use of mouthguards during sports activities is important.

<p>1. What should be done if a tooth falls completely out of its socket, in a dental-alveolar trauma (dental avulsion)?</p> <p>a) Pick up the tooth and take the person to the dentist immediately.</p> <p>b) Save the tooth to go to the dentist when scheduling an appointment.</p> <p>c) Place the tooth back in its socket immediately, at the accident site, and go to the dentist.</p> <p>d) Do not worry to pick up the tooth that was lost.</p> <p>2. Where is the best place to take a person to be rescued in the case of a dental avulsion?</p> <p>a) I wouldn't care to take the person anywhere since the tooth was lost.</p> <p>b) Nearby hospital, to be rescued by a doctor.</p> <p>c) Nearby private dental clinic.</p> <p>d) Public health service.</p> <p>3. If you decided to return the tooth to its original place, but it had fallen into a dirty place, what would you do?</p> <p>a) Wash in running water and put it back in its socket.</p> <p>b) Wash, scrub, and place it very clean back in its socket.</p> <p>c) Wash with some product that would deeply clean the tooth and put it back in its socket.</p> <p>d) I wouldn't clean it but I would place it back in its socket.</p> <p>4. What is the appropriate storage medium for the avulsed tooth until replantation, if it wasn't replanted in the socket immediately?</p> <p>a) Wrapped in a handkerchief or paper</p> <p>b) Water</p> <p>c) Saliva</p> <p>d) Milk</p> <p>5. How long can an avulsed tooth be out of its socket?</p> <p>a) Less than 1 hour</p> <p>b) 6 hours</p> <p>c) 1 day</p> <p>d) 1 week</p> <p>6. Where would you hold the avulsed tooth?</p> <p>a) In its shaper tip.</p> <p>b) In the middle of the tooth.</p> <p>c) In its white structure.</p> <p>d) I would never touch the tooth.</p> <p>Yes or no questions:</p> <p>7. Have you ever taken emergency care of tooth avulsion?</p> <p>8. Have you ever learned about dental trauma in school or university?</p> <p>9. Do you consider it important to use mouthguards during sports activities?</p> <p>10. Do you want to receive more information concerning dental avulsion?</p>
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Figure 1. Questionnaire.

Table 1. Statistical results of the six alternative questions

QUESTION	ALTERNATIVES	Before (n=151) n (%)	After (n=140) n (%)
1. What should be done if a tooth falls completely out of its socket, in a dento-alveolar trauma (dental avulsion)? (p=0.00)	a) Pick up the tooth and take the person to the dentist immediately.	a) 90 (59.6%)	a) 59 (42.1%)
	b) Save the tooth to go to the dentist when schedule an appointment.	b) 11 (7.3%)	b) 4 (2.9%)
	c) Place the tooth back in its socket immediately, at the accident site, and go to the dentist.	c) 39 (25.8%)	c) 77 (55.0%)
	d) Do not worry to pick up the tooth that was lost.	d) 11 (7.3%)	d) 0 (0.0%)
2. Where is the best place to take a person to be rescued in face of a dental avulsion? (p=0.002)	a) Wouldn't care to take the person nowhere, since the tooth was lost.	a) 8 (5.3%)	a) 0 (0.0%)
	b) Nearby hospital, to be rescued by a doctor.	b) 11 (7.3%)	b) 4 (2.9%)
	c) Nearby private dental clinic.	c) 117 (77.5%)	c) 129 (92.1%)
	d) Public Health Service.	d) 15 (9.9%)	d) 7 (5.0%)
3. If you decided to return the tooth to its original place, but it had fallen into a dirty place, what would you do? (p=0.00)	a) Wash in running water and put it back in its socket.	a) 83 (55.0%)	a) 136 (97.1%)
	b) Wash, scrub and place it very clean back in its socket.	b) 15 (9.9%)	b) 0 (0.0%)
	c) Wash with some product that would deeply clean the tooth and put it back in its socket.	c) 50 (33.1%)	c) 2 (1.4%)
	d) I wouldn't clean it but I would place it back in its socket.	d) 2 (1.3%)	d) 2 (1.4%)
4. What is the appropriate storage medium for the avulsed tooth until replantation, if it wasn't replanted in the socket immediately? (p=0.00)	a) Wrapped in a handkerchief or paper	a) 52 (34.4%)	a) 2 (1.4%)
	b) Water	b) 46 (30.5%)	b) 0 (0.0%)
	c) Saliva	c) 18 (11.9%)	c) 0 (0.0%)
	d) Milk	d) 36 (23.8%)	d) 138 (98.6%)
5. How long can an avulsed tooth be out of its socket? (p=0.00)	a) Less than 1 hour	a) 95 (62.9%)	a) 129 (92.1%)
	b) 6 hours	b) 26 (17.2%)	b) 10 (7.1%)
	c) 1 day	c) 26 (17.2%)	c) 1 (0.7%)
	d) 1 week	d) 4 (2.6%)	d) 0 (0.0%)
6. Where would you hold the avulsed tooth? (p=0.00)	a) In its shaper tip.	a) 23 (15.2%)	a) 25 (17.9%)
	b) In the middle of the tooth.	b) 60 (39.7%)	b) 8 (5.7%)
	c) In its white structure.	c) 52 (34.4%)	c) 107 (76.4%)
	d) I would never touch the tooth.	d) 16 (10,6%)	d) 0 (0.0%)

Pearson Chi-square test.

Table 2. Yes or no answers to the questions (n=151)

QUESTION	YES n (%)	NO n (%)
7. Have you ever taken emergency care of tooth avulsion?	12 (7.9%)	139 (92.1%)
8. Have you ever learned about dental trauma in school or university?	30 (19.9%)	121 (80.1%)
9. Do you consider it important to use mouthguards during sports activities? (p=0.140)	138 (91.4%)	13 (8.6%)
10. Do you want to receive more information concerning dental avulsion?	110 (72.8%)	41 (27.2%)

Pearson Chi-square test.

In figure 2, as demonstrated by the Kruskal-Wallis test, the p-value was significant ( $p < 0.05$ ) in the improvement of the quality of the answers after

attending the lecture, of all interviewed students. The mean values can be observed of the students attending different courses.

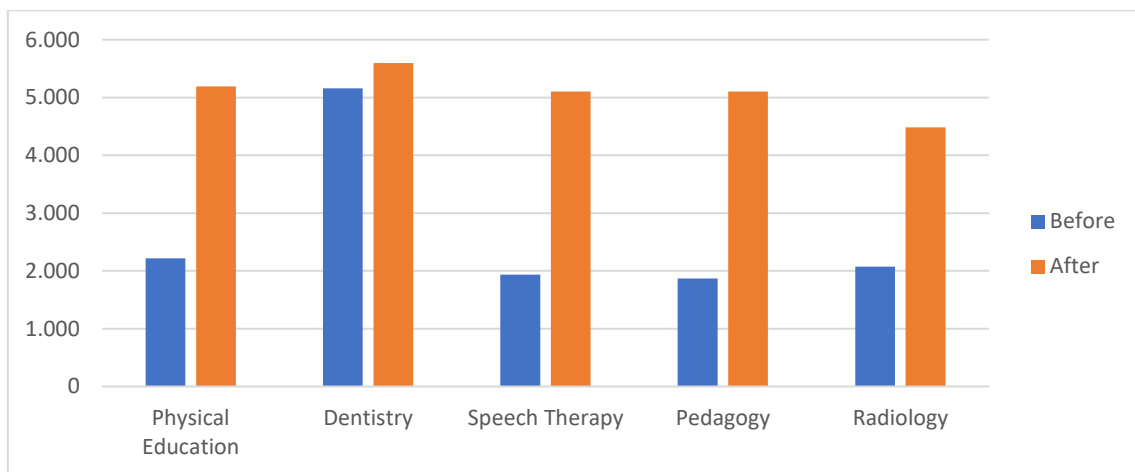


Figure 2. Mean values of the first 6 questions and their correct answers by course, before and after the lecture. In blue, the values of the correct answers before the lecture and in orange, the values of the correct answers after the lecture

#### 4 DISCUSSION

This study consisted of investigating the knowledge of students about dental avulsion, replantation, and emergency management. It contributed to the improvement of students' knowledge, evaluating by questions prior, and post-lecture. Teaching emergency care in replantation obtains positive results, indicating the constant need for this training in all areas of health care.

It is well known that replantation of the

tooth in its socket after trauma is the ideal procedure for maintaining the health of the avulsed tooth<sup>1,2,8-10</sup>. Its success depends on the actions taken at the moment of the trauma<sup>11,12</sup>. It is also well known that health professionals don't have enough information about dental traumatology, which must be improved in all health schools<sup>13,14</sup>. In this research, there was a statistical difference between the first and the second questionnaire, the latter carried out after an informative lecture, indicating that initially

the participants of the Physical Education, Dentistry, Speech Therapy, Pedagogy and Technologist in Radiology courses demonstrated a little knowledge on the management of an avulsed tooth.

The dentists of the Public Health Service aren't prepared to accomplish a dental replantation follow up, in our country. This is a major inconvenience to our Public Dental Service. For this reason, if the tooth is replanted immediately, or even when the patient was rescued in a Public Health Service, a private trained in dental trauma dentist must be responsible for the trauma treatment and follow up. According to the results obtained, most participants didn't know, with a significant difference, that the victim should have its tooth replaced immediately in its socket and then be referred to a nearby dental clinic. After receiving adequate information about dental avulsion, the number of correct answers increased.

It is stated that washing the tooth with soap and water or brushing its root would compromise the viability of the periodontal ligament cells and compromise the prognosis of the immediate replantation<sup>15</sup>. In this research, when the question addressed on what conduct to take in this situation, most individuals reported that they would clean the tooth in running water and return it into the socket.

After the lecture, there was a significant increase in the correct answers suggested by 2012 guidelines to just clean the tooth in running water and replace it in its alveolar socket. However, the 2020 IADT guidelines suggest that the tooth may be cleaned just by removing loose debris and visible contamination by agitating the tooth in a physiologic storage medium, like milk, before immediate replantation<sup>1</sup>.

If the tooth cannot be replanted immediately, it must be placed in a convenient transport medium. This should be done quickly

to avoid dehydration of the root surface, which starts in a matter of a few minutes. The last guidelines for avulsed teeth recommend that the tooth be kept in a physiologic storage media, including tissue culture media and cell transport media. Examples of osmolality-balanced media are milk and Hanks' Balanced Salt Solution (HBSS) (1). Unfortunately, HBSS is not available everywhere, as it is milk. In descending order of preference: milk, HBSS, saliva (after spitting into a glass for example) or saline are suitable and convenient storage mediums<sup>1</sup>. Although water is a poor medium, it is better than leaving the tooth to air-dry<sup>1</sup>. Before the lecture, most students would wrap up the avulsed tooth on a paper or handkerchief until the replantation procedures, demonstrating that the students did not have adequate knowledge regarding the storage of an avulsed tooth. However, there was a significant difference between the responses pre and post educational lecture, with most students adding milk as the best form of storage of the avulsed teeth.

As already mentioned, when dental avulsion occurs, replantation must be performed within one hour. After an extra-alveolar dry time of 30 minutes, most PDL cells are non-viable. For this reason, information regarding the dry time of the tooth before replantation or before being placed in a storage medium is important to the follow-up of the patient and its replanted tooth<sup>16,17</sup>. In the results obtained about the ideal time to seek care, there was an improvement in students' knowledge, with a statistical difference between the first and the second questionnaire, even though there was already a favorable index of answers even in the first step.

Regarding the question: how to handle the avulsed tooth, 35% of the students answered that they would take it by the "white part of the tooth", which corresponds to the dental crown. This percentage more than doubled after the

instruction given to the students. Reports suggest that when the tooth is found it must be held by the crown, always avoiding touching the root tooth<sup>8,10</sup>.

Very few students (8%) reported having witnessed some type of dental trauma. This result was close to a study demonstrating a lack of knowledge of the participants who have witnessed some type of dental trauma<sup>18</sup>.

Using a mouthguard as an important preventive method of dental-alveolar trauma was reinforced, especially in violent and collective sports<sup>19,20</sup>, since there was no significant difference between the responses before and after the lecture. Interestingly, even though the management of dental avulsion is of little knowledge, it is intuitive the comprehension of the importance of the mouthguard as an individual preventive action. Therefore, collective preventive actions are suggested to be taken in schools, parks, sports academies, and by conventional and social media.

Finally, according to the answers to the first questionnaire applied, the knowledge among students from the different courses surveyed, was not enough to implement emergency procedures in the case of a dental avulsion.

Next to the lecture, most of them demonstrated that they had assimilated the information received in the educational lecture, and the percentage of correct answers almost doubled for most questions. Our results are following that obtained in a previous study, where the educational intervention demonstrated a significant positive impact on the knowledge of dental trauma emergency management among health students<sup>21</sup>.

The introduction of dental trauma, not only of the dental avulsion, into the health care curricula, will address the gap in health care providers' knowledge and skills. This basic dental trauma course is regarded as an essential

training in the overall health care and medical education training and should begin at the undergraduate level<sup>13,14</sup>.

As a result of our research, a plan to assess the health care students' retention of knowledge will be investigated in one year and dental trauma training will be suggested to be offered in the health care professionals' curricula.

This study has some limitations: medical and nursing students, as well as dental assistants, were not included in the sample since the University doesn't offer these courses. A partnership with other Universities must be carried out to make the sample larger and to include other specialties.

As it would be expected, the students from the Dentistry course obtained the highest average scores, even though they still need to receive constant emergency care training. Most of them will work in Public Health Services, where the first care of an avulsed tooth is performed. An intensive campaign on this issue urge to be carried out to sensitize the authorities to train health employees and teams in all Public Health Services and offer continuous education on emergency dental trauma, stimulating the dentists that perform the endodontic and restorative dentistry to include the follow-up procedures in the dental trauma patients.

It is important to consider people's preferred mode of receiving information because this could help when planning health education. Nowadays, social media strongly increases the dissemination of information and must be employed. Furthermore, apps, e-books, and free available sites on the Internet could also improve the knowledge of dental trauma, and most important, dental avulsion and immediate replantation. IADT offers a free app and free guidelines on its site, but it is not easily reachable in countries where English isn't the mother language. An innovative and objective way to

offer evidence-based information on dental trauma must be effectively developed in all main languages, to reach all societies in the whole world.

## 5 CONCLUSION

In conclusion, the answers before the educational lecture demonstrated that the students of the different courses did not have enough knowledge to intervene in the emergency care of a dental avulsion. The educational lecture on tooth avulsion and replantation achieved its objectives since there was an improvement in the index of all responses to the post-lecture questionnaire. Dentistry students demonstrated a high level of knowledge on the subject when compared to the others. Finally, an intensive campaign on this issue urge to be carried out to sensitize the authorities to train health employees and offer continuous education on emergency dental trauma for all the population.

## RESUMO

### **Manejo emergencial da avulsão dentária e do reimplante: conhecimento dos estudantes de graduação na área de saúde**

O reimplante dentário é um grande problema de saúde pública. Seu prognóstico depende do atendimento de urgência, mas ainda falta conhecimento. Assim, este estudo tem como objetivo avaliar o conhecimento de graduandos de Odontologia, Fonoaudiologia, Educação Física, Pedagogia e Tecnólogo em Radiologia. Cento e cinquenta e um alunos responderam a 10 perguntas sobre cuidados de reimplante de emergência. Em seguida, foi realizada uma palestra educativa. As mesmas perguntas foram feitas novamente aos mesmos alunos para reavaliar suas respostas. Os testes estatísticos foram empregados em um nível de significância de  $p < 0,05$ . Houve diferença significativa ( $p < 0,05$ ) nas respostas antes e depois da palestra. Os estudantes de odontologia apresentaram maior conhecimento sobre o assunto ( $p < 0,05$ ). A apresentação educativa atingiu seu objetivo,

visto que houve uma melhora no índice de todas as respostas do questionário pós-aula, demonstrando que as pessoas devem ser informadas e treinadas no manejo emergencial da avulsão dentária.

**Descritores:** Avulsão Dentária. Reimplante Dentário. Educação em Odontologia. Primeiros Socorros. Educação Interprofissional.

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