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A study into dentists' knowledge of the treatment of traumatic injuries to young permanent incisors

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Summary. *Objective.* The aims of this study were to evaluate dentists' knowledge of the emergency treatment of traumatic injuries to young permanent incisors, and to investigate barriers to treatment.
Design. A closed-ended questionnaire was sent to 1023 general dental practitioners (GDPs) and community dental officers (CDOs) in West/North Yorkshire and Humberside, UK.
Methods. The questionnaire comprised 17 questions. Six questions asked for general information about the participants (i.e. profession, age, gender, year of graduation, training or education on dental trauma, and willingness to provide emergency care), 10 were relevant to the emergency treatment of crown fractures, root fractures, luxation and avulsion injuries, and the last question queried any perceived barriers to treatment.
Results. Seven hundred and twenty-four questionnaires were returned, a response rate of 71%, and these indicated that dentists' knowledge of the emergency treatment of dentoalveolar trauma in children was inadequate. The CDOs were significantly more knowledgeable than the GDPs, as were younger and more recently graduated dentists compared with older ones. The GDPs regarded the difficulty of treating children and the inadequate fees of the UK National Health Service as important barriers to treatment. Dentists who attended continuing dental education courses on dental traumatology had a more thorough knowledge than those who did not.
Conclusion. Overall, the dentists' knowledge of the emergency treatment of dentoalveolar trauma in children was inadequate. Greater emphasis on undergraduate and postgraduate education in this area is indicated.

Introduction

The results of a national survey in England and Wales in 1983 [1] showed that dental trauma prevalence had increased by 50% among 14–15-year-olds over the previous decade [2]. In the USA, hospital admissions as a result of traumatic dental injuries doubled between 1979 and 1984 [3]. Additionally, epidemiological studies have demonstrated that approximately 50% of schoolchildren have traumatized teeth before leaving school [4], and predicted that dental trauma would probably exceed dental caries and periodontal disease as the most significant threat to dental health among the young in the future, with significant economic consequences. Despite the prevalence and cost of dental trauma in children, academic involvement in this area at both the undergraduate and postgraduate levels is still limited in the UK. Between 1981 and 1988, the percentage of publications on dental traumatology decreased by 80%. This would inevitably lead to a lack of knowledge of the treatment of dental trauma, and a poor understanding of its long-term prognosis and complications [4]. It is unclear if this has changed in recent years.

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The emergency treatment, repair and maintenance of traumatized anterior permanent teeth in children requires clinical skills, diagnostic knowledge of the problem, excellent emergency treatment and appropriate long-term follow-up. The knowledge and skills of general dental practitioners (GDPs), and thus the training and education they receive, are therefore critical in the management of trauma in child patients. Moreover, any hesitation that dentists might have in treating this type of patient are worth investigating in order to find ways to overcome this reluctance. Previous research into the knowledge of GDPs of emergency treatment of dental traumatic injuries in children has been limited, and most of it restricted to lay people [5–7].

A study by Hamilton *et al*. [7] in Manchester, UK, in the mid-1990s showed that GDPs in the primary-care sector had insufficient knowledge to treat trauma in adolescents, although the majority of GDPs believed that paediatric trauma patients should be treated by them. Fewer GDPs agreed that specialist knowledge was required for the long-term care of traumatized teeth. In British general dental services, the major barrier was reported to be financial since most GDPs considered the fees on the National Health Service (NHS) to be inadequate. On the other hand, the majority of salaried community dental officers (CDOs) disagreed with the statement that emergency treatment of traumatized teeth took up too much clinic time. Hamilton *et al*. [7] suggested that educational and financial initiatives should be concentrated on improving the front-line care provided in the primary sectors. Accordingly, the aim of the present investigation was to study dentists' knowledge of, and barriers to, the emergency treatment of traumatized anterior permanent teeth in children in an area of the UK.

Methods

Sample size

A total of 1023 dentists, either GDPs or CDOs, in West/North Yorkshire and Humberside were included in the study. Their names and addresses were obtained through the NHS Postgraduate Medical and Dental Education Department (Yorkshire Office, Leeds University).

Questionnaire design and distribution

A closed-ended questionnaire [8] was used comprising six general questions about the dentists, 10 relating to the emergency treatment of traumatized young permanent incisors and one about barriers to that treatment. All questionnaires were mailed with a pre-stamped, pre-addressed envelope to encourage their return. The survey was anonymous, and a letter from the investigators to the participants explaining the purpose, importance and confidentiality of the study was enclosed.

General questions. These were constructed to gather general information about the nature of the participant's practice [i.e. GDP or CDO, age, gender, year of graduation, training or education acquired on dental trauma, and willingness to provide emergency care at the undergraduate or postgraduate level or in the form of continuing dental education (CDE) courses].

Emergency treatment questions. Eight questions and their multiple-choice answers were constructed to collect information on GDPs' knowledge of the emergency treatment of the different types of traumatic injuries to young permanent incisors in children. The questions asked about:

- crown fractures into dentine of young permanent incisors, with various stages of pulp involvement and different stages of root development, such as: (a) without a pulp exposure, (b) with a pinpoint pulp exposure (less than 3 h old) and an open apex, (c) with a large pulpal exposure (24 h old) and an open apex, and (d) with a large pulpal exposure (24 h old) and a closed apex; and
- avulsion injuries and prognosis of re-implanted avulsed incisors, according to: (a) the medium for extra alveolar storage, (b) the handling of an avulsed incisor prior to re-implantation, (c) the maximum extra-alveolar period after which re-implantation would not be considered, and (d) duration of a splinting period for a re-implanted incisor.

Question on dentists' barriers to emergency treatment. The last question was included to determine the perceived barriers to treatment of traumatic injuries to young permanent incisors. Dentists were asked about their degree of agreement or disagreement with three statements. A five-point scale [9] allowed a middle option as well (i.e. strongly agree, agree, undecided, disagree and strongly disagree).

The statements were:

(a) 'Children are more time-consuming and difficult to treat than adults.'
(b) 'Cost-effectiveness (as determined by NHS remuneration) is unfavourable when treating traumatized young permanent teeth (for GDPs only).' [This statement was replaced in the CDOs' questionnaires by a different one, namely, 'Treating dental trauma in normal children is no longer the responsibility of the community dental officers (for CDOs only).']
(c) 'Treatment of traumatized teeth with open apices is complicated and should be carried out by specialists.'

Statistical analysis

The data were entered in spreadsheets using the Microsoft Excel 5·0 computer program. The variables assessed were categorical and their analysis was carried out using a chi-square (χ^2) test. A significance level of $P < 0{\cdot}05$ was accepted as statistically significant.

Results

Response rate

A total of 1023 questionnaires were sent to 909 GDPs and 114 CDOs. The response rate was 724 (71%). Thirty-one of the returned questionnaires were excluded, however, because the practitioners had retired, changed address or were unable to answer the questionnaire since treatment of traumatic injuries did not occur in their practice (e.g. orthodontists). A total of 693 (68%) questionnaires were finally analysed therefore: 612 completed by GDPs and 81 by CDOs.

Age, gender and year of graduation of the study sample

This data is presented in Table 1. The age of the participants ranged from 24 to 59 years. The study sample was divided arbitrarily into two age groups for statistical purposes: between 24·0 and 39·9 years, and between 40·0 and 59·0 years of age. Similarly, the year of graduation from dental school ranged from 1964 to 1996, and was also divided into two groups for statistical purposes: between 1964 and 1979, and between 1980 and 1996.

Table 1. Age, gender and year of graduation of the general dental practitioners (GDPs) and community dental officers (CDOs) who participated in the present study.

Variable	GDPs	CDOs	Number
Age (years):			
24·0–39·9	309	30	339
40·0–59·0	303	51	354
Gender:			
male	453	25	478
female	159	56	215
Year of graduation:			
1964–1979	267	47	314
1980–1996	345	34	379

Table 2. Types of training and/or education on dental traumatology reported by general dental practitioners (GDPs) and community dental officers (CDOs) in the UK.

Type of training/education	GDPs (n = 612)	CDOs (n = 81)	Sample size
Masters degree*	37	13	50
Continuing dental education courses	273	56	329
Undergraduate training	306	15	321
None	26	0	26
Other	46	25	71
Total	688	109	797

*Masters degree in dentistry (e.g. Paediatric Dentistry).

Training/education on dental traumatology of the study sample

The distribution of responses according to the type of training and/or education on dental traumatology is shown in Table 2. Answers to this question were not mutually exclusive, and therefore, the total number of positive responses is not equal to the number of participants. It can be seen that most of the practitioners had received some form of training in dental traumatology at either an undergraduate or a postgraduate level, such as a Masters degree or CDE after qualification. Continuing dental education in trauma, such as NHS Section 63 courses, were more popular amongst CDOs (69%) than GDPs (45%).

Provision of emergency treatment for dentoalveolar traumatic injuries

It can be seen from Fig. 1 that the some 80% of CDOs and 67% of GDPs would always provide the necessary emergency treatment for traumatic injuries to young permanent incisors, the difference being statistically significant ($\chi^2 = 5{\cdot}36$; $P < 0{\cdot}05$).

Emergency treatment of crown fractures

Some 50% of GDPs would treat this injury with an immediate permanent restoration compared with

Table 3. Types of emergency treatment of uncomplicated crown fractured incisors reportedly provided by general dental practitioners (GDPs) and community dental officers (CDOs) in the UK.

			Continuing dental education courses	
Treatment modality	GDPs	CDOs	Yes	No
None (wait until 16 years old)	3 (0%)	0 (0%)	1	2
Temporary dressing	269 (44%)	15 (19%)	111	173
Immediate permanent restoration	304 (50%)	65 (80%)*	202**	167
Treatment if sensitive	36 (6%)	0 (0%)	14	22
Do not know	0 (0%)	1 (1%)	1	0

*$\chi^2 = 28{\cdot}78$; $P < 0{\cdot}001$.
**$\chi^2 = 16{\cdot}90$; $P < 0{\cdot}001$.

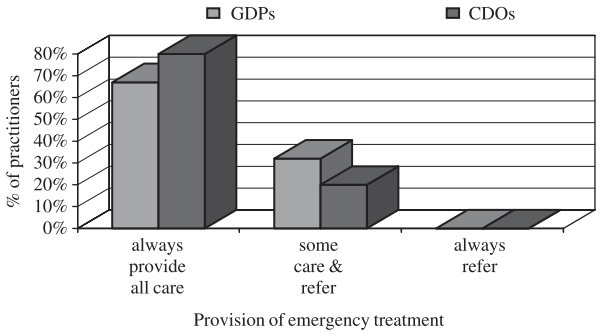

Fig. 1. Histogram showing the provision of emergency treatment by the study sample.

80% of CDOs ($\chi^2 = 28{\cdot}78$; $P < 0{\cdot}001$). Training and/or education on dental trauma also had a significant relationship with the emergency treatment of uncomplicated crown fractures. Practitioners who had attended CDE courses would provide an immediate permanent restoration significantly more often than those who had not ($\chi^2 = 16{\cdot}90$; $P < 0{\cdot}001$) (Table 3).

Emergency treatment of complicated crown fractured incisors with recent, pinpoint exposures and open apices

A large majority of dentists (93% of GDPs and 69% of CDOs) would carry out a pulp capping for a complicated crown fractured incisor with a recent, minimal exposure and an open apex (Table 4). There was no significant impact of CDE courses on the choice of treatment which would be provided. Practitioners who reported receiving some form of trauma training as undergraduates, however, would do a pulp capping more often than those who reported no training as undergraduates ($P < 0{\cdot}01$).

Table 4. Types of emergency treatment of complicated crown fractured incisors with recent, pinpoint exposures and open apices provided by general dental practitioners (GDPs) and community dental officers (CDOs) in the UK.

Treatment modality	GDPs	CDOs
Leave and monitor	4 (1%)	0 (0%)
Pulp capping	571 (93%)	56 (69%)
Partial pulpotomy	33 (5%)	24 (30%)
Full coronal pulpotomy	3 (1%)	1 (1%)
Root canal treatment	0 (0%)	0 (0%)
Do not know	1 (0%)	0 (0%)

Emergency treatment of complicated crown fractured incisors with old, large exposures and open apices

The majority of dentists (78%) would perform either a partial or a full coronal pulpotomy for a complicated crown fractured incisor with an old, large exposure and open apex. The differences between GDPs and CDOs in the emergency treatment modalities of the above injury are presented in Fig. 2. A significantly smaller percentage of CDOs would carry out a pulp capping or a pulpectomy as compared with GDPs ($\chi^2 = 24{\cdot}64$; $P < 0{\cdot}001$). Furthermore, dentists who had attended CDE courses were significantly less likely to perform a root canal treatment as compared with those who had not attended such courses ($\chi^2 = 12{\cdot}73$; $P < 0{\cdot}05$).

Emergency treatment of complicated crown fractured incisors with old, large exposures and closed apices

The majority of practitioners (81%) reported that root canal treatment would be the emergency treatment of choice. Comparison of the responses between GDPs and CDOs revealed that CDOs were

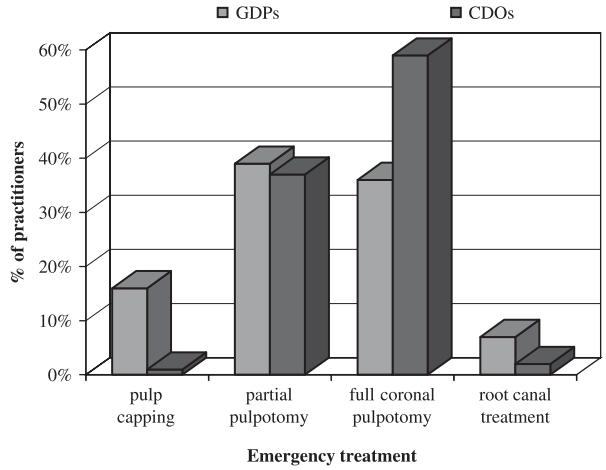

Fig. 2. Histogram showing the types of emergency treatment of complicated crown fractured incisors with old, large exposures and open apices by the study sample.

Table 5. Types of emergency treatment of complicated crown fractured incisors with old, large exposures and closed apices by general dental practitioners (GDPs) and community dental officers (CDOs) in the UK.

Treatment modality	GDPs	CDOs
Leave and monitor	3 (0%)	0 (0%)
Pulp capping	43 (7%)	3 (4%)
Partial pulpotomy	18 (3%)	2 (2%)
Full coronal pulpotomy	45 (7%)	15 (19%)
Root canal treatment	499 (82%)	61 (75%)
Do not know	4 (1%)	0 (0%)

*$\chi^2 = 11{\cdot}77$; $P < 0{\cdot}01$.

significantly more likely to carry out a full coronal pulpotomy ($\chi^2 = 11{\cdot}77$; $P < 0{\cdot}01$) (Table 5). There was no significant influence of CDE courses.

Emergency treatment of luxation injuries

Nearly all of the participants (90%) would reposition and splint a luxated immature permanent incisor on the day of the accident. A significantly greater number of younger ($\chi^2 = 8{\cdot}35$; $P < 0{\cdot}05$) and more recently graduated practitioners ($\chi^2 = 7{\cdot}48$; $P < 0{\cdot}05$) responded that they would not know how to treat a luxated incisor compared with those of an older age and with more experience.

Emergency treatment of avulsion injuries

The two most popular types of media for extra-alveolar storage of avulsed permanent incisors were milk and the child's mouth (Table 6). The most popular splinting period chosen by practitioners for a re-implanted permanent incisor was one week. A significantly higher percentage of CDOs (53%) would splint for one week as compared with GDPs (26%) ($\chi^2 = 37{\cdot}39$; $P < 0{\cdot}001$).

Table 6. Types of extra-alveolar storage media for avulsed teeth preferred by general dental practitioners (GDPs) and community dental officers (CDOs) in the UK.

Storage medium	GDPs	CDOs
Ice	2 (0%)	0 (0%)
Tap water	5 (1%)	0 (0%)
Handkerchief	2 (0%)	0 (0%)
Milk	359 (59%)	57 (70%)
Child mouth	238 (39%)	24 (30%)
Do not know	6 (1%)	0 (0%)

Barriers to the provision of emergency treatment for traumatized young permanent incisors

When asked whether difficulty in treating children who were deemed to be uncooperative was felt to be a barrier to the provision of emergency treatment, 11% of GDPs strongly agreed and 42% agreed, compared with only 1% of CDOs who strongly agreed and 16% who agreed, the difference being statistically significant ($\chi^2 = 55{\cdot}36$; $P < 0{\cdot}001$). The majority of GDPs (69%) agreed with the statement that 'Involvement in treatment of traumatic injuries to young permanent teeth is not cost-effective on the NHS', whereas the majority of CDOs disagreed with the statement that 'Treatment of dental trauma in normal children is no longer the responsibility of the Community Dental Service'. Furthermore, the majority of respondents (44% of GDPs and 53% of CDOs) disagreed with the statement that 'Treatment of traumatized teeth with open apices is complicated and should be referred to a specialist'.

Discussion

The response rate of 68% was lower than that of Hamilton *et al*. [7], who reported 90% ($n = 153$) of GDPs and 88% ($n = 53$) of CDOs returning questionnaires. Their survey area was limited to Manchester, UK, however, and only 229 dentists were initially contacted. The age distribution of this study's sample was similar to that of the previous study [7].

A postgraduate degree in Paediatric Dentistry was quoted by very few of the respondents as a source

of training on dental traumatology. On the other hand, postgraduate education on dental traumatology by CDE courses had been obtained by 69% of CDOs and 45% of GDPs. It can be speculated that postgraduate degrees and/or courses were more popular amongst CDOs because the Community Dental Service tries to employ practitioners already educated in children's and/or special needs dentistry, and encourages further education. The prevalence of postgraduate trauma education in this study (9%) was greater than that reported in other studies [7]. Fifty per cent of the GDPs in our study replied that they had received some form of training as undergraduates, as compared with only 18·5% of the CDOs. Moreover, the practitioners were asked if they had any additional sources of education on dental traumatology such as journal reading, previous hospital experience or communication with colleagues, but only 10% of them gave a positive response.

The majority of dentists (69%) recorded that they always provided all emergency treatment for dental traumatic injuries to permanent incisors; 31% would refer on to a specialist after they had provided some emergency care. These results are not in agreement with previous studies, where up to 23% of GDPs referred immediately for emergency treatment [9]. This disagreement could possibly be a result of different study samples, however. Fewer CDOs referred trauma patients after providing some form of emergency care than did GDPs (significant at the 5% level). The reason for such a difference could be the greater experience of CDOs in children's dentistry because of either more frequent exposure or more extensive postgraduate education.

Only half of the participants would provide an immediate permanent restoration for a young permanent incisor with a crown fracture into dentine. Bearing in mind the importance of immediate permanent restoration for uncomplicated crown fractures in order to eliminate potential risk of damage to the pulp [10–12], it can be concluded that the dentists' knowledge of this emergency treatment is insufficient. The CDOs would provide the appropriate emergency treatment for an enamel-dentine crown fracture in an incisor more frequently than GDPs (highly significant at the 0·1% level). This can be explained again by the observation that CDOs had received postgraduate training on dental trauma more often than GDPs and were more confident in not referring trauma patients. This was in agreement with previous studies [7], where CDOs were found to be slightly more knowledgeable than GDPs.

In the present study, the vast majority of dentists (90%) would pulp cap a recent pinpoint pulp exposure of an immature crown fractured incisor, whereas very few practitioners (8%) would carry out a partial pulpotomy. Pulp capping is indicated in mature and immature teeth when a small exposure should be treated shortly after injury [12]. Pulp capping has been suggested as the treatment of choice when a pulp exposure is small (< 2 mm in diameter) and has not been open to contamination from saliva for more than 24 h [13–15]. Pulp capping has been a highly successful technique for the treatment of pulpally involved immature teeth, with a significant correlation between the stage of root development and the success rate of the technique [15]. Therefore, the GDPs' knowledge of the emergency treatment of this type of injury was found to be satisfactory.

Partial pulpotomy is indicated in mature and immature teeth showing vital pulp tissue at the exposure site, irrespective of its size and interval between injury and treatment [16]. This technique is regarded as the treatment of choice for pulp exposures > 2 mm or where the patients present as late as 24 h after the injury [14,15]. In our study, however, only 39% of the practitioners would carry out a partial pulpotomy, which is the treatment of choice for immature crown fractured incisors with old, large pulp exposures. The remaining 60% would either perform a pulp capping, or a cervical pulpotomy or a pulpectomy, which are not the techniques of choice for the treatment for such injuries. Therefore, it was concluded that the GDPs' knowledge of the emergency treatment of this type of injury was insufficient.

In cases of a pulpally involved fractured incisor with complete root formation, pulpectomy and root canal treatment should be the immediate approach of choice, especially if pulpal signs of irreversible pulp inflammation are obvious at presentation or extensive coronal loss necessitates a post and core restoration [11]. In this study, the majority of practitioners (81%) would immediately carry out a pulp extirpation and root canal treatment for pulpally involved crown fractures with old, large exposures and closed apices. The GDPs' knowledge in this area was satisfactory.

The principle of the emergency treatment of luxation injuries is twofold: immediate and correct repositioning and flexible splinting of the luxated

tooth [11,19]. Nearly all of the participants (90%) would adequately reposition and splint a luxated immature permanent incisor on the day of the accident.

Storage in physiologic saline causes less resorption than dry storage [20]. Because saline is not usually available at the site of the accident, however, storage in saliva (in the patient's buccal vestibule) would seem an appropriate solution since avulsed teeth stored in saliva for up to 2 h exhibit good periodontal healing [21]. Nevertheless, the hypotonicity and bacterial content of saliva could compromise cell survival and impair periodontal healing. Milk has also been widely investigated and found to be a biocompatible storage medium, superior to saliva, but only in experimental studies [22–24]. In the present study, 60% of GDPs knew that milk is the extra-alveolar medium of choice for avulsed permanent incisors. Another 38% of the respondents would advise the parents to keep the avulsed tooth in their child's mouth. This was also an acceptable storage medium since a number of studies have shown that, although not ideal, saliva is comparable to saline and more favourable than dry storage of avulsed incisors [21]. It was concluded that, the dentists' knowledge of the appropriate extra-alveolar storage medium was sufficient, as shown before [7].

Nearly half of the practitioners (58%) would rinse the avulsed tooth with saline prior to re-implantation, a higher percentage than that reported previously [7]. Only 46% of GDPs in previous studies knew that saline was the best medium in which an avulsed incisor should be irrigated. One-third of our respondents (33%) would re-implant a tooth without any further handling. If the literature is critically reviewed [21,25], both handling procedures can be considered acceptable. Therefore, it can be assumed that the majority of dentists were knowledgeable of the most appropriate ways of root handling for an avulsed tooth prior to re-implantation. Only a minority of the practitioners (9%) would either rinse the tooth in tap water/sodium hypochloride or would not know how to handle the root prior to re-implantation.

The wide range of responses in the question related to the maximum extra-alveolar storage time could be interpreted as an indication of the practitioners' dilemma about whether to re-implant an avulsed permanent incisor after a long extra-alveolar storage. The review of the relevant literature clearly shows that avulsed teeth should be re-implanted as soon as possible. Because this is usually not feasible, the practitioners should critically decide whether to re-implant an avulsed tooth according to the medium and duration of extra-alveolar storage. It has been reported that healing of the pulp and periodontal ligament can be achieved with relatively high rates of success if the avulsed teeth are replanted within one hour of avulsion [26,27]. Even if the chances of survival of the replanted tooth are minimal after long periods of extra-alveolar storage, however, the practitioner should not be discouraged from re-implanting an avulsed permanent incisor. It is generally accepted that teeth replanted after a prolonged extra-alveolar period will become ankylosed and will undergo replacement resorption. With replacement resorption, however, the root of the ankylosed tooth will be replaced with bone, which is essential for the success of any future prosthesis, such as a bridge, implant or a premolar transplant. Even though the maintenance of a tooth replanted in the full knowledge of its poor prognosis might not be deemed to be cost-effective, its potential to maintain the height of the alveolar bone means that it is correct treatment option in the best long-term interest of the child.

Re-implanted avulsed teeth should be splinted only for a minimal period of time. One week is considered normally sufficient to ensure adequate periodontal support since gingival fibres are already healed by this time [11]. In their UK National Guidelines, Gregg & Boyd [24] have also suggested a flexible splint for 7–10 days. The most popular splinting period chosen by the GDPs surveyed in this study was one week (29%; higher than in previous studies, where only 19% of dentists knew that they should splint a re-implanted incisor for one week) [7]. Equally prevalent in our study were durations of 2 weeks (28%) and one month (25%), however, suggesting that dentists' knowledge of the appropriate duration of splinting is insufficient. The CDOs seemed more knowledgeable than the GDPs since significantly more of them would splint a re-implanted incisor for one week than amongst GDPs (highly significant at the 0·1% level).

Half of the GDPs (53%), as compared with only 21% of the CDOs, either agreed or strongly agreed with the statement that 'Children were more difficult and time-consuming to treat than other patients' (highly significant at the 0·1% level). In this study, 63% of the salaried CDOs disagreed or strongly disagreed with this statement, corresponding to previous studies, where 72% of the CDOs largely disagreed with a similar statement that 'such treatment

takes up too much clinic time' [7]. Another barrier to treatment was the remuneration within the NHS. The majority of GDPs agreed or strongly agreed with the statement 'Involvement in treatment of traumatic injuries to young permanent teeth is not cost-effective on the NHS'. This was in line with previous reports where the major barrier to providing care was perceived to be financial since 86% of GDPs 'considered the fees inadequate' [7]. The majority of CDOs (62%) either disagreed or strongly disagreed with the statement that 'Treatment of children with dentoalveolar trauma was no longer the responsibility of the Community Dental Service'. One-third (32%) of them agreed or strongly agreed with this statement, however, which is similar to the previous study [7]. The majority of participants (45% of GDPs and 53% of CDOs) disagreed with the statement that 'Treatment of traumatized teeth with open apices is complicated and should be referred to a specialist'. These percentages were lower than those reported previously (81·5%) [7]. Only a minority of our participants (17%) agreed or strongly agreed that dental trauma should be treated by specialists. The CDOs strongly disagreed with these statements to a greater extent than the GDPs ($P \leq 0{\cdot}001$).

Therefore, it appeared that the main barrier to treatment of dental trauma in the UK was financial. The difficulties and delays when treating children formed a rather ambiguous barrier to treatment of traumatized incisors since only half of the respondents agreed with such a statement. Similarly, the need for specialist knowledge when treating traumatized teeth with open apices in children was not widely quoted as a barrier because the majority of respondents either disagreed or were undecided on the matter. Significantly more salaried CDOs did not feel that dental trauma needed specialist care. This might be because there were no financial implications for CDOs (they are salaried) compared with GDPs, who were paid on item of service, and CDOs were more likely to attend relevant CDE courses.

In summary, dentists' knowledge of the emergency treatment of traumatic injuries to young permanent incisors in a northern area of the UK was generally deficient. Child cooperation and financial implications were quoted by GDPs as the most important barriers to emergency treatment. Salaried CDOs were significantly more knowledgeable than GDPs on dental traumatology. A significant expansion in undergraduate and postgraduate education on dental traumatology is needed, and better ways of providing financial remuneration also have to be developed.

Résumé. *Objectif.* Évaluer les connaissances des dentistes quant au traitement d'urgence des traumatismes des dents permanents jeunes, et analyser les obstacles aux traitements.
Protocole. Un questionnaire a été adressé à 1023 dentistes généralistes (GDPs) et communautaires (CDOs) dans le Yorkshire Nord/Ouest et dans le Humberside.
Méthodes. Le questionnaire comprenait 17 questions, 6 donnant des informations générales sur les participants (profession, âge, genre, année de diplôme, formation ou enseignement sur les traumatismes dentaires, volonté de fournir des soins d'urgence), 10 questions étaient en lien avec le traitement des fractures coronaires, fractures radiculaires, luxations et avulsions et la dernière question se rapportaient aux obstacles ressentis par rapport aux traitements.
Résultats. 724 questionnaires ont été renvoyés, un taux de réponse de 71%, indiquant des connaissances inadéquates sur le traitement d'urgence des traumatismes dento-alvéolaires chez l'enfant. Les CDOs avaient significativement plus de connaissances que les GDPs, de même que les dentistes les plus jeunes par rapport aux plus âgés. Les GDPs citaient la difficulté de traiter les enfants, en la comparant aux tarifs inadaptés du British National Health Service, comme des barrières importantes au traitement. Les dentistes suivant des cours de formation continue sur la traumatologie dentaire avaient des connaissances plus sûres que les autres.
Conclusion. D'une manière générale, les connaissances des dentistes sur le traitement d'urgence des traumatismes dento-alvéolaires chez l'enfant étaient inadéquates. Un plus grand accent doit être mis sur ce domaine dans les formations initiale et post-universitaire.

Zusammenfassung. *Ziel.* Evaluation der Kenntnisse von Zahnärzten hinsichtlich Notfallversorgung von Zahntrauma jugendlicher permanenter Schneidezähne sowie Untersuchung von Hindernissen der Versorgung.
Design. Ein Fragebogen wurde an 1023 Zahnärzte in West/Nord Yorkshire und Humberside versandt, einerseits Praktiker (GDP) und andererseits Zahnärzte des öffentlichen Gesundheitswesens (ZÖGD).
Methoden. Der Fragebogen enthielt 17 Fragen, 6 mit Informationen über den beantwortenden Zahnarzt

(Art der zahnmedizinischen Tätigkeit, Alter, Geschlecht, Jahr der Approbation, Weiterbildung oder Fortbildung auf dem Gebiet des Zahntraumas, Bereitschaft zum Angebot von Notfallbehandlung). Zehn weitere Fragen waren relevant hinsichtlich der Notfallbehandlung von Kronenfrakturen, Wurzelfrakturen, Luxation und Avulsion. Die letzte Frage beschäftigte sich mit den empfundenen Barrieren einer Versorgung.
Ergebnisse. 724 Fragebögen wurden zurückgesandt, dies entspricht einer Rücklaufquote von 71%. Es wurde deutlich, dass die Kenntnisse der Zahnärzte hinsichtlich Notfallversorgung von dentoalveolärem Trauma bei Kindern inadäquat waren. ZÖGD waren dabei signifikant kenntnisreicher als GDP, ähnliches galt für jüngere und kürzer approbierte Zahnärzte im Vergleich zu älteren. Die GDP maßen unzureichenden Vergütungssätzen für die Notfallbehandlung durch das britische Gesundheitswesen eine maßgebliche Rolle als Barriere für eine adäquate Versorgung bei. Zahnärzte, welche an Fortbildungskursen zum Thema Zahntrauma teilgenommen hatten, wiesen einen umfassenderen Kenntnisstand auf als Nichtteilnehmer.
Schlussfolgerung. Insgesamt gesehen sind die Kenntnisse der Zahnärzte zur Behandlung von Zahntraumata bei Kindern unzureichend. Größere Anstrengung in der Aus- Weiter- und Fortbildung auf diesem Gebiet sind nötig.

Resumen. *Objetivo*. Evaluar el conocimiento del dentista en el tratamiento de urgencias de lesiones por traumatismo en incisivos permanentes jóvenes e investigar barreras al tratamiento.
Diseño. Se envió un cuestionario de respuestas cerradas a 1,023 dentistas generales (GDPs) y comunitarios (CDOs) de West/North Yorkshire y Humberside.
Métodos. El cuestionario comprendía 17 preguntas, 6 de información general sobre los participantes (profesión, edad, género, año de graduación, práctica o instrucción en traumatismos dentales, predisposición a procurar tratamientos de urgencias), 10 preguntas eran relativas al tratamiento de urgencias de fracturas coronarias, fracturas radiculares, lesiones por luxación y avulsión y la última pregunta indagaba sobre la percepción de cualquier barrera sobre el tratamiento.
Resultados. Se devolvieron 724 cuestionarios, el porcentaje de respuesta fue del 71% e indicaba que el conocimiento que los dentistas tenían sobre el tratamiento de urgencias del traumatismo dentoalveolar era inadecuado. Los CDOs conocían significativamente más que los GDPs, así como los dentistas más jóvenes y los recién graduados en comparación con los mayores. Los GDPs contemplaban la dificultad de tratar a los niños y las tarifas inadecuadas del Servicio Nacional de Salud Británico como barreras importantes al tratamiento. Los dentistas que asistían a cursos de Educación Dental Continuada sobre traumatología dental tenían un conocimiento más completo que los que no asistían.
Conclusión. El conocimiento global de los dentistas sobre el tratamiento de urgencias del traumatismo dento-alveolar en los niños, era inadecuado. Esta indicado poner un mayor énfasis en la educación pregraduada y postgraduada en esta área.

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