

IN BRIEF

- An overview of the attitudes and beliefs of General Dental Practitioners (GDPs) with regard to the provision of treatment for traumatised teeth.
- Insight into the perceived level of confidence of GDPs in their ability to treat trauma cases.
- The barriers to care of trauma cases within the General Dental Service, as highlighted by GDPs themselves.
- Suggestion that communication between primary and secondary care providers could be improved, offering benefits to appropriate care provision

Management of dental trauma in primary care: a postal survey of general dental practitioners

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Objectives To determine the self-perceived knowledge and attitudes of general dental practitioners (GDPs) concerning management of dental trauma in primary care. To identify potential barriers to the management of dental trauma in primary care.

Design and setting A self-completion postal questionnaire survey of 417 GDPs in six local health authority districts in northeast England.

Main outcome measures Likert scale responses to 20 statements designed to test self-perceived knowledge and attitudes. Following descriptive statistical analysis. Factor analysis with principle components analysis was undertaken to identify areas of correlation in questionnaire responses, followed by Chi squared test, Spearman's Rank Correlation and analysis of variance (ANOVA) to measure association between variables.

Results The response rate was 74%. Enamel and dentine fractures were the most common injury, with 45% of GDPs responding seeing more than 10 cases of dental trauma in the preceding year and 53% of respondents seeing one to three cases of complicated crown fracture. Seventy-eight per cent believed that NHS remuneration was inadequate, but only 8% would refer patients with dental trauma to secondary care for this reason. Half of the GDPs believed that trauma could be treated more effectively in practice if NHS payments were greater. GDPs were significantly more likely to agree with this statement if they had previously undertaken a postgraduate course in the treatment of dental trauma ($p=0.002$). Single handed GDPs were statistically significantly more likely to agree with the statements 'I would not treat dental trauma cases at my practice because the NHS payment is inadequate' ($p=0.008$) and 'Treating dental trauma at my practice requires too much of my clinical time to be worthwhile' ($p=0.002$). Ninety-six per cent of GDPs disagreed that treatment of dental trauma rested solely within secondary care. Ninety-six per cent of GDPs agreed that they had a responsibility to provide initial emergency treatment for trauma patients prior to referral. Eighty-eight per cent of GDPs felt that aids to management would be useful.

Conclusions Although GDPs believed that financial remuneration was inadequate, this did not prevent them treating trauma cases. They

strongly agreed that they had responsibility for the management of dental trauma in primary care and that they believed trauma could be treated more effectively in practice if payment was greater. Time constraints were perceived as a barrier to long-term management of complex trauma cases in primary care. GDPs would welcome the use of management aids.

INTRODUCTION

The majority of dental trauma cases seen in secondary care present initially in general dental practice¹ and mainly occur in children. It is therefore imperative that general dental practitioners (GDPs) have a sound working knowledge of managing dental trauma; especially the initial treatment. Initial failure to treat an injury may have aesthetic and functional implications, with increased discomfort and inconvenience to the child, as well as financial implications if advanced restorative procedures are required.^{2,3}

In the UK, the National Health Service provides children's dental care free at the point of delivery with the main providers of dental care being GDPs. The community dental service provides both primary and secondary care. Geographical location plays a role in the provision of secondary care; locations close to dental hospitals will be able to rely more upon these services than more isolated communities.

With regard to the responsibility for the treatment of dental trauma, the NHS Plan⁴ published in 2000 states that; 'Registered NHS patients have the right to receive under the NHS all the treatment that is necessary to secure and maintain their oral health.'

Patients presenting initially to primary care may require referral to secondary care. This does not however remove the responsibility of the primary care service to provide necessary initial treatments such as an emergency 'bandage' over an exposed pulp.

Several barriers may reduce the optimum management of dental trauma. These include the clinician's knowledge and skills, financial considerations, and time constraints. Access to care is crucial, since dental trauma often requires prompt treatment.⁵ Previous investigations into barriers to treatment of dental trauma have largely concentrated on assessing the knowledge of care providers and consumers.⁶ Few studies have evaluated the level of skill possessed by dentists in the treatment of trauma or assessed the factors contributing to the perceived barriers to care. Recent developments in trauma management and improved treatment

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outcomes from the adoption of more conservative approaches to treatment need to be communicated to dentists.³ Similarly, effective, two-way communication between primary and secondary care providers is important to ensure optimum care.

Time constraints may be a barrier to emergency treatment of dental trauma, particularly with a distressed child. Similarly, the long-term management of traumatic injuries may also be time consuming.

Financial barriers could exist; if GDPs consider remuneration for trauma management inadequate, they may feel unable to provide care. There is little published literature relating to possible barriers to treatment of dental trauma in primary care.

The aims of this study were to determine:

1. The potential barriers to the management of dental trauma in general dental practice.
2. The self-perceived knowledge of GDPs in northeast England regarding the management of dental trauma and their attitudes towards responsibility for its management.
3. General dental practitioners' views towards various methods of improving their ability to manage dental trauma cases and enhancing communication between primary and secondary care services.

MATERIALS AND METHODS

Following ethical approval from regional and local research ethics committees, a self-completion postal questionnaire was developed with advice from paediatric dentists, community dentists and a senior lecturer in dental public health. The questionnaire was confidential and consisted of a series of statements with a Likert scale graded from 'strongly disagree' to 'strongly agree'.

The questionnaire was subjected to pre-pilot assessment by eight GDPs who worked part-time in Newcastle Dental Hospital, followed by a pilot survey of ten GDPs outside northeast England. Following minor changes to the questionnaire design, based on comments from the GDPs in the pilot survey, current lists of GDPs were obtained from six local health authorities (LHA); Newcastle, Northumberland, North Tyneside, South Tyneside, Gateshead and Sunderland. All 417 GDPs providing dental care in these areas were included in the survey to eliminate any possibility of subject-selection bias and provide the maximum volume of data.

The practitioners' details were entered into a relational database (*Microsoft Access* version 9.0) and a questionnaire distributed by post to all GDPs with a letter of information, instructions for completion of the questionnaire and a stamped addressed envelope.

Upon return of the questionnaire a 'returned' field was entered into the database, allowing identification of non-responders. Following the requested return date, practice managers of non-respondents were contacted by telephone to check that the GDP was still working at the practice before a reminder pack was issued.

Upon receipt of the questionnaires, the Likert responses were coded and the data were entered into a spreadsheet (*Microsoft Excel* version 9.0). Ten per cent ($n=30$) of the final questionnaires were randomly selected and re-entered to assess the reliability of data entry using Cohen's Kappa analysis.

Once data entry was completed, statistical analysis was undertaken using *SPSS* (*SPSS inc.* version 10.0) software. Following descriptive analysis, factor analysis with principle components analysis was undertaken to identify areas (or themes) of correlation in the responses to the questions. A four-theme factor analysis produced groupings with the best face validity. Following Cronbach's analysis to assess the internal reliability of the question groupings, a mean score for each GDP was then generated from their responses within each of the four themes.

Chi-squared tests were undertaken to determine associations between GDPs' responses and various categorical demographic variables, while ordinal data were investigated using Spearman's

rank correlation. The effect of which of the six LHA districts where the GDP worked was investigated using one-way analysis of variance.

RESULTS

Of the 417 GDPs sent a questionnaire, the initial response rate was 54%. Following telephone contact to remind potential responders, a total of 304 (73%) were returned and subsequently analysed.

Between the six districts the response rates differed (Table 1) ranging from 80% (Sunderland) to 61% (South Tyneside).

The mean time since qualification for the 304 respondents was 22 years (SD = +/-9.5 range 1-45 years). Of the 303 GDPs who responded to this section of the questionnaire, 225 (74%) were graduates of Newcastle Dental School. The mean number of dentists per practice was four (SD = +/-2, range 1-14), while 41 GDPs (14%) worked in single-handed practices. Only 16 (5%) GDPs saw a majority of private patients in their practice. One hundred and eleven (37%) GDPs who responded to the questionnaire worked at a practice providing postgraduate training in the form of vocational training or general professional training schemes and 181 (59%) had access to the internet at their practice. One hundred and twelve GDPs (36%) had undertaken some postgraduate training in the treatment of dental trauma.

Number of patients with trauma seen by the practitioner

GDPs were asked about the numbers of patients attending their surgery with dental trauma during the previous 12 months. Enamel and dentine fractures were reported as being seen most frequently, with 131 (45%) of respondents seeing more than ten cases in the previous year, while 16 (53%) of GDPs had seen one to three cases of complicated crown fracture in the previous year. Root fractures

Table 1 Number of respondents in each district

	Number of questionnaires sent	Number returned	% response rate
Newcastle	96	73	76.8%
Gateshead	58	44	75.9%
North Tyneside	46	34	73.9%
South Tyneside	41	25	61.0%
Sunderland	78	62	79.5%
Northumberland	98	66	67.3%
Total	417	304	72.9%

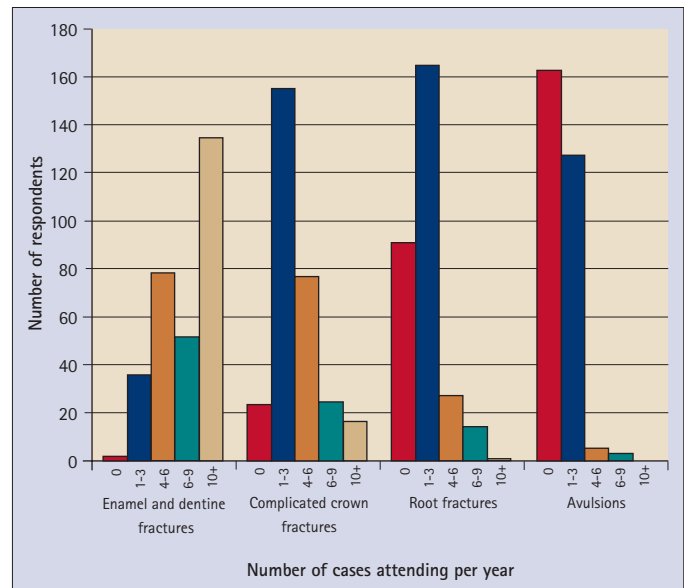


Fig. 1 Distribution of the number and type of trauma cases seen by respondents within the previous 12 months

Table 2 GDPs' confidence in their ability to provide appropriate treatment and long-term care for various types of dental trauma.

	Confident in management		Unsure		Not confident in management	
	No.	(%)	No.	(%)	No.	(%)
Enamel dentine fractures	303	(99.7%)	1	(0.3%)	0	(0.0%)
Complicated crown fractures	287	(94.4%)	5	(1.6%)	12	(3.9%)
Root fractures	155	(51.0%)	93	(30.6%)	56	(18.4%)
Avulsion injuries	139	(46.0%)	96	(31.8%)	67	(22.2%)

and avulsion injuries were seen less frequently (Fig. 1).

GDPs' attitudes towards trauma management

When asked about their ability to provide appropriate emergency and long-term treatment for dental trauma, of the 304 GDPs who responded, all except one were confident in the management of enamel and dentine fractures, whilst 287 (94%) were confident in managing complicated crown fractures. In contrast, only 155 (51%) of 296 respondents were confident in managing root fractures and 139 (46%) of 302 respondents were confident in avulsion injury management (Table 2).

Two hundred and sixty-three GDPs (87%) believed that most dental trauma could be managed effectively in general dental practice. One hundred and forty-two respondents (47%) did not believe GDPs saw too few cases of trauma to be competent in its management, although 95 GDPs (31%) were undecided about this issue. The majority (56%) of GDPs believed that their undergraduate training was sufficient for them to be confident in treating dental trauma although 76 (25%) did not believe that this training was sufficient.

Two hundred and thirteen (70%) GDPs did not feel that complicated crown fractures would be most effectively managed in specialist centres. In contrast, however, for avulsion injuries, 156 (52%) believed that long-term management required specialist care.

Two hundred and ninety (96%) GDPs disagreed that responsi-

bility for the treatment of dental trauma was only the responsibility of the dental hospital or community dental service, with 278 (92%) believing it unnecessary to refer all trauma to specialist centres. Two hundred and ninety-one (96%) agreed that they had a responsibility to provide emergency treatment for trauma prior to referral (Table 3).

Barriers to management of dental trauma in primary care

As seen in Table 4, 235 (77%) of GDPs responding believed that the NHS payment for treating trauma was insufficient and half believed that trauma could be treated more effectively in practice if NHS payments were greater. Chi-squared analysis demonstrated that GDPs were significantly more likely to agree with this statement if they had previously undertaken a postgraduate course in the treatment of dental trauma ($p=0.002$). However, only 8% of GDPs would refer trauma cases to secondary care services due to insufficient payment for treatment in primary care and only 3% of GDPs would not treat trauma at their practice because of inadequate payment. Only 47 (16%) of GDPs felt that trauma treatment took up too much time to be worthwhile. Opinions regarding the feasibility of performing time-consuming treatments, such as apexification procedures in primary care, were divided. One hundred and twenty-eight (42%) GDPs believed these treatments were feasible while 112 (37%) believed they were not.

General dental practitioners were positive towards suggested management aids. The most positive response was for a 'decision tree'-style form providing appropriate treatment steps for more complex cases which 265 respondents (88%) believed would be useful.

To assess the effect of the demographic variables on GDPs' responses, chi squared analysis was performed.

Practitioners who had qualified within the last five years were shown to be statistically significantly more likely to agree that dentists saw too few cases of trauma to be competent in its treatment ($p<0.001$), and were less likely to believe that the treatment of dental trauma required too much clinical time to be worthwhile ($p=0.01$).

Table 3 GDPs' attitudes towards aspects of responsibility for the management of dental trauma cases.

Statement	Disagree		Neither agree or disagree		Agree	
	n	%	n	%	n	%
Treatment of all cases of dental trauma is only the responsibility of the local dental hospital or community dental service	290	95.7%	8	2.6%	5	1.7%
GDPs in practice have a responsibility to treat cases of dental trauma.	2	0.7%	15	4.9%	286	94.4%
All patients with dental trauma should be referred to the dental hospital or community dental service for management	278	91.5%	25	8.2%	1	0.3%
Before referring a patient with dental trauma, GDPs have a responsibility to provide the patient with initial emergency treatment (eg bandage on pulps exposed by enamel, dentine pulp fractures)	6	2.0%	6	2.0%	291	96.0%
Most dental trauma cases can be effectively managed in general dental practice.	11	3.6%	30	9.9%	263	86.5%

Table 4 GDPs' attitudes towards possible financial and time barriers to the management of dental trauma.

Statement	Disagree		Neither agree or disagree		Agree	
	n	%	n	%	n	%
The NHS payment for treating dental trauma is sufficient. I would not treat dental trauma cases at my practice because the NHS payment is inadequate.	235	77.3%	31	10.2%	38	12.5%
Dental trauma could be treated in practice more effectively if the NHS payment for dental trauma cases was greater.	274	90.7%	18	6.0%	10	3.3%
Insufficient payment is a reason for me to refer my cases of dental trauma to a dental hospital or community dental service.	75	24.8%	76	25.1%	152	50.2%
Treating dental trauma requires too much of my clinical time to be worthwhile.	252	83.2%	27	8.9%	24	7.9%
The long-term endodontic treatment of open apex teeth (ie apexification) would take up too much time to be feasible in my practice.	202	67.1%	52	17.3%	47	15.6%
	128	42.2%	63	20.8%	112	37.0%

Those GDPs who had participated in postgraduate training courses for dental trauma management were statistically significantly less likely to agree that treating trauma required too much clinical time to be feasible ($p=0.03$) and that insufficient payment would cause them to refer trauma cases to the dental hospital ($p=0.002$). GDPs who had participated in these courses were statistically significantly more likely to feel confident in the management of avulsion injuries ($p=0.05$).

When the responses of GDPs working at single handed practices compared to multi-practitioner practices, single handed GDPs were statistically significantly more likely to agree with the statements 'I would not treat dental trauma cases at my practice because the NHS payment is inadequate' ($p=0.008$) and 'Treating dental trauma at my practice requires too much of my clinical time to be worthwhile' ($p=0.002$).

Respondents working in practices that provided training facilities for first year dental graduates were more likely to agree that CAL packages would help their management of dental trauma ($p=0.04$) and that the long-term management of avulsion injuries requires specialist knowledge and skills ($p=0.04$). GDPs working at these practices were less likely to agree that trauma management took up too much clinical time to be worthwhile ($p=0.002$) and that long term endodontic treatments of open apex teeth were not feasible ($p=0.005$).

From the factor analysis, four themes with acceptable face validity were produced. These were:

1. Competence of GDPs in the management of dental trauma
2. Responsibility for the management of dental trauma in primary care
3. Barriers to the management of trauma in primary care
4. Attitudes towards the use of management aids.

A GDP's mean score by theme was calculated and the effect of time since qualification, and size of practice was analysed using Spearman's rank correlation. The district where the GDP worked was analysed using ANOVA.

A statistically significant association at the 0.05 level was demonstrated between time since qualification and the GDP's mean score for theme one and two ($p=0.03$ and 0.02 respectively). This was a negative correlation with younger GDPs reporting a lower perceived competence. A statistically significant correlation at a 0.05 level was also shown between the size of practice and the GDP's mean score for the themes one, two and three ($p = 0.02$, 0.03 and 0.04 respectively). The direction of the correlation for themes one and two was positive, in that the larger the practice size the greater the perceived competence and responsibility for care. However, the direction of the correlation for theme three was negative; the larger the practice in which the GDP worked, the fewer perceived barriers to care. The differences between mean scores within the factor analysis however, were very small and not considered clinically significant.

DISCUSSION

The overall response rate of 73% and the steps taken in planning and pre-piloting the questionnaire fulfilled criteria given for an acceptable response rate for this type of investigation.⁷ Differing response rates across the districts surveyed could indicate the varying workloads between dentists practising in different districts.

The difference between the response rate before (54%) and after (73%) telephone contact and reminder pack distribution demonstrated the effectiveness of this type of follow-up and supports findings from other studies.⁸

The majority of GDPs believed that the remuneration provided by the NHS for the treatment of dental trauma was inadequate, and that that they could manage trauma more effectively if the NHS payment was greater. Despite this, they did not view financial

issues as a major barrier to trauma management. This contrasts with the findings of previous work,⁶ where a questionnaire survey of GDPs in northwest England highlighted financial issues as a perceived barrier. The general consensus from the present study was that despite insufficient payment, GDPs were willing to undertake trauma management because of their professional obligations and this was reinforced by comments included in the returned surveys;

- 'Fees are inadequate but like most GDPs this is accepted and treatment is carried out anyway. Remuneration issues don't dictate treatment provided.'
- 'The fees are too low for long term monitoring but from an ethical point of view I feel GDPs have a responsibility to treat their own trauma patients.'

Dental trauma may present unpredictably and require considerable amounts of clinical time. Busy dental practices may not have sufficient capacity to allocate the necessary number of appointments for the long-term management of more complex dental trauma cases. Indeed, responses from the survey indicated that almost 40% of GDPs believed that time constraints were a barrier to long-term management of complex trauma cases. Again, this view was reinforced by some of the comments from the GDPs:

- 'The main reason for referral is that considerable time is necessary to treat trauma cases.'
- 'In my view, time is the major problem, not money. By definition, emergencies arrive without appointments and often need to be seen quickly. After 25 years in care I still have no answer to that problem!'

In contrast to the findings of this study, the questionnaire survey conducted in the northwest of England⁶ found that time constraints were perceived as a smaller barrier to care by GDPs than the financial aspects, although Community Dental Officers found time constraints to be the greatest barrier.

Although no test was made of actual knowledge and skills, our study demonstrated a high self-perceived ability of GDPs to manage the simpler forms of dental trauma, such as enamel and dentine and complicated crown fractures. Confidence was much lower in relation to more complex cases such as root fractures and avulsion injuries, confirming the findings from the study by Hamilton *et al.*⁶ Interestingly in the present study, despite this self-reported confidence in the ability to correctly manage complicated crown fractures, a previous study of trauma cases referred by GDPs from the same area¹ found many injuries were referred to the dental hospital with either inappropriate or no emergency care. Therefore some GDPs' confidence in their ability to correctly manage such injuries may be misplaced.

The number of traumatic injuries seen by a dentist is an important factor in determining their competence to treat dental injuries. It was apparent from the study that the majority of practitioners saw relatively few cases of more complex dental injuries. This raises issues when determining how treatment provision for dental trauma should be facilitated. GDPs seeing relatively few trauma cases may be best placed to act as 'gatekeepers' for the more complex treatment, providing effective emergency care then referring such cases into secondary care. The study by Hamilton *et al.*⁹ concluded that there was a need to develop more specialist centres to receive dental trauma referrals from primary care. There is an emerging consensus of opinion in medicine that improved treatment outcomes are achieved in centres that carry out procedures more frequently than low-volume service providers. However, caution should be used when extrapolating the results of complex medical care provision to the management of dental trauma.

Most GDPs did not feel that referral to a specialist centre was necessary for complicated crown fractures. The majority of GDPs

reported that one to three cases of complicated crown fracture attended their practice for treatment in the previous year. A conservative estimate of one complicated crown fracture, per GDP per year would indicate 417 complicated crown fractures attended GDPs for treatment in the previous year in the study population. Previously published work¹ detailing the numbers of cases of complicated crown fractures referred to a dental hospital over a two-year period was 98, that is 49 referrals per year. This would indicate that the vast majority of complicated crown fracture cases occurring in the northeast are being managed solely in primary care. It is crucial, therefore, that GDPs are able to provide the appropriate care for these cases.

The positive response of the GDPs towards various proposed management aids was encouraging. The use of a CAL package for the treatment of dental trauma was found to be an effective learning tool for GDPs.¹⁰ Responses received for the use of both 'decision tree' procedure forms and preformed referral letters indicate that development of these items for use by the local GDP population may be required. Such management-support aids have already been developed for other areas of dentistry.¹¹⁻¹⁴ However, when planning strategies for managing dental trauma, the aids should be evidence-based and developed in close collaboration with the GDPs to be targeted by the programme.¹⁵ Internationally recognised evidence-based management guidelines for dental trauma already exist¹⁶⁻¹⁸ and the challenge is to ensure that the information within them is accessible, and useable by practitioners.

In conclusion, GDPs believed that financial remuneration for the treatment of dental trauma was inadequate but it did not prevent them from managing these cases. Time constraints were seen as a barrier to trauma treatment, especially those GDPs working alone.

GDPs saw relatively few complex dental trauma cases and were not confident in its management. There may be a need to proactively encourage long-term management of complex trauma cases in the secondary care setting following appropriate emergency treatment in primary care.

GDPs demonstrated enthusiasm for aids to management and strategies to improve communication between primary and sec-

ondary care. Developing appropriate methods in close collaboration with GDPs should be a priority.

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