

Management of orthodontic emergencies in primary care – self-reported confidence of general dental practitioners

H. Popat,^{*1} K. Thomas² and D. J. J. Farnell³

In brief

Highlights that orthodontic emergencies do not frequently present to general dental practitioners.

Outlines the more common orthodontic emergencies encountered in general dental practice.

Presents research results that show GDPs are confident in the management of orthodontic emergencies.

Notes that undergraduate training in orthodontics has increased within the last 10 years.

Objective To determine general dental practitioners' (GDPs) confidence in managing orthodontic emergencies.

Design Cross-sectional study. **Setting** Primary dental care. **Subjects and methods** An online survey was distributed to dentists practicing in Wales. The survey collected basic demographic information and included descriptions of ten common orthodontic emergency scenarios. **Main outcome measure** Respondents' self-reported confidence in managing the orthodontic emergency scenarios on a 5-point Likert scale. Differences between the Likert responses and the demographic variables were investigated using chi-squared tests. **Results** The median number of orthodontic emergencies encountered by respondents over the previous six months was 1. Overall, the self-reported confidence of respondents was high with 7 of the 10 scenarios presented scoring a median of 4 indicating that GDPs were 'confident' in their management. Statistical analysis revealed that GDPs who saw more orthodontic emergencies in the previous six months were more confident when managing the presented scenarios. Other variables such as age, gender, geographic location of practice and number of years practising dentistry were not associated with self-reported confidence. **Conclusions** Despite GDPs encountering very few orthodontic emergencies in primary care, they appear to be confident in dealing with commonly arising orthodontic emergency situations.

Introduction

An orthodontic emergency can be described as a problem arising from an orthodontic appliance, where an unscheduled appointment is required to resolve the issue.¹ When a patient experiences such an issue, a timely additional appointment may need to be arranged with a dental professional. Patients who present with an orthodontic emergency may be experiencing pain or discomfort. It can also be inconvenient for the patient and

parents in attending for an additional, unexpected appointment due to pre-existing school or work commitments. Consequently, repeated breakages prolong treatment time and can lead to decreased patient motivation due to a loss of confidence in the appliance or the operator¹. By providing appropriate timely management, inconvenience and distress to both the patient and parents can be minimised with the efficacy of the appliance still being maintained.²

In the UK, dental professionals are regulated by the General Dental Council (GDC). The learning outcomes outlined within the GDC's Preparing for Practice document state that dental registrants should be competent at undertaking limited orthodontic appliance emergency procedures.³ Similarly, the Association for Dental Education in Europe (ADEE) specify that dental graduates should be competent at handling all forms of orthodontic emergencies including referral when necessary.⁴

To satisfy both the GDC and ADEE learning outcomes related to orthodontic emergencies, practitioners should have had appropriate training as a dental student. Despite these regulations, previous studies have found that levels of undergraduate confidence in managing orthodontic procedures are low.⁵ Recent graduate satisfaction of orthodontic training is also poor with more than 50% of graduates within their vocational training year feeling unable to use a removable appliance to correct a simple malocclusion.^{6,7} Additionally, it has been demonstrated that dental foundation trainers rate the training of undergraduate students in orthodontics as inadequate when compared to other areas of dentistry.⁸ Specifically, it has been shown that general dental practitioners' (GDPs) self-perceived confidence at dealing with orthodontic emergencies is relatively low, with 40% of GDPs feeling 'incompetent' at dealing with these situations.⁹ Conversely, a more recent qualitative

¹Melbourne Dental Clinic, Faculty of Medicine, Dentistry and Health Sciences, Melbourne University, 723 Swanston Street, Carlton, 3010, Australia; ²School of Dentistry; ³Applied Clinical Research and Public Health, Cardiff University, Cardiff, CF14 4XY

*Correspondence to: H. Popat
Email: Hashmat.Popat@unimelb.edu.au

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study of dental students' reflections found that confidence in dealing with orthodontic emergencies as undergraduates was relatively high, with almost two thirds of students feeling confident at managing these situations in a training environment.¹⁰ Given that most previous work in this area has been carried out in higher education institutions, a further study in general dental practice would allow greater exploration of the attitudes of dental professionals in the UK relating to orthodontic emergencies. Therefore, the aims of this study are to:

- Identify the incidence of orthodontic emergencies in the general dental practice setting
- Explore GDPs' confidence in managing common orthodontic emergencies
- Identify factors that influence the confidence levels of GDPs managing orthodontic emergencies.

Methodology

Study design

This study was designed as a cross-sectional, self-reported survey. Ethical approval was granted by Cardiff University Dental School Ethics Committee (Ref. 15/15).

Inclusion and exclusion criteria

The participants of the study included all primary care general dental practitioners registered as dental providers in Wales (n = 226). In the UK, a dental provider is defined as a limited company, partner, sole trader or shareholder who holds a general/personal dental services agreement within the National Health Service (NHS). This is different to dental performers who are qualified dentists who work for providers. There was no restriction on whether NHS or private orthodontics was provided by the respondents, although this was recorded. Orthodontic specialists and those individuals recognised as dentists with enhanced skills in orthodontics were excluded.

Questionnaire

An online survey was developed using the Bristol Online Survey Tool. The survey was divided into three separate sections relating to screening for inclusion/exclusion criteria, collection of basic demographic information (age, gender, practice location, number of years qualified, undergraduate/postgraduate training in orthodontic emergencies, and number of orthodontic emergencies seen in

the previous six months) and presentation of orthodontic emergency scenarios. A structured literature review was used to identify ten common orthodontic emergencies¹¹⁻¹⁴ that were described within the questionnaire (Table 1). Respondents indicated their level of confidence on a 5-point Likert Scale when dealing with these situations, if they were encountered in general practice.

Dissemination

Before the questionnaire was distributed, it was piloted between six clinical members of staff (two senior lecturers in restorative dentistry, two specialist practitioners in restorative dentistry and two general dental practitioners) at the University Dental Hospital, Cardiff in order to gauge validity. Feedback from the pilot study was provided by these members of staff and any further discussions were carried out on an individual basis. Minor modifications to the questioning were made accordingly. Welsh Local Health Boards disseminated the online questionnaire link to registered dental providers at the beginning of July 2015 and the questionnaire remained open until the end of September. Participants were sent reminder emails at 2 and 4 weeks following initial contact. Participant consent to be involved in the study was implicit on completion of the questionnaire.

Statistical analysis

Data from the questionnaires were exported from the Bristol Online Survey Tool into SPSS (IBM SPSS Statistics, Version 22.0. Armonk,

NY) for analysis. Descriptive statistics were used to investigate the confidence of general practitioners in managing the different scenarios and chi-squared tests were used to assess whether the association between the demographic variables on the GDPs' self-reported confidence was statistically significant. The assumption of the chi-squared test (that is, that no more than 20% of the responses had a count of less than 5) was met.

Results

In total, 103 responses were obtained, of which 15 were excluded due to their previous orthodontic training either as a dentist with enhanced skills, special interest or an orthodontic specialist. Subsequently, the total number of responses used for data analysis was 88 achieving a response rate of 39%. The gender ratio of respondents was equal. A quarter of participants (24%) provided orthodontics at their practice, either performed by themselves or by another practitioner. Just over half of respondents (53%) practised in South East Wales, 33% in South West Wales and the remaining 13% in North Wales. The majority of respondents (89%) worked in a multi-surgery practice.

Approximately one third of respondents had been practising dentistry for up to 10 years (35%) and a further third from 11–20 years (35%). There were less respondents who had been qualified for longer between 21–30 years (14%) and greater than 30 years (16%).

Less than half of respondents (43%) had received training on orthodontic emergencies

Table 1 Orthodontic emergency scenario legend with descriptions

Code	Orthodontic emergency description
GP	Generalised dental pain from all the lower teeth. A lower fixed appliance was placed one week ago.
DB	A debonded bracket from a lower right second premolar. The bracket is still attached to the archwire with an elastic module but is causing trauma to the buccal mucosa.
TW	A traumatic ulcer related to an over-extended piece of wire from an upper left first permanent molar.
FR	An upper removable appliance that has fractured a clasp on the upper right first permanent molar.
BF	A broken lower fixed retainer where the composite has become debonded from the lingual surface of one of the central incisors.
LR	A concern from a patient that their teeth may be moving because they have lost their removable retainer three days ago.
TB	Soreness related to a traumatic ulcer adjacent to a fixed appliance bracket on an upper right permanent canine.
LM	A lost elastic module which engaged the archwire to the fixed appliance bracket.
DW	An archwire that has been displaced out of the last standing molar attachment and is digging into the buccal mucosa.
PA	A localised periodontal abscess around a molar band.

as an undergraduate. Of those that had received training as an undergraduate, theoretical training was the most common type (38%), followed by observation of orthodontic emergencies clinics (27%) and clinical patient exposure (25%). Less participants had been taught using simulated clinical teaching such as a typodont (8%) and had training in the form of an online module (2%). Two-thirds of respondents who had graduated within the last ten years received training in orthodontic emergencies (67%) whereas only a third of those who had been practising for over 10 years received any such training (33%). Only 6% of respondents stated they had experienced postgraduate training in orthodontic emergencies.

The median number of orthodontic emergencies encountered by GDPs over the previous six months was one. Just over half of respondents (55%) reported no clinical contact with any form of orthodontic emergency over this

time period. Only 9% of participants indicated they had encountered five or more orthodontic emergencies. The most frequent emergencies encountered were a debonded bracket (37%) followed by a protruding archwire (25%). The remaining emergencies included fractured archwires (7%), fractured removable appliances (7%), loose archwires (6%), broken retainers (6%), lost ligatures (4%), ulceration (4%) and post-operative pain following fixed appliance adjustment (4%).

Overall the self-perceived confidence level of participants when managing the orthodontic emergencies detailed in Table 1 was relatively high. Figure 1 presents the responses of all participants to these ten scenarios graphically. A median confidence level of 4 was reported for seven out of ten of the scenarios (GP, DB, TW, LR, TB, LR, DW, PA) indicating 'confident' in management (Fig. 1). The median confidence level for the remaining three scenarios (FR,

BF, LM) demonstrated a slightly lower value of 3, suggesting a neutral response of 'neither confident or not confident' in management.

Chi-squared tests showed that gender, type of practice (single/multi-surgery), number of years qualified and previous postgraduate training were not significantly related to confidence in managing orthodontic emergencies (Table 2). The main variable which showed a statistically significant relationship with the perceived confidence level in managing orthodontic emergencies was the number of orthodontic emergencies encountered by the respondent over the previous six months (Table 2). The effect of orthodontic treatment being conducted at the workplace was only statistically significant for three of the scenarios; generalised orthodontic pain ($P = 0.020$), traumatic ulcer associated with a long archwire end ($P = 0.013$) and lost removable retainers ($P = 0.001$). Undergraduate training in orthodontic emergencies was statistically associated with higher confidence levels in managing traumatic ulcers as a result of long archwires ($P = 0.008$) and fractured clasps on removable appliances ($P = 0.032$).

Discussion

This study has identified the incidence of orthodontic emergencies in general dental practice and the confidence of GDPs in their management. Although orthodontic emergencies present infrequently to general dental practice, practitioners' confidence in managing these patients is relatively high. Despite undergraduate training in orthodontic emergencies being more common among recent graduates, (that is, within the last ten years) there was no association with increased confidence levels when compared to respondents who

Fig. 1 Stacked bar chart showing confidence levels of respondents for each orthodontic emergency scenario

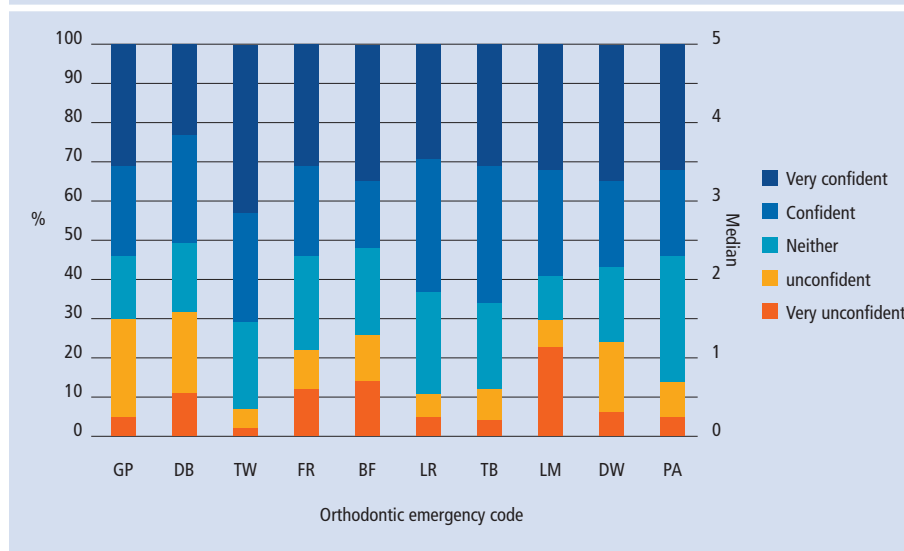


Table 2 Chi-squared tests showing significance of variables on confidence levels of different orthodontic emergency scenarios

Variable	Orthodontic emergency scenario									
	GP	DB	TW	FR	BF	LR	TB	LM	DW	PA
Orthodontics at workplace	0.020*	0.146	0.013*	0.497	0.056	0.001*	0.109	0.114	0.137	0.221
Gender	0.617	0.228	0.520	0.141	0.926	0.725	0.210	0.293	0.331	0.407
Years qualified	0.176	0.591	0.178	0.096	0.247	0.266	0.382	0.600	0.419	0.059
Multi- or single-surgery practice	0.075	0.703	0.890	0.547	0.284	0.968	0.995	0.464	0.110	0.685
Undergraduate training	0.836	0.131	0.008*	0.032*	0.511	0.055	0.065	0.161	0.157	0.983
Postgraduate training	0.605	0.595	0.475	0.140	0.143	0.290	0.253	0.115	0.135	0.704
Number of emergencies seen in last six months	0.061	0.003*	0.021*	0.018*	0.023*	0.010*	0.069	0.004*	0.000*	0.014*

*Statistically significant results at the 5% level

had not received undergraduate training. All other demographic variables (gender, practice location, single/multi-surgery practice, and the number of years since dental qualification) showed no statistical relationship with confidence levels. The main significant relationship was found between the number of orthodontic emergencies encountered by practitioners in the preceding six months and confidence. As the orthodontic emergency scenarios described within the questionnaire correlated very strongly with the orthodontic emergencies seen by respondents it can be assumed that clinical experience/exposure to a particular problem is the most likely reason for the higher confidence levels indicated by these practitioners. This theory is supported by the highest level of confidence being reported for managing a traumatic ulcer caused by a protruding archwire. This particular problem was the second most commonly encountered orthodontic emergency by respondents over the previous six months.

A weaker relationship to the confidence level of respondents (statistically significant for three of the ten scenarios), was whether orthodontic treatment was provided at the workplace, either by the participant themselves or by a fellow colleague. If an individual is routinely in contact with fixed or removable appliances they should be increasingly confident at managing problems with these appliances. Alternatively, if a colleague within the practice provides orthodontic treatment then the participant may feel more confident at managing an emergency as they are aware that they can seek advice from this individual and subsequently provide the appropriate treatment with the suitable materials.

There is limited literature to compare the findings of this study. The only previous literature published on this subject was conducted some ten years ago where the authors reported that practitioners' perceived confidence when managing orthodontic emergencies in comparison to alternative orthodontic procedures was relatively low.⁹ While this study does provide new knowledge in the field a number of points need further discussion. In particular, responder bias may have influenced the results. Interpretation of 'management' may have

varied between respondents. For the scenario describing a debonded bracket, an individual may indicate a low level of confidence based on their self-perceived ability to detach the bracket, remove the wire and cement a new bracket, whereas others may indicate a high level of confidence as their interpretation of treatment may be to provide conservative management, for example, soft wax and refer to the orthodontist for definite treatment. Semi-structured interviews or focus groups would have eliminated misinterpretation but would have led to a reduced overall sample size and increased the study cost and time burden.

Another limitation of the study was the sample size. Overall, a response rate of 39% was achieved. Due to the small sample size, the power to detect significant differences may have been low. Therefore, although statistical tests were performed on the collected data, a larger sample size would have facilitated more generalisable results. The present study could have been extended to GDPs in England and Scotland to increase the sample size. In Wales, only individuals registered as orthodontic specialists and/or dentists with enhanced skills in orthodontics service NHS orthodontic contracts.¹⁵ Therefore, those practitioners with significant orthodontic experience could be excluded and a homogenous group of GDPs was considered here. Elsewhere in the UK, GDPs with no formal orthodontic qualification may service NHS orthodontic contracts. From a respondent perspective, therefore, previous orthodontic experience may have been difficult to standardise and confounded the study results if extended.

In summary, this study provides an insight into the number of orthodontic emergencies encountered in general dental practice. The low numbers of these patients seen by GDPs suggest that problems from orthodontic appliances are most likely dealt with by the treating clinician. Despite the limited clinical exposure and lack of undergraduate training in orthodontic emergencies for practitioners qualified for over ten years, self-reported confidence of orthodontic emergencies by GDPs was high. Literature also suggests that the number of short-term orthodontic treatments is rising in general dental practice.¹⁶ As such, GDPs

may be able to manage emergency procedures should they arise. Further studies with larger sample sizes may identify additional learning needs of GDPs in this subject area.

Conclusion

Although orthodontic emergency patients present infrequently in general dental practice, common emergency problems are likely to be dealt with confidently by practitioners. Those practitioners who see more orthodontic emergencies are more confident in their management.

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