Assessment of time taken to treat dental trauma in Nigerian children

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Key words: clinical time, diagnostic time, treatment time, dental trauma, Nigerian children

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Abstract

AIM: To assess the clinical time (diagnosis and treatment times) to manage traumatic dental injuries (TDIs) in children attending paediatric dental clinics in Nigeria. **STUDY DESIGN:** Cross sectional observational pilot study on children presenting at four government hospitals in South West Nigeria over a 3-month period. **METHODS:** Dental injury was classified using the method recommended by Andreasen et al. [2003]. A standardized protocol was followed and the details of the diagnosis time, treatment time and total clinical time for management of different traumatic injuries to the primary and permanent dentition were recorded and calculated on a data collection form. **RESULTS:** There were 73 dental injuries in 39 children. For the primary dentition, complicated crown fracture had the highest average total treatment time namely 76.0±48.1 minutes as well as the highest average number of visits (2.6 visits). More time was spent manageing the same level of injury in the permanent dentition than in the primary dentition. For the permanent dentition, extrusive luxation injury had the highest average total treatment time (103.3±11.5 minutes). **CONCLUSION:** The clinical time for management of dental injuries in children was relatively high and varied by type of injury.

Introduction

The prevalence of dental trauma is increasing in Nigeria [Adeyemo et al., 2005] and its treatment is occupying an greater amount of dentists' time. In Nigeria, the prevalence of traumatic dental injuries (TDI) to the anterior permanent teeth of 12 year olds was 11% [Otuyemi, 1994]. The prevalence of TDI to anterior teeth was much higher in the primary than in the permanent dentition [Otuyemi et al., 1996]. This relatively high prevalence has led to a need to assess the clinical time and resources needed to treat dental injuries. There are very few studies to assess the time taken to manage dental trauma and none have been carried out in Nigeria. From the literature the time to treat uncomplicated and complicated TDI in primary teeth can take between 0.8 and 1.6 hours spread over 2.5 to 4.3 visits [Josefsson and Karlander, 1994]. In Swedish children, treatment times for both primary and permanent teeth were 2.0 and 2.7 times higher for complicated injuries compared to uncomplicated TDIs [Glendor et al., 2000].

As there was an identified need to assess the time for the clinical management of TDIs in Nigeria the objective of this study was to assess the clinical time (diagnosis and treatment times) to manage TDIs in Nigerian children.

Material and methods

This was a cross sectional observational pilot study of all children aged from 2 to 16 years, who presented with dental injuries at four well-equipped government hospitals in Nigeria over a three month period in 2006. Children presenting with a TDI were examined using the classification of dental injuries recommended by Andreasen et al. [2003].

The clinical time spent on managing dental injury was assessed by recording time in minutes for diagnosis and treatment. The diagnosis time included period spent taking a history, extra-oral and intra-oral examination of the child and on conducting investigations including radiographs and pulp testing for permanent teeth. The treatment time was that spent actually treating the injury. The time was recorded separately for each of the treatment visits. The time a patient spent in the dental chair for any further history taking, examination or investigations during check-up visits was also included. For children who failed to complete treatment, clinical time for diagnosis only was calculated.

Instructions on how to assess the time spent on diagnosis and treatment and on how to record the data were given to each of the dentists participating in data collection. The record on time was kept with the help of an assistant using a clock with minutes and second readings. The time of the day when diagnosis and treatment commenced (noted as the time the paedodontists made contact with the patient) was noted on the patient's data sheet. Also, the time of the day when diagnosis and treatment was concluded (indicated by time when paedodontists' stated diagnosis or treatment was completed) was also recorded on the treatment sheet. One of the authors (TOL) calculated the difference in this time – from time treatment commenced to time when treatment was completed – to the nearest minute.

Participating dentists had postgraduate training in paediatric dentistry. They were familiar with assessment of dental injuries using the Andreason et al. [2003] classification. There was common consensus amongst the paedodontists on management modalities of dental injury with agreement that there could be variability in individual case management. Management modalities for each case were to be recorded in each patients' record.

One of the authors (TOL) trained each of the participating dentists and the assistant on a one-on-one basis at the clinic site. The dentists were trained on data collection methods, data entry methods, and manageing clinical diagnosis challenges.

The results from all the four hospitals were combined and the mean and standard deviations of the diagnostic time, treatment time and total clinical management time were calculated for each tooth injury for the primary and permanent dentitions. When multiple tooth dental injuries occurred, each tooth was treated independently. For multiple dental injuries that were of similar type in the same patient, the history and examination times were considered simultaneously. For multiple dental injuries that were not of the same injury type, the diagnostic and treatment times were considered separately. The average number of visits for each tooth injury was also recorded. Analysis was made using Microsoft Excel 2007.

Results

Subjects. There were 73 injuries recorded in 39 children; ages of the permanent dental injuries ranged from 5.0 – 16.0 yrs with an average of 9.9 yrs and median of 10yrs. The ages of primary dental injuries ranged from 2.0 – 6.5 yrs with an average of 3.6 yrs and median of 3.5 yrs.

Table 1. *Frequency of dental injuries in primary and permanent teeth in children attending four dental clinics in Nigeria.*

Classification of Dental injury	Primary teeth	Permanent teeth	Total (%)
Enamel fracture	1	4	5(7.0)
Enamel-dentine fracture	1	17	18(24.7)
Complicated crown fracture	2	8	10(13.7)
Complicated crown root	0	1	1(1.5)
Concussion injury	0	1	1(1.5)
Subluxation	0	3	3(4.2)
Extrusive luxation	1	2	3(4.2)
Intrusive luxation	8	3	11(15.1)
Avulsion	7	12	19(26.0)
Lateral luxation	0	0	0
Root fracture	0	0	0
Uncomplicated crown-root	0	0	0
Total (%)	20 (27.4)	53 (72.6)	73 (100)

Injuries. More permanent (72.6%) than primary teeth were treated for dental injuries in the 4 dental centres (Table 1). The most frequent form of injuries to primary teeth was intrusive luxation. This occurred in 8 out of the 20 (40.0%) primary teeth managed. The most frequent form of injury to permanent teeth was enamel-dentine fracture: this occured in 17 of the 53 (32.1%) permanent teeth managed. For both dentitions, avulsion was the commonest form of injury and occurred in 19 (26.0%) teeth. Complicated crown root fracture, concussion and subluxation injuries were not observed in the primary teeth during the study period (Table 1). Root fracture, uncomplicated crown – root fracture and lateral luxation injuries were also not observed in both primary and secondary dentition studied. The 13 cases of multiple dental injuries observed were treated as separate injuries. The forms of treatment provided for the various types of dental injuries are presented in Table 2.

Table 2. *Types of treatment provided to the primary and permanent teeth with a traumatic dental injury.*

Dental trauma	*Treatment	
	Primary teeth	Permanent teeth
Enamel fracture	No active treatment	Rounding off sharp edges
Enamel – dentine fracture	No active treatment	Composite bandage,
Complicated crown fracture	Extraction	Root canal treatment
Complicated crown root	–	Extraction
Concussion injury	–	Occlusal trimming of opposing tooth
Subluxation	–	No treatment
Extrusive luxation	Extraction	Repositioning and splinting
Intrusive luxation	Extraction	No active treatment
Avulsion	No active treatment	Replantation and splinting but if presenting without tooth, fabrication of prosthesis undertaken

*All cases were treated with local anaesthesia.

Diagnostic and treatment times. For primary teeth the average diagnostic and treatment times varied by type of TDI. Extrusive luxation (14.0 mins) and avulsion (23.1 mins) required the least time to diagnose whereas enamel and enamel dentine fracture took 35 minutes and complicated crown fractures 41 minutes to diagnose (Table 3). Enamel and enamel-dentine fractures in primary teeth were not treated. Complicated crown fracture to primary teeth had the longest treatment time (35 mins) and average total clinical management time (76.0±48.1 mins). Avulsion, extrusive and intrusive luxation took between 3.6 and 10 minutes to treat.

In the permanent dentition subluxation injury had the longest diagnostic time (71.7 mins). Diagnosis for the other forms of TDI ranged from 18.3 minutes for enamel fracture to 46.7 minutes for avulsion (Table 4).

Table 3. Average clinical times and average number of visits for management of the primary teeth with a traumatic dental injury.

Classification of dental trauma	Clinical times (mins)			Average number of visits
	Average diagnostic time (mins)*	Average treatment time (mins)*	Average total management time (mins)*	
Enamel fracture	35.0±0.0	0.0	35.0±0.0	1.0
Enamel -dentine fracture	35.0±0.0	0.0	35.0±0.0	1.0
Complicated crown fracture	41.0±26.9	35.0±21.2	76.0±48.1	1.5
Extrusive luxation	14.0±0.0	7.0±0.0	21.0±0.0	1.0
Intrusive luxation	40.3±10.9	10.0±5.9	50.3±13.9	2.6
Avulsion	23.1±7.9	3.6±7.5	26.7±14.2	1.0

* mean ± standard deviation

Table 4. Average clinical times and average number of visits to manage dental trauma to the permanent teeth with a TDI.

Classification of Dental trauma	Clinical times (mins)			Average number of visits
	Average diagnostic time*	Average treatment time*	Average total management time*	
Enamel fracture	18.3±13.7	10.0±13.7	28.3±22.3	1.0
Enamel-dentine fracture	30.1±23.7	31.8±49.9	61.9±52.0	1.2
Complicated crown fracture	29.7±0.5	47.3±12.6	77.0±12.9	2.0
Complicated crown root	38.0±0.0	12.0±0.0	50.0±0.0	1.0
Concussion injury	21.0±0.0	2.0±0.0	23.0±0.0	1.0
Subluxation	71.7±25.2	0.0	71.7±25.2	1.0
Extrusive luxation	43.3±11.5	60.0±0.0	103.3±11.5	1.0
Intrusive luxation	23.3±10.4	16.7±5.7	40.0±13.2	1.3
Avulsion	46.7±14.2	30.4 ± 33.9	77.1± 40.7	1.4

* mean ± standard deviation

Extrusive luxation had the longest treatment time (60.0 mins). Treatment times for the other forms of TDI ranged from 2 minutes for concussion to 10 minutes for enamel and 47 minutes for complicated crown fracture. None of the patients with subluxation injury received treatment. Patients with complicated crown fracture had to make the highest number of dental visits for management of their injury (2.0 visits) (Table 4).

Overall, for both the primary and permanent dentition, more time was spent diagnosing the injury in the primary dentition than in the permanent dentition, except for extrusion and avulsion. On the other hand, more time was spent in managing all types of lesions in the permanent than in the primary dentition. More hospital visits were also required for the management of dental injuries in the permanent dention than in the primary dentition except for the management of intrusion (Tables 3 and 4).

Discussion

There is a need to assess the amount of time spent managing dental trauma in children. Understanding how much time is spent on clinical management of a child helps both the dentists and parents to understand how to effectively manage time. Effective time management will include how best to schedule and prioritise treatment where critical decisions have to be made as to the best use of limited time.

In the primary dentition, intrusive luxation and complicated crown fractures were the only injuries where multiple dental visits were reported, which were required in the form of follow-up monitoring visits for both forms of injuries following an extraction. They also both required longer management time, which was often due to time expended in making a diagnosis.

The time taken to treat complicated injuries to primary teeth was more than uncomplicated injuries. This can be due to more time needed to gain the cooperation of a child with complicated injuries. This result is comparable with that of Glendor et al., [2000] who also observed longer times and more dental visits to treat complicated trauma to primary teeth per individual.

The mean number of visits required to manage both uncomplicated and complicated TDIs in the present study were less than that observed in the studies done of Glendor et al., [2000] and Borssén et al., [2002] and it falls short of the recommendation by the International Association for Dental Trauma (IADT). While the dentists may have actually asked patients to come back for follow-up visits (this will always be the case for any management given to any patients in the dental hospital prior to discharge), the onus is on the patient to come back. This study reported on actual events – the number of visits the patients made to the hospitals and not the number of visits the dentists proposed for the patients. Compliance with recall appointments is known to be poor in the study populations.

In the permanent dentition, complicated injuries required longer management time and multiple visits. This result is comparable with that of Glendor et al., [1998]. However, the treatment times and number of visits required to treat these injuries were comparatively less in this study than that of Glendor, et al. [1998] Also, in this study, enamel-dentine fractures classified as uncomplicated dental injuries [Andreasen et al., 2003] required multiple visits due to associated pulpal complications resulting from delay in seeking treatment.

Although the time taken to develop radiographs was not included in the diagnostic time, it was for uncomplicated TDIs, complicated crown fracture and intrusive injuries took longer in primary teeth. This may include longer time for taking radiographs in younger children due to less tolerance of intra-oral radiographs than older ones, and also the tendency for less cooperation and need to use multiple behavioural management techniques to obtain compliance. These explanations are at best, postulations, as the data did not capture levels of detail than would allow objective explanations.

The opposite was noted when it came to the treatment time that was longer in the permanent dentition than in the primary dentition for all forms of TDIs. The frequency of dental visits was equal to or more in permanent for the same type of TDIs, except for intrusive injury (the average number of visits for the primary teeth doubled).

The average management time for complicated TDIs to primary teeth was 1.2 times higher than uncomplicated TDIs and for complicated TDI to permanent teeth was 1.4 times higher than corresponding uncomplicated trauma. These times were shorter than that recorded by Glendor et al. [1998], who reported management times of 2.0 and 2.7 times higher in primary and permanent teeth respectively.

The combination of longer time for treatment and number of visits for treatment may have significant impact on a child's school attendance and may disrupt important engagements of a child's guardian during the treatment period. Such an important commitment for the parent of Nigerian children may lead to a loss of earnings for the parent. Dental trauma in children thus needs to be considered as a significant public health issue in view of its prevalence and potential socio-economic impact on families.

This study reports that dental injury was commoner in the permanent dentition and agrees with findings by Al-Malik [2009]. The most frequent injury to primary and permanent teeth in this study were intrusive luxation and enamel-dentine fracture respectively. These results are similar to those of previous studies [Glendor et al., 1998; Dietschi et al., 2000; Acosta Alfaro and Garcia-Godoy, 2006]. In primary teeth, complicated injuries were more prevalent in this study than uncomplicated injuries and most of them underwent extraction. It may also be the minor traumatic injuries in the primary dentition are not presenting to centres involved this study or that minor dental injuries are not reported at all to any dental clinic. While it is important to emphasis the need to prevent trauma to primary teeth, there is a need to expand this study into communities to understand the pattern of reporting and management of dental injuries in children.

The design of this study does have limitations as it was not blinded. Dentists were aware of the objectives of the study and may have consciously been more efficient with time management. Thus, longer times may actually be spent on treating traumatic dental injuries in children than observed. The study was exclusively conducted in public health centres and did not include children with special needs. While it may be assumed that longer time may be needed to manage children with special needs, there will be a need to conduct similar studies in children with special needs so as to plan adequately for their dental care. This study focused on quantitative analysis of the time to manage dental trauma. There are quite a number of observations made that will need to be addressed by qualitative analysis. Subsequent studies may therefore be designed to evaluate the details of what informs the observed differences in time expended for diagnosis and treatment of dental trauma.

Conclusion

At the four Nigerian centres involved, permanent teeth were more affected by dental injury than primary teeth. There were generally longer treatment times for dental injuries to permanent teeth than primary teeth. There were, however , generally longer diagnostic times for primary teeth compared to permanent teeth.

Acknowledgements

Ethical approval was obtained from the Ethical Review Board of the Obafemi Awolowo University Teaching Hospitals Conplex, Ile-Ife. Approval for study was also obtained from the Heads of Department of the Child Dental Health unit of each hospital.

Thanks to Professor E.O. Ogunbodede who provided guidance for the study. We also wish to acknowledge the assistance of Drs. Ridwan Kekere-Ekun, MO Agbaje, EO Oziegbe, and MO Ashiwaju who all assisted with data collection.

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