

# Developing a Primary Dental Trauma Protocol for a Large Emergency Department at a Children's Hospital

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**INTRODUCTION:**

Traumatic dental injuries (TDI) are highly prevalent among children worldwide, projected as the second most frequent oral disease after dental caries and world's fifth most prevalent injury according to a systematic review.<sup>1</sup> Unintentional falls, collisions and leisure activities account for most of TDI with 22.7% of injuries affecting the primary teeth worldwide.<sup>1,2</sup> Due to the acute nature of TDI, many patients present to EDs for emergency treatment. Pediatric emergency services demonstrate the highest pooled prevalence of TDI (29%) compared with general hospitals, maxillofacial surgery clinics, and dental emergency clinics (13%, 7%, and 7%, respectively).<sup>3</sup> This protocol is based on current guidelines and research regarding management of primary dental trauma. The goals of this study are for educational gains among non-dental emergency medicine providers and reduction in length of stay for patients in the ED. The sample was pediatric patients presenting to Children's Hospital of Pittsburgh Emergency Department with a chief complaint of primary dental trauma, mouth injury, or dental fractures. ED encounters were tracked prior to and after the implementation of trauma protocol. Pre- and post-protocol tests were given to ED providers to evaluate their understanding of the protocol followed by a post-protocol survey.

**METHODS:**

1. A child presenting to the Children's Hospital of Pittsburgh Emergency Department from July 1, 2022, to December 1, 2022, complaining of primary dental trauma, mouth injury, or dental fracture was catalogued as part of pre-protocol patient encounter data.
2. Patient encounters were sorted using ICD-10-CM Diagnosis coding for dislocation of tooth (S03.2XXA) or fracture of tooth (S02.5XXA).
3. The Emergency Department staff triaged the patients and either performed no acute treatment, referred to home dentist, referred to the Children's Hospital of Pittsburgh Pediatric Dental Clinic, paged the dental resident on-call, prescribed pain medications, or a combination of these.
4. Various Emergency Department staff including Advanced Practice Practitioners (APPs), residents, fellows, and attendings were trained on primary dental trauma management using Figures 1, 2, 3.
5. Descriptive analyses were performed on pre- and post-protocol test results from Emergency Department staff. Post-protocol patient encounter data was then collected for the same ICD-10-CM codes and triage outcomes for three months.

**RESULTS:**

Prior to the implementation of primary trauma protocol, there were 35 patients between July 1, 2022, to December 1, 2022, who presented to the ED with ICD-10-CM diagnosis code for dislocation or fracture of a primary tooth. The average ED length of stay was approximately 162.8min with the greatest average of length of stay in the month of September (200.4min). After implementing the primary trauma protocol, the average ED length of stay between December 18, 2022 to March 1, 2023 was approximately 160min. Pre-protocol tests given to twenty-five ED staff comprised of three clinical cases. The average test scores for cases 1, 2, and 3 were 52%, 32%, and 26%, respectively. Following training on primary dental trauma, post-protocol tests were given, comprised of the same three clinical cases as mentioned before. The average test scores for cases 1, 2, and 3 were 96%, 96%, and 88%, respectively. Comparing the pre- and post-protocol test results showed great improvement in triaging and managing primary dental trauma, and results were statistically significant.

**REFERENCES:**

1. Pettit S, Glendor U, Andersson L. World Traumatic Dental Injury Prevalence and Incidence, A Meta-Analysis-One Billion Living People Have Had Traumatic Dental Injuries. Dent Traumatol. 2018; 34:71-86.
2. Andersson L, Pettit S, Day P, Kenny K, Glendor U, Andreasen JO. Classification, Epidemiology and Etiology. In: Andreasen JO, Andreasen FM, Andersson L (Eds.). Textbook And Color Atlas of Traumatic Injuries to The Teeth (5th Ed.). Oxford, Wiley-Blackwell 2019. Pp.252-294.
3. Lima, TCDS, Coste, SC, Fernandes, MIAP, et al. Prevalence of traumatic dental injuries in emergency dental services: A systematic review and meta-analysis. Community Dent Oral Epidemiol. 2023; 51: 247- 255.
4. Day PF, Flores MT, O'Connell AC, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 3. Injuries in the primary dentition. Dent Traumatol 2020;36(4):343-359.

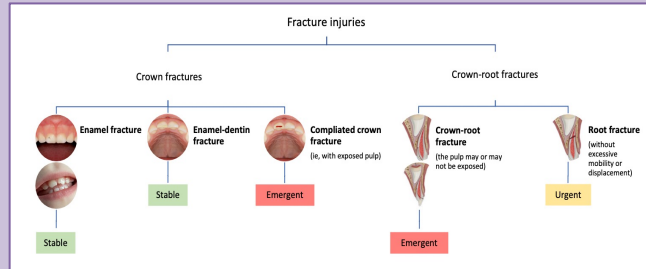


Figure 1.

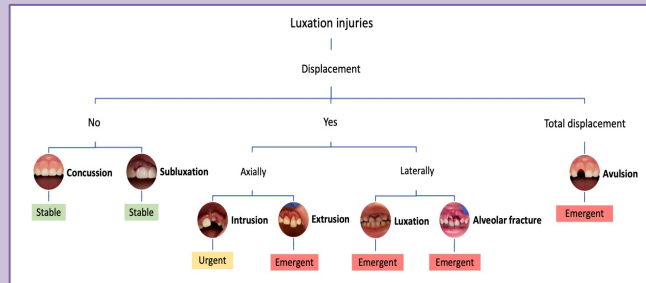


Figure 2.

| Stable primary dental trauma  | Urgent primary dental trauma   | Emergent primary dental trauma   | Permanent dental trauma  |
|---|--|--|--|
| <ul style="list-style-type: none"> <li>• Contact CHP Dental or return to home dentist to schedule a trauma follow-up within 7 days</li> <li>• Review post-trauma instructions*</li> <li>• Page dental resident for any questions</li> </ul> | <ul style="list-style-type: none"> <li>• May require future intervention</li> <li>• Contact CHP Dental or return to home dentist to schedule a trauma follow-up within 7 days</li> <li>• Review post-trauma instructions*</li> <li>• Page dental resident for any questions</li> </ul> | <ul style="list-style-type: none"> <li>• Requires acute intervention</li> <li>• Page dental resident for further evaluation and treatment</li> <li>• Keep patient NPO for possible sedation</li> </ul> | <ul style="list-style-type: none"> <li>• Page dental resident for further evaluation and intervention</li> <li>• Keep patient NPO for possible sedation</li> </ul> |

Figure 3.

**DISCUSSION:**

There is a great demand for management of traumatic dental injuries among pediatric patients in emergency medicine. This study's results showed that non-dental emergency medicine providers can have differing baseline knowledge of dental trauma management and can collectively benefit from educational materials on primary dental trauma. A post-protocol survey completed by ED staff also revealed positive feedback with requests for the trauma protocol to be published online as a Clinical Effectiveness Guideline for the hospital. Some limitations of this study include the length of time observed following implementation of the trauma protocol. The pre-protocol patient encounter data was collected over a six-month period, excluding November, while the post-protocol data was collected for three months to date. There was an improvement on knowledge and confidence of triaging amongst the trained staff, but whether that translates to decreased ED time of service and unnecessary resident pages is yet to be determined.

To determine the long-term effectiveness of primary dental trauma protocol on reducing the length of stay for ED patients, this study should be followed for at least another six months to a year. In the future, designing a similar trauma protocol for major permanent dental traumas could be beneficial as well. In remote areas for patients with limited access to emergency service clinics, these trauma protocols could be shared at schools and nurses' offices.

**CONCLUSION:**

Primary dental trauma protocol can be a useful tool in the Emergency Department for many pediatric patients presenting with traumatic dental injuries. Training on dental trauma can help emergency medicine providers to triage primary vs. permanent dentition injuries as well as different types of dental injuries. Utilizing an evidence-based primary dental trauma protocol can also facilitate a streamlined approach to trauma triage and management. This could potentially reduce the length of stay for many Emergency Department patients.

