

Time to Closed Reduction in the Emergency Department: Who is at Risk for Delays and Does it Matter?

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ABSTRACT BODY:

INTRODUCTION: Timely management of pediatric fractures in the emergency department (ED) through closed reduction (CR) under conscious sedation is a critical determinant of patient outcomes and healthcare efficiency. While time to reduction (TTR) is a priority in fracture care, systematic delays and their underlying causes have yet to be thoroughly investigated. Such delays can exacerbate and worsen outcomes, prolong pain, and may lead to increased complications, highlighting the need for a detailed examination of TTR and its associated factors. The present study addresses this significant gap in pediatric orthopaedic care by investigating the demographic, clinical, and systemic factors that influence TTR in the ED setting. The research aims to lay the groundwork for evidence-based interventions that can mitigate disparities and optimize care delivery for pediatric patients presenting with fractures. The findings have the potential to inform policy changes and improve ED operational protocols, ultimately enhancing the quality of pediatric fracture care on a national scale.

METHODS: This is a retrospective study of fractures managed with CR under conscious sedation in UCSF health system pediatric emergency care sites over a five-year period (2017-2022). We included patients between the ages of 5-18 and excluded patients with poly trauma, open fractures, or those transferred from other facilities. Chart review was performed to collect demographic and clinical data. TTR was defined as the difference in time from presentation to the ED and start on sedation for CR. Radiographic images were reviewed to assess improvement in angulation, translation, and shortening after CR. Descriptive, univariate, and correlation analyses were performed.

RESULTS: This study included 301 patients. The mean age of patients was 10 years (SD 3.2 years), and the study population was 69% male. The mean TTR was 199 minutes (SD: 124min) in this cohort with upper extremity fractures waiting on average 189 minutes and lower extremity fractures waiting on average 234 minutes ($p<0.01$). TTR varied by race with White patients waiting shorter than other racial groups (174 min vs. 214 min, $p<0.01$). TTR was also longer for Hispanic patients compared to non-Hispanic patients (231min vs. 183min, $p<0.01$), non-English speakers compared to primary English speakers (248min vs. 189min, $p<0.01$), and patients with government insurance compared to private insurance (215min vs. 186min, $p=0.04$). TTR was correlated with fractures that were shorter ($r=0.18$, $p=0.04$) and more translated ($r=0.27$, $p<0.01$). There was no significant correlation between morphine equivalent units administered in the ED and TTR ($r=-0.06$, $p>0.05$).

DISCUSSION: The findings of our study suggest a multifaceted issue influenced by socioeconomic and systemic factors. Patients with government insurance often face broader systemic challenges, including limited access to primary care, which can lead to more complex ED presentations requiring extended evaluation and management time before safe CR can be conducted. The administrative complexities associated with government insurance processing may also introduce delays. Furthermore, the variance in TTR by race and ethnicity could be indicative of deeper sociocultural and institutional biases that extend beyond insurance type, possibly reflecting unconscious provider biases or structural inequities within healthcare delivery models. These disparities are not merely reflective of clinical urgencies but may be emblematic of broader societal issues such as differential access to healthcare resources, education, and transportation, particularly affecting minority and non-English speaking communities. This pattern underscores the need for hospitals and policymakers to scrutinize and reform emergency care protocols, ensuring that operational workflows are culturally competent and equitable, not predicated on insurance status or demographic characteristics. The absence of a correlation between morphine equivalent units and TTR suggests that pain management practices did not contribute to the urgency of treatment across different patient groups, thus directing attention back to the identified disparities. By recognizing and starting to unravel the complex interplay of these factors, our study paves the way for targeted interventions aimed at reducing TTR and improving the equity of pediatric emergency orthopaedic care. The study's limitations, including the absence of data on real-time ED operations and patient flow, provider expertise, and the exclusion of complex cases, may affect the generalizability of our results.

SIGNIFICANCE/CLINICAL RELEVANCE: This study is significant as it highlights inequities in the delivery of emergency pediatric fracture care that are associated with patient demographics and system variables, which can have profound implications for health outcomes and resource utilization. The identification of these factors is a critical step toward the development of targeted strategies to reduce treatment delays, potentially improving both the efficiency of emergency department operations and the quality of orthopaedic care for pediatric populations.