

## Selected Topics: Sports Medicine



### RETROSPECTIVE CHART ANALYSIS OF CONCUSSION DISCHARGE INSTRUCTIONS IN THE EMERGENCY DEPARTMENT

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**Abstract—Background:** Recognition and diagnosis of concussion is increasing, but current research shows these patients are discharged from the emergency department (ED) with a wide variability of recommendations and instructions. **Objective:** To assess the adequacy of documentation of discharge instructions given to patients discharged from the ED with concussions. **Methods:** This was a quality-improvement study conducted at a University-based Level I trauma center. A chart review was performed on all patients discharged with closed head injury or concussion over a 1-year period. Chi-squared measures of association and Fisher's exact test were used to compare the proportion of patients receiving discharge instructions (printed or documented in the chart as discussed by the physician). Multivariable logistic regression was used to assess the relationship between whether the concussion was sport-related in relation to our primary outcomes. **Results:** There were 1855 charts that met inclusion criteria. The physician documented discussion of concussion discharge instructions in 41% (95% confidence interval [CI] 39.2–43.7) and printed instructions were given in 71% (95% CI 69.1–73.2). Physicians documented discussion of instructions more often for sport-related vs. non-sport-related concussion (58% vs. 39%,  $p = 0.008$ ) with an odds ratio (OR) of 2.1 (95% CI 1.6–2.8). Discharge instructions were given more often for sport-related injuries than those without sport-related injuries (85% vs. 69%,  $p = 0.047$ ), with an OR of 2.2 (95% CI 1.6–3.1). Children were more likely to have had physician-documented discussion of instructions (56%, 95% CI 52.3–59.1 vs. 31%, 95% CI 28.0–33.6), printed discharge

instructions (86%, 95% CI 83.2–88.1 vs. 61%, 95% CI 57.6–63.4), and return-to-play precautions given (11.2%, 95% CI 9.2–13.6 vs. 4.5%, 95% CI 3.4–5.9) compared with adults. **Conclusions:** Documentation of discharge instructions given to ED patients with concussions was inadequate, overall. © 2017 Elsevier Inc. All rights reserved.

**Keywords—**sports medicine; concussion; closed head injury

### INTRODUCTION

#### *Background*

The incidence in diagnosis of traumatic brain injury (TBI) in the United States is increasing and is a major public health concern (1). According to 2010 data from the Centers for Disease Control and Prevention (CDC), TBI accounted for 2.2 million visits to the emergency department (ED), an overall 70% increase from 2001. In addition, there was a 57% increase in visits related to TBI from sports and recreational activities in children ages 19 years or under. The majority of these TBIs are either concussions or minor closed head injuries (2). Furthermore, these estimates are likely conservative, given that concussions are often under-recognized, under-reported, and underdiagnosed (1).

### *Importance*

Although concussions have historically been perceived as a benign condition, there is mounting evidence that concussions are associated with significant morbidity and, rarely, mortality. A single concussion may result in short-term neurologic, behavioral, and psychiatric sequelae, and these symptoms may persist for up to a year or longer, leading to significant morbidity (3,4). After a concussion occurs, there is a temporal window of brain vulnerability that makes it more susceptible to further injury (5). If re-injury to the brain occurs during this window, it can lead to diffuse cerebral swelling and second impact syndrome, as well as chronic postconcussion syndrome and long-term cognitive, psychiatric, and neurobehavioral problems (6,7). Therefore, it is imperative that concussions are recognized early and managed appropriately.

Evidence-based guidelines for the evaluation and management of head injuries in the ED do exist, such as the American College of Emergency Physician's (ACEP) current clinical policies on mild traumatic brain injury and the Pediatric Emergency Care Applied Research Network (PECARN) pediatric head injury/trauma algorithm (8,9). However, these focus more on the identification of intracranial bleeding and the selective use of neuroimaging, rather than on the diagnosis and management of concussions. Several practice guidelines that do focus on diagnosis and management of concussions are available, and although not specific to the ED population of patients, may be used in the ED. These practice guidelines include recommendations from the American Society for Sports Medicine (AMSSM) position statement, the consensus statement on concussion in sport from the 4th International Conference on Concussion in Sport, the CDC HEADS UP Concussion in Youth Sports initiative, and the American Academy of Neurology (AAN) (6,10–12). All of these guidelines suffer from methodological flaws because they are based upon only level II or level III evidence from small studies and expert opinions; therefore, none can be considered the “gold standard” in concussion care. However, most of these guidelines include a period of cognitive and physical rest, followed by a supervised, graded, stepwise return to activity protocol after sustaining a concussion. Despite these recommendations, research has shown that a high percentage of physicians, including family practitioners, pediatricians, and emergency physicians are unaware of the current consensus guidelines and recommendations (13–16).

Emergency physicians (EPs) are often the first providers to assess, diagnose, and manage acute head injuries. Therefore, it is crucial that EPs not only recog-

nize concussions, but also communicate appropriate anticipatory guidance and discharge instructions to the patient at the time of the ED encounter. These include adequate cognitive and physical activity restrictions, as well as appropriate follow-up. Current research, however, shows wide variability in the adequacy of discharge instructions and activity restrictions for patients sent home from the ED with the diagnosis of concussion (8,15,17–19). Many of these studies, however, were limited by small sample size, included only survey data, or included only pediatric subjects.

### *Goals of This Investigation*

The goal of our investigation was to assess the adequacy of documentation of discharge instructions given to patients discharged from our Level I trauma center with a diagnosis of concussion over a 1-year period.

## **MATERIALS AND METHODS**

### *Study Design*

We performed a quality-improvement study of all patients that were evaluated at our university-based Level I trauma center with a diagnosis of closed head injury or concussion from July 1, 2012 through June 30, 2013. Our ED treats approximately 75,000 emergency patients annually, of which approximately 20,000 are children age 17 years and under. This project was assessed by our University Institutional Review Board and determined to be a quality-improvement project.

### *Selection of Participants*

A data report was run for all primary and secondary International Classification of Disease, Ninth Revision codes for the diagnoses of concussion and closed head injury. Patients of all ages who were discharged home with one of these diagnoses were eligible for inclusion in the study. For this study, the definition of concussion from the 4th International Conference on Concussion was used: “... a brain injury ... [with] a complex pathophysiological process affecting the brain, induced by biomechanical forces” (6). Only those patients with evidence of direct or indirect trauma or symptoms of concussion documented in the chart were included. Exclusion criteria included admitted patients, patients who were not discharged to home (e.g., left against medical advice, eloped, or patients sent into law enforcement custody), patients with any evidence of acute intracranial abnormality discovered on imaging, or patients with any preexisting neurologic or psychiatric disorders.

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