



Contents lists available at ScienceDirect

Injury

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Full length article

Universal Health Insurance and its association with long term outcomes in Pediatric Trauma Patients[☆]

Meesha Sharma^a, Andrew J. Schoenfeld^{a,b,*}, Wei Jiang^a, Muhammad A. Chaudhary^a, Anju Ranjit^a, Cheryl K. Zogg^a, Peter Learn^c, Tracey Koehlmoos^c, Adil H. Haider^a

^a Center for Surgery and Public Health, Harvard Medical School, Harvard T.H. Chan School of Public Health, Department of Surgery, Brigham and Women's Hospital, Boston, MA, United States

^b Department of Orthopaedic Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, United States

^c Uniformed Services University of Health Sciences, Bethesda, MD, United States

ARTICLE INFO

Article history:

Accepted 16 September 2017

Keywords:

Trauma
Pediatric
Healthcare utilization
Post discharge care
Disparities

ABSTRACT

Background: Racial disparities in mortality exist among pediatric trauma patients; however, little is known about disparities in outcomes following discharge.

Methods: We conducted a longitudinal cohort study of children admitted for moderate to severe trauma, covered by TRICARE from 2006 to 2014. Patients were followed up to 90 days after discharge. All children <18 years with a primary trauma diagnosis, an Injury Severity Score >9 and 90 days of follow-up after discharge were included. Complications, readmissions and utilization of healthcare services up to 90 days after discharge were compared between Black and White patients.

Results: Of the 5192 children included, majority were White (74.6%, n = 3871), with 15.4% Black (n = 800) and 10.0% Other (n = 521). Most common injuries involved the extremities or the pelvic girdle followed by the head or neck. Complication and readmission rates were 3.6% and 8.9% within 30 days of discharge respectively and 4.4% and 9.3% within 90 days of discharge. 99.0% of children had at least one outpatient visit by 90 days. After adjusting for patient and injury characteristics no significant differences were detected between Black and White children in outcomes after discharge.

Conclusions: Universal insurance may help mitigate disparities in post discharge care in pediatric trauma populations by increasing access to outpatient services overall and within each racial group. Further studies are required to determine the appropriate timing and frequency of follow up care in order to achieve maximum reduction in use of acute care services after discharge.

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Introduction

Trauma is the leading cause of pediatric mortality and long-term morbidity in the United States (US) [1,2]. In 2014 more than 8.3 million children were treated for an injury in an emergency department (ED), with more than 321,000 requiring further care in the form of hospitalization or transfer to another facility [3].

Children from racial and ethnic minority families are known to experience disparities in many aspects of trauma care, ranging from access and utilization to management and outcomes [4–7].

Previous studies of disparities in pediatric trauma have identified up to 37% increased likelihood of mortality after trauma among minority children as compared to Whites [8,9]. Comparatively little is known about disparities in longer-term outcomes or healthcare utilization patterns among survivors after discharge. Attempts to study disparities in long-term outcomes in pediatric trauma – such as functional impairment or complications and healthcare utilization – have been predominately confined to studies of traumatic brain injury or splenic injury [7,10–13].

Among adults, racial disparities in trauma outcomes have been attributed to a myriad of factors including insurance status which serves as an indicator of access to care [14,15]. Within the broader spectrum of emergency surgical care, differences in insurance explained approximately 20% of the variation in unplanned readmission within 180 days of discharge [16], and nearly 40% of the variation in perforations among young adults with acute appendicitis [17]. Among children, lack of insurance has been

[☆] Meeting presentation: Pediatric Trauma Society 3rd Annual Meeting, Nashville, TN.

* Corresponding author at: Center for Surgery and Public Health, Brigham and Women's Hospital, One Brigham Circle, 1620 Tremont Street, 4-020, Boston, MA 02120, United States.

E-mail address: ajschoen@neomed.edu (A.J. Schoenfeld).

found to contribute to disparities in trauma mortality [9]. Disparities might thus be anticipated in post discharge health care utilization among children although this issue has not been evaluated empirically.

To examine the association of race with disparities in healthcare utilization after discharge, we studied the occurrence of complications, readmissions and outpatient visits (including pediatrician, primary care, specialist, rehabilitation and emergency department visits) up to 90 days following discharge, in a universally insured segment of the US population.

Methods

Study design and data source

We conducted a retrospective, longitudinal analysis of 2006–2014 National TRICARE claims data from the Military Health System Data Repository. TRICARE is a United States Department of Defense healthcare program that covers 9.5 million Active Duty Service Members, National Guard and Reserve Members, retirees, and their families [18]. The Military Health System (MHS), through TRICARE, provides universal coverage to all eligible dependent children of service members, retirees and those medically separated for disability. The program currently covers over 2 million children up to the age of 21 years [19]. Children are enrolled in TRICARE under their military parent who is designated as their primary TRICARE sponsor. TRICARE claims data provides a unique opportunity to study pediatric trauma patients from across the country longitudinally and evaluate their outcomes and patterns of healthcare utilization beyond discharge. TRICARE beneficiaries receive care through military health facilities (direct care), civilian health facilities (purchased care) but not through the Veteran's Health Administration [20,21].

Study population

Our study population included all children <18 years enrolled in TRICARE with an inpatient claim for a primary diagnosis of trauma (*International Classification of Diseases, Ninth Revision, Clinical Modification* [ICD-9-CM] primary diagnosis codes 800-959). Children diagnosed with late effects (ICD-9-CM codes 905-909), foreign body injuries (ICD-9-CM codes 930-939), or burns (ICD-9-CM codes 940-949) were excluded as were those that were Active Duty personnel (Fig. 1), since such patients would have different expected morbidity patterns than the rest of the cohort. Injury Severity Score (ISS) was used to determine the severity of the injury and was classified as Moderate (ISS = 9–14) or Severe (ISS > 15). ISS was calculated using the ICD Programs for Injury Categorization (ICDPIC) in Stata. This method of generating ISS based on the Abbreviated Injury Scale (AIS), using ICD-9 CM codes has been previously validated in studies that sought to identify injury severity [22]. We limited our analysis to children with moderate to severe trauma (ISS > 9) [14].

Outcome variables

The primary outcomes measured were complications, readmissions and outpatient healthcare utilization (including outpatient visits to a pediatrician, primary care physician, specialist, rehabilitation service and emergency department) within 30 and 90 days after discharge. Outcomes within 90 days of discharge include those that occur within 30 days. Major complications were identified using a previously published algorithm and included infection/sepsis, hemorrhage, shock, myocardial infarction, respiratory failure, renal failure, neurological complications, deep vein thrombosis and pulmonary embolism [23,24].

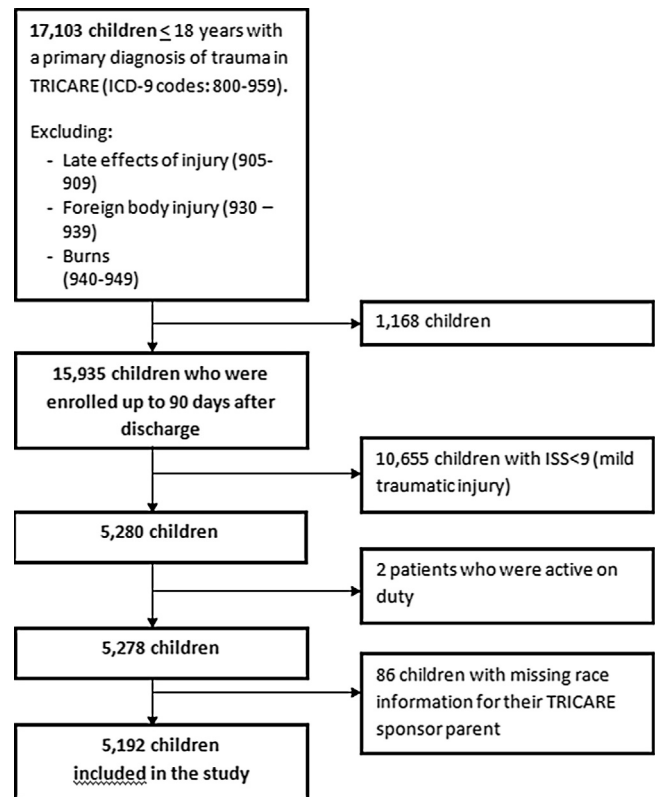


Fig. 1. Flow diagram depicting study population selection.

Differences in children's index length of stay (LOS) and in-hospital mortality were also analyzed. Children who died in hospital were removed from the cohort while calculating outcomes following discharge.

Independent variables

The main predictor variable was race. Since children are not required to report race on enrollment into a TRICARE program, the quality of data for children's reported race in the database is incomplete, as previously documented [25]. However, each sponsor enrolled in TRICARE is required to report her/his race. Thus, for our study, we used race of the sponsor parent as representative of each child's race, a method previously validated by Stewart et al. [24] Race was characterized as White, Black and Other (e.g. Asian, Native American, Pacific Islander).

The following additional patient and sponsor data were abstracted: Age, sex, sponsor's rank (used as a proxy for socioeconomic status [20,21] – Enlisted Junior [lowest four ranks in any branch], Enlisted Senior [non-commissioned officers], Officers including Warrant Officers and Cadets), beneficiary category (Dependent of Active Duty/Guard Member, Other), source of healthcare provision (direct care – military facility, purchased care – civilian facility), U.S. census region (South, West, Northeast, Midwest, Not reported), and mechanism of injury (Penetrating, Non-penetrating). ISS was categorized as Moderate (ISS = 9–14), and Severe (ISS > 15).

Statistical analysis

Statistical analyses were performed using Stata software, version 14.1 (StataCorp LP, College Station, TX). Differences in outcomes were compared by race. Chi-square tests were used to determine significance of categorical variables and Kruskal-Wallis

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