



The trauma registry compared to All Patient Refined Diagnosis Groups (APR-DRG)



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ARTICLE INFO

Keywords:

Trauma
Administrative data
Registry

ABSTRACT

Background: Literature has shown there are significant differences between administrative databases and clinical registry data. Our objective was to compare the identification of trauma patients using All Patient Refined Diagnosis Related Groups (APR-DRG) as compared to the Trauma Registry and estimate the effects of those discrepancies on utilization.

Methods: Admitted pediatric patients from 1/2012–12/2013 were abstracted from the trauma registry. The patients were linked to corresponding administrative data using the Pediatric Health Information System database at a single children's hospital. APR-DRGs referencing trauma were used to identify trauma patients. We compared variables related to utilization and diagnosis to determine the level of agreement between the two datasets.

Results: There were 1942 trauma registry patients and 980 administrative records identified with trauma-specific APR-DRG during the study period. Forty-two percent (816/1942) of registry records had an associated trauma-specific APR-DRG; 69% of registry patients requiring ICU care had trauma APR-DRGs; 73% of registry patients with head injuries had trauma APR-DRGs. Only 21% of registry patients requiring surgical management had associated trauma APR-DRGs, and 12.5% of simple fractures had associated trauma APR-DRGs.

Conclusion: APR-DRGs appeared to only capture a fraction of the entire trauma population and it tends to be the more severely ill patients. As a result, the administrative data was not able to accurately answer hospital or operating room utilization as well as specific information on diagnosis categories regarding trauma patients. APR-DRG administrative data should not be used as the only data source for evaluating the needs of a trauma program.

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Background

As the landscape of healthcare continues to adapt to an environment focused on quality improvement and clinical outcomes, there is an increasing need for readily accessible data related to patient outcomes, healthcare costs, and resource utilization [1–3]. Administrative financial data are widely available, use information that is already collected for billing purposes, and are generated from discharge reports submitted to payers. Consequently, administrative datasets are often utilized by

hospital leadership to assess quality and performance. These data are subject to limitations of national coding rules and guidelines [2,4,5]. Previous studies have demonstrated that utilizing administrative billing datasets may not identify patients correctly [5–7].

Hospitals designated as trauma centers are required to have trauma registries that contain detailed data on all trauma patients cared for at that specific hospital. Trauma registry data are abstracted from the medical record by registrars using specialized software and specific training [8]. The data collected include information on patient demographics, the circumstances surrounding injury, pre-hospital care, transport, emergency department and inpatient procedures, anatomic injury descriptions, physiological measurements, complications, comorbidities, and outcomes. Trauma registry abstraction differs from administrative

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coding in that descriptions of injuries and medical care are not confined to International Classification of Disease (ICD) groups. In contrast to administrative coding, nursing documentation, laboratory data, and imaging reports can be utilized for registry collection. Wynn et al. demonstrated that compared to ICD-9 codes in administrative data, trauma registries recorded more diagnosis, procedures and outcomes in the care of trauma patients [5]. However, trauma registries require a significant financial investment, 1 registrar for every 500–700 annual trauma patients, a cost of approximately \$100–140 per patient.

The All Patient Refined Diagnosis Related Groups (APR DRG) classification system groups the diagnoses and care provided during a hospitalization to bundle the reimbursement into similar groups. The APR DRG system classifies patients into like categories and further stratifies them by severity of illness and risk of mortality [4]. The APR DRG system can be used for resource allocation, financial planning, and quality assurance. Studies evaluating the accuracy of the APR DRG classification system for reporting clinical outcomes have been done outside of trauma, but to our knowledge this is the first to compare the trauma registry to the APR DRG [6,9–13].

We sought to determine whether the APR DRG classification system could be used as a surrogate for the trauma registry and estimated the effects of those discrepancies on utilization and program evaluation. We hypothesized that the APR DRG is less accurate in identifying trauma patients from an administrative database than from the trauma registry. While APR DRGs might be limited in their ability to identify all patients, we additionally hypothesized that they may be able to accurately represent the trauma population allowing the hospital system to answer questions which are required in order to maintain trauma center verification.

Methods

This is a retrospective study including trauma patients from a single Level 1 Pediatric Trauma Center from 01/2012 to 12/2013. Administrative data including diagnoses, procedures, and APR DRG classification derived from the discharge summaries were obtained from the Pediatric Health Information System (PHIS) database. The database is operated by the Children's Hospital Association and contains administrative and financial details for more than 6 million patient cases from 45 children's hospitals. For this study the hospital administrative system could have been used but we sought to evaluate the feasibility of a similar evaluation across multiple hospitals.

Discharges from the administrative systems were identified if they had one of 13 specific trauma-specific APR DRG [4,14]. The codes selected from the administrative data set were selected due to being specific for traumatic injuries. Other APR DRG codes may have included some trauma patients, but would not have been

limited exclusively to trauma patients. The trauma-specific APR DRGs were:

Surgical APR DRGs

- APR DRG 20, Craniotomy for Trauma
- APR DRG 308, Hip & Femur Procedures for Trauma Except Joint Replacement
- APR DRG 910, Craniotomy for Multiple Significant Trauma
- APR DRG 911, Extensive Abdominal/Thoracic Procedures for Multiple Significant Trauma
- APR DRG 912, Musculoskeletal & Other Procedures for Multiple Significant Trauma
- APR DRG 711, Post-op, Post-Trauma, Other Device Infections with OR Procedures

Medical APR DRGs

- APR DRG 40, Spinal Disorders & Injury
- APR DRG 55, Head Trauma with Coma >1 h or Hemorrhage
- APR DRG 56, Brain Contusion/Laceration & Complicated Skull Fracture, Coma <1 h or no Coma
- APR DRG 57, Concussion, Closed Skull Fractures NOS, Uncomplicated Intracranial Injury, Coma <1 h or No Coma
- APR DRG 135, Major Chest & Respiratory Trauma
- APR DRG 384, Contusion, Open Wound & Other Trauma to Skin & Subcutaneous Tissue
- APR DRG 930, Multiple Significant Trauma without OR Procedure

Demographic and clinical characteristics included age, gender, hospital length of stay (LOS), the use of intensive care nursing, primary procedures, primary diagnosis and discharge disposition were abstracted from administrative data. Additional patient characteristics and outcome data were abstracted from the trauma registry. All patients in the trauma registry were assumed to have an admitting diagnosis of trauma. Only data from patients who were admitted as inpatients or admitted as observation to the hospital were analyzed. Patients discharged from the emergency department and emergency department deaths were excluded.

The patients identified by trauma-specific APR DRGs were directly matched with the patients in the trauma registry by medical record number (MRN), financial identification number (FIN) and dates of service. Patients found in both databases were considered matched. All patient encounters that were not "matched" were reviewed by a trauma registrar. Burns were excluded in the pediatric centers trauma registry and trauma-specific APR DRGs.

The following variables were compared to evaluate the level of agreement between the administrative database and the trauma registry: overall agreement, severity of illness/injury, ICU utilization, surgical utilization, head injury, simple fractures, and abdominal trauma. Table 1 shows the definitions that were used

Table 1
Variable definitions used to compare administrative and registry datasets.

Variables	Administrative	Registry Definition
Severity of Illness Category	APR DRG SOI (Severity of Illness)	ISS (Injury Severity Score)
Hospital LOS	Hospital Full Days	Hospital Full Days
ICU LOS	Intensive care nursing charge	Full Days
Mortality	Discharge Disposition	Discharge Status in Registry- Alive or Dead
Surgery	Primary Procedure	Operating Room Procedure
Head Injury	APR DRG Category 20, 55, 56, 57, 910	AAAM AIS coding definition of Head Injury
Craniotomy	APR DRG Category 20 or 910	Surgical Procedure List
Simple Extremity Fractures	APR DRG 308	Across all Diagnosis Codes
Abdominal Trauma	APR DRG 911	Across all Diagnosis Codes

APR DRG – All Patient Refined Diagnosis Related Group, AAAM – Association for the advancement of Automotive Medicine, AIS – Abbreviated Injury Scale.

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