

Brief Report

How Many Trauma Admissions Require Acute Trauma Team Interventions?

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ABSTRACT

Introduction. The aim of this study was to assess the percentage of trauma patients admitted and receiving intervention, and to identify which of these interventions were performed by non-trauma specialists.

Methods. The authors conducted a retrospective chart review of all adult patients who presented to the trauma service between January 2019 and June 2019. Collected data included demographics, trauma activation level, total interventions performed, interventions performed by the trauma team, interventions performed by subspecialty teams, and isolated injuries requiring orthopedic, neurosurgical, or other specialized care. Descriptive analyses were used to evaluate the data.

Results. The authors reviewed a total of 287 patient charts. Of these, 111 patients (38.7%) underwent operative intervention. Seventy-five patients (26.1%) received operative intervention from the orthopedic surgery team, 16 patients (5.6%) from the neurosurgery team, and 14 patients (4.9%) from other subspecialty teams. Only six patients (2.1%) underwent operative intervention by the trauma team.

Conclusions. The data suggest that many trauma admissions do not require trauma team interventions. This highlights the potential need to reassess the criteria for admitting trauma patients.

INTRODUCTION

The concept of trauma systems for the care of injured patients is well-established, with origins dating back to military history.¹ Over time, these systems have evolved into the modern North American trauma system, which encompasses prehospital care, acute surgical care, and recovery. This contemporary system has proven beneficial, significantly reducing trauma-associated morbidity and mortality.¹

Despite these advancements, the North American trauma system faces challenges, particularly with the decreasing operative volume for trauma services as more patients are managed non-operatively.²⁻⁷ This reduction in surgical experience for trauma surgeons is further exacerbated by the increasing compartmentalization of specialties and referrals to fields like orthopedics, neurosurgery, and interventional radiology.^{2,3,8} Additionally, patients with isolated injuries requiring subspecialty care often receive post-operative care from trauma surgeons who did not participate in the initial surgery. As a result, the role of the trauma surgeon has shifted from being primarily interventional to increasingly supportive of other surgical subspecialists. This trend

poses a concern for the trauma surgery subspecialty, as it reduces surgical opportunities and may deter surgical residents from pursuing this field.^{3,4,9-12}

The aim of this study was to determine the percentage of trauma patients who were admitted and received interventions, and to identify which of these interventions were performed by non-trauma specialists.

METHODS

Patient Selection. The authors conducted a retrospective chart review on all patients aged 18 years or older who presented through the trauma service between January 2019 and June 2019. Patients meeting the criteria were identified using the trauma registry database at our American College of Surgeons Committee on Trauma-verified Level I trauma center. The study was reviewed and approved by the Institutional Review Board (IRB) of Ascension Via Christi Hospitals Wichita, Inc.

Data Collection. Medical records were reviewed to collect pertinent information, including age, gender, trauma activation level, Injury Severity Score (ISS), Glasgow Coma Scale (GCS) score, procedures and operations performed, interventions by the trauma surgery team, interventions by subspecialty surgery teams, isolated injuries (orthopedic, neurosurgery, and other), intensive care unit (ICU) admission and length of stay, hospital length of stay, discharge disposition, and mortality. For this study, a 'procedure' was defined as an ICU or bedside procedure performed by the trauma surgery team, which included central venous lines, chest tubes, arterial lines, bronchoscopy, resuscitative endovascular balloon occlusion of the aorta (REBOA), dialysis catheters, and intracranial pressure (ICP) monitors.

Statistical Analysis. Interval/ratio level data were summarized using means and standard deviations for normally distributed data or medians and quartiles for skewed data, as well as ordinal data. Nominal data were summarized by counts and proportions. All statistical analyses were conducted using complete case analyses in IBM SPSS Statistics for Windows, version 19.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Data from 287 patients were included in this study, with a majority being male (59.6%) and a median age of 66 years (Table 1). Of the patients evaluated, 9.1% were full trauma activations, 44.3% were partial trauma activations, 19.2% were trauma consults, and 27.5% had no trauma activation. The median ISS was 9, and the median GCS score was 15, with 93.4% of patients having a GCS score of 8 or higher. The massive transfusion protocol (MTP) was initiated in only one patient.

Less than half of the patients (39.4%, n = 113) underwent a surgical intervention by any surgical team, while the majority (60.6%, n = 174) did not undergo any surgical intervention (Table 2). Among those who did have surgery, most operative interventions were performed by teams other than the trauma surgery team. Specifically, 76 patients (26.5%) underwent surgery by the orthopedic team, 5.6% by the neurosurgery team, and 5.2% by other teams, including general surgery, interventional radiology, and plastic surgery. Only six patients (2.1%) underwent surgery by the trauma surgery team.

Table 1. Demographics, trauma activation level, and injury severity of patients admitted to the trauma service.

Parameter	Number (%)
Number of observations	287 (100%)
Age (years) ^a	66 (40 – 81)
Male gender	171 (59.6%)
Trauma activation level	
Full (Level I)	26 (9.1%)
Partial (Level II)	127 (44.3%)
Consult	55 (19.2%)
No trauma activation (direct admission)	79 (27.5%)
Injury Severity Score ^a	9 (4 – 10)
Glasgow Coma Scale score	
<8	13 (4.5%)
≥8	268 (93.4%)
Not documented	6 (2.1%)
Massive transfusion protocol initiated	1 (0.3%)

^aData presented as median (IQR)

Table 2. Operative interventions by specialty for patients admitted to the trauma service (entire sample).

Parameter	Number (%)
Number of observations	287 (100%)
No operation performed	174 (60.6%)
Operation performed	113 (39.4%)
Orthopedics	76 (26.5%)
Neurosurgery	16 (5.6%)
Other subspecialty (includes general surgery)	15 (5.2%)
Trauma	6 (2.1%)

When considering all types of interventions, both procedures and surgeries, 113 patients (39.3%) underwent some form of procedural or operative intervention (Table 3). About half of the patients (48.1%) were admitted to the ICU. Sixteen patients (5.6%) had ICU procedures performed by the trauma team, with a total of 26 procedures performed across all patients (9.1%), some undergoing more than one procedure. The individual procedures included nine central venous lines, seven chest tubes, six arterial lines, one bronchoscopy, one resuscitative endovascular balloon occlusion of the aorta (REBOA), one dialysis catheter placement, and one ICP monitor placement. The median ICU length of stay was two days, while the median hospital length of stay was three days.

DISCUSSION

To be verified as a Level 1 trauma center by the American College of Surgeons Committee on Trauma, several surgical subspecialists, including neurosurgery and orthopedics, must be available. The center also must maintain less than 10% non-surgical admissions, less than 5% undertriage, and less than 50% overtriage.¹³ While the Advanced Trauma Life Support-certified providers can begin major trauma resuscitations without a qualified attending surgeon present, an attending surgeon must arrive within 15 minutes of the patient’s arrival to direct the resuscitation. Once the patient is assessed and stabilized, a decision is made regarding admission.¹³ These standards are particularly relevant when considering the findings of this study.

Table 3. Interventions and outcomes of patients admitted to the trauma service.

Parameter	Number (%)
Number of observations	287 (100%)
Operative intervention	113 (39.4%)
Intensive care unit (ICU) admission	138 (48.1%)
ICU length of stay (days) ^a	2 (2 – 4)
Patients undergoing a trauma team ICU procedure	16 (5.6%)
Total procedures performed	26 (9.1%)
Central venous line placement	9 (3.1%)
Chest tube placement	7 (2.4%)
Arterial line placement	6 (2.1%)
Bronchoscopy	1 (0.3%)
REBOA	1 (0.3%)
Dialysis catheter placement	1 (0.3%)
Intracranial pressure monitor placement	1 (0.3%)
Hospital length of stay (days) ^a	3 (2 – 6)
Disposition destination	
Home or self-care/home with services	137 (47.7%)
Long-term care/skilled nursing facility	71 (24.7%)
In-patient rehabilitation	22 (7.7%)
Hospice	8 (2.8%)
Inpatient mental health/psychiatric hospital	6 (2.1%)
Correctional Facility/court/law enforcement	4 (1.4%)
Against medical advice	3 (1.0%)
Other	21 (8.4%)
In-hospital mortality	15 (5.2%)

^aData presented as median (IQR)

In our study, less than half of trauma admissions involved any surgical intervention. Among those who underwent surgery, the majority were treated by orthopedic or neurosurgical subspecialists. Similar results were observed in a large study of a Level 1 trauma center by Ciesla et al.,² which reviewed 1,667 patients. They found that 92% of patients admitted to the trauma service did not meet trauma activation criteria, with 52% having injuries confined to a single abbreviated injury scale (AIS) region and 46% to the extremities. Only 11% of patients had surgeries performed by trauma surgeons, while orthopedic surgeons performed surgeries on 28%. The authors concluded that many trauma patients could be more appropriately admitted to teams other than the trauma surgery team, potentially preserving resources.

One potential strategy to reduce unnecessary admissions to the trauma service is to revise how Level 2 traumas are assessed. Ciesla et al.² suggested that these patients could first be evaluated by an emergency medicine physician, who would then determine whether to admit the patient to an appropriate team, such as medicine, non-trauma surgery, or trauma surgery. Another approach, possibly in conjunction with the first, involves a multidisciplinary team of physicians assessing the patient after initial evaluation and resuscitation.

This team could include specialists from surgical subspecialties, emergency medicine, internal medicine, and family medicine. This multidisciplinary discussion would occur in the trauma bay before the patient is admitted, with the team collaboratively determining the patient's admission status. If admitted to a non-trauma team, the trauma team would continue to follow the patient as consultants if needed. This approach aligns with our findings that our trauma admissions had a median ISS of 9, only 2.1% required trauma-specific operations, and only 5.6% of patients required a trauma team procedure during their inpatient stay.

In fact, some existing services within the contemporary trauma system already function similarly to this proposed plan.¹⁴⁻¹⁶ For example, patients with isolated hip fractures are admitted to the medicine service, with the orthopedic team consulting as needed. It also may be beneficial to admit certain patients to a geriatric service, given evidence that gerontologists can improve outcomes for trauma patients.¹⁴⁻¹⁶ A relevant case might be a geriatric patient with an isolated rib fracture and multiple medical comorbidities. Overall, it may be time to reconsider the current American College of Surgeons guidelines.

Limitations. This study had several limitations. As a retrospective review, there is a risk of selection bias and information bias, which may affect the accuracy of the analysis. Additionally, the study was conducted over a relatively short period of approximately five months. This limited time frame may not be fully representative of trauma admissions, and the findings could differ if a longer study period were used, accounting for seasonal variations. Furthermore, the study was performed at a single site, which may limit the generalizability of the results to other trauma centers. To better understand the outcomes investigated in this study, future research could include a larger sample size and/or a multi-center prospective study involving Level I trauma centers.

CONCLUSIONS

In the context of potential over-triage, these findings suggest the need to re-evaluate current American College of Surgeons guidelines and admission criteria for trauma patients. The data also may highlight the importance of considering admissions by non-trauma surgical subspecialties or medical teams, rather than defaulting to trauma surgery admissions. Such decisions could play a crucial role in enhancing resource efficiency, improving patient care, and ultimately, optimizing patient outcomes.

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