The Journal of Emergency Medicine, Vol. 41, No. 1, pp. 90–94, 2011

0736-4679/$–see front matter

ELSEVIER

doi:10.1016/j.jemermed.2009.11.003

Administration of Emergency Medicine

TRAUMA ACTIVATIONS AND THEIR EFFECTS ON NON-TRAUMA PATIENTS

Daniel C. Smith, MD,* Alyssa Chapital, MD,† Brooke Maile Burgess Uperesa, BS,‡ Erin R. Smith, MD,§ Catherine Ho, MD,‖ and Alan Ahana, MD¶

*Department of Emergency Medicine, The Queen's Medical Center, Honolulu, Hawaii, †Mayo Clinic Hospital, Phoenix, Arizona, ‡Creighton University School of Dentistry, Omaha, Nebraska, §Department of Emergency Medicine, Harbor-UCLA Medical Center, Torrance, California, ‖Departments of Emergency Medicine and Internal Medicine, UCLA Medical Center, Los Angeles, California, and ¶Department of Anesthesiology, Loma Linda University, Loma Linda, California

Reprint Address: Daniel C. Smith, MD, Department of Emergency Medicine, The Queen's Medical Center, 1301 Punchbowl Street, Honolulu, HI 96813

□ **Abstract—Background: Trauma patients consume many resources in the emergency department (ED), but what effect their care may have upon other patients seeking care is unclear. Objective: We sought to determine whether the presentation of trauma patients to the ED diverts staff and resources away from non-trauma patients. We hypothesized that the admission of trauma patients to the ED would result in longer times to physician evaluation and completion of laboratory and imaging studies, as well as a longer length of stay in the ED. Methods: This retrospective study reviewed and compared the charts of two groups of non-trauma ED patients. The group affected by trauma arrived up to 30 min after a trauma activation. The group unaffected by trauma arrived >3 h before or 3 h after a trauma activation. Times from arrival to initial MD evaluation, X-ray study, and computed tomography (CT) scan were documented. Median times from order to completion of laboratory results and imaging were compared, as well as total ED lengths of stay (LOS). Results: Median time from arrival to MD evaluation for patients affected by a trauma activation was almost twice as long as for unaffected patients (42 vs. 23 min, respectively; $p < 0.001$). Times from arrival to X-ray study, CT scan order, and laboratory results were all significantly greater for patients affected by a trauma activation ($p < 0.001$). For patients who required admission to the hospital, the affected group had a median LOS that was increased by 16 min (224 vs. 208 min, respectively) when compared to unaffected patients ($p = 0.04$). Conclusion: In the setting studied, the arrival of a trauma patient delayed physician evaluation and diagnostic testing. It only modestly increased the ED LOS for patients needing hospital admission.** © 2011 Elsevier Inc.

□ **Keywords—trauma; administration; triage**

INTRODUCTION

In recent years, specialized care for various groups of patients has created protocols and priorities for their rapid evaluation and treatment in emergency departments (EDs). These initiatives may be specialty driven, such as care for trauma and stroke, whereas others are formulated through regulatory agencies. In this latter case, quality measures (many related to time intervals) such as for pneumonia and myocardial infarction, are linked to reimbursement. Although there are data to suggest that improvement in care for some of these designated groups may be achieved through these strategies, there has been little reported on any secondary

This project was funded by the Queen Emma Foundation, Honolulu, Hawaii.

Preliminary findings of this study were reported in abstract form at the annual meeting of The Society for Academic Emergency Medicine, Chicago, Illinois, May 2007.

RECEIVED: 19 November 2008; FINAL SUBMISSION RECEIVED: 22 October 2009;
ACCEPTED: 9 November 2009

effects on other patients who may have resources diverted from their timely care.

The Queen's Medical Center (QMC) houses the only trauma center in the Hawaiian Islands. It is certified as a Level II trauma center by the American College of Surgeons, Committee on Trauma (ACS-COT), but as the only certified trauma center in the state, it functionally serves as a Level I center. Given QMC's role as the sole trauma center for the region, we came to consider whether the activation of the trauma team may divert staff and resources away from other ED patients.

Prior studies evaluated the delays in evaluation and clinical impact on patients with coronary syndromes when trauma patients came to the ED, concluding that the arrival of trauma patients delayed the evaluation of patients with acute chest pain (1,2). Another study concluded that trauma activations do not increase the time to obtain computed tomography in suspected stroke patients (3). These studies examined two highly specific groups of patients, both of whom were also evaluated under specific priority protocols of their own. One report was performed in Canada under a very different system, with no in-house trauma surgeon (1).

The aim of our study was to establish whether the admission of trauma patients to the ED diverts staff and resources away from the general population of non-trauma patients concurrently being evaluated and treated. We hypothesized that the admission of trauma patients to the ED would result in longer times to physician evaluation, longer times to completion of laboratory and imaging studies, and a longer ED length of stay (LOS).

METHODS

Study Design

This was a retrospective chart review study. We collected data on a subset of patients who were in the ED when a trauma patient entered the department and compared this to a randomly selected group, not affected by the presence of a trauma patient in the department. The study was approved by the institutional review board at QMC.

Study Site

QMC, located in Honolulu, Hawaii, is a 500-bed acute care hospital that is an ACS-COT-verified Level II trauma center. Approximately 50% of the hospital's 20,000 annual admissions are first seen in the ED. Adult patients (>18 years of age) comprise 95% of the census. The ED is staffed 24 h a day by board-certified emergency physicians, with an average of 68 h of daily coverage during the study period. There is intermittent coverage by a single first-year internal medicine or transitional resident. An in-house attending-level trauma surgeon directs the trauma service 24 h a day with an R1 resident rotating through the service each month. Trauma activations, either full or modified, are initiated by the ED physician based upon pre-hospital reports. The staff allocated to trauma activation is indicated in Table 1. The care of all trauma patients is immediately supervised by either an Emergency Medicine attending or a Trauma Surgery attending. In 2004 there were 44,300 patient visits to the ED, with an admission rate of 22%. Plain film radiographs and CT scanning were available 24 h a day, with technicians in house continuously during the study period.

Table 1. The Queen's Medical Center's (QMC's) Level II Trauma Activation Personnel

Acuity level	QMC Medical Personnel
Full trauma	Attending trauma surgeon
	Trauma intern
	Emergency Attending
	Orthopedic resident
	Crisis nurse
	ED Nurse
	CRNA
Modified trauma	Attending trauma surgeon
	Trauma intern
	Emergency Attending
	Crisis nurse
	ED nurse

ED = Emergency Department; CRNA = Certified Registered Nurse Anesthetist.

Intended Sample

This retrospective study reviewed patient records from 2004 using the QMC trauma database registry as well as the ED Logicare Database. Data for two groups of emergency non-trauma patients from 2004 were collected. One group was affected by trauma activation and the other was unaffected by trauma activation. The "affected" group of patients arrived within 30 min of a trauma activation. The "unaffected" group of patients arrived >3 h before or after a trauma activation was initiated. A total of 1575 patients were admitted to the trauma service in 2004. Patients admitted to the trauma service had a mean Injury Severity Score of 18.31; 24.41 for full activations and 17.81 for modified activations. For the study period, 25.4% of patients were admitted to the Intensive Care Unit, 1.2% died in the ED, and 9.2% went directly from the ED to the operating room. Patients transferred or admitted to the Trauma service after a