

Selected Topics: Critical Care



REDUCED HOSPITAL DURATION OF STAY ASSOCIATED WITH REVISED EMERGENCY DEPARTMENT–INTENSIVE CARE UNIT ADMISSION POLICY: A BEFORE AND AFTER STUDY

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Abstract—Background: Emergency department (ED) and hospital crowding adversely impacts patient care. Although reduction methods for duration of stay in the ED have been explored, few focus on medical intensive care unit (MICU) patients. **Objective:** To quantify duration of stay or mortality changes associated with a policy intervention that changed the role of an MICU resident to “screen” and write MICU admission orders in the ED to instead meet the patient and write orders in the MICU if there was an available bed. The intervention moved “screening” bed management-appropriateness discussions to the MICU attending or fellow level. **Methods:** We performed a retrospective before and after study at an urban, level 1 trauma center of adults admitted to the MICU from the ED during the first 6 months in 2009 before, and the corresponding 6 months in 2010, after the intervention. We collected demographics, ED, MICU, and hospital duration of stay, duration of mechanical ventilation, Acute Physiology and Chronic Health Evaluation (APACHE) scores, and mortality from electronic medical records. Linear models compared duration of stay differences; logistic regression compared in-hospital mortality. T-tests assessed APACHE score changes

before and after the policy change. Analyses were adjusted for age and sex. **Results:** We included 498 patients, average age 66 years (± 18), 52% male. Hospital duration of stay decreased 18% from 6.8 to 5.6 days (unadjusted $p = 0.029$). MICU duration of stay decreased from 3.5 to 3.3 days (unadjusted $p = 0.34$) and ED duration of stay from arrival to physical transfer decreased 40 min (375 to 324 min; unadjusted $p = 0.006$). Mortality and APACHE scores were unchanged. **Conclusions:** A streamlined admission intervention from the ED to the MICU was associated with decreased ED and hospital duration of stay without altering mortality. © 2015 Elsevier Inc.

Keywords—workflow; duration of stay; utilization; critical care; ED; ICU

INTRODUCTION

The 2007 Institute of Medicine report “Hospital-Based Emergency Care at the Breaking Point,” (1) brought crowding in the emergency department (ED) national attention when it showed a 26% increase in visits while the number of EDs decreased by more than 400 and the number of inpatient beds decreased by almost 200,000. Literature on the cause and effects of ED crowding has since grown. ED crowding initially was blamed on “unnecessary ED visits”

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(2–5). We now know that these visits have limited impact; rather, a major source of ED crowding is hospital crowding (6–8). Boarding occurs when admitted patients remain in the ED for extended periods as the result of hospital crowding; however, as the number of ED visits and admissions continues to increase without increased hospital capacity, the problem is worsening (9–12).

Many studies have shown ED crowding adversely impacts patient care and increases duration of stay (13–15). Time to treatment for patients with pneumonia, acute myocardial infarction, and acute pain all increase during times of crowding (16–20). Alleviating ED crowding by decreasing duration of stay for admitted patients has led to the “adopt-a-boarder” “full capacity protocol” developed at Stony Brook, which transfers admitted patients from the ED to inpatient hallway beds (21,22). Other programs such as “Bed ahead” focus on detailed process mapping and historic data, allowing downstream units to anticipate demand and work to create available beds and “pull” patients to the unit rather than waiting for the ED to push patients to them (23–25). Transitional or holding orders, once taboo, have become more accepted as a means to facilitate movement of patients from the ED to inpatient units. Revised triage practices have attempted to streamline front-end evaluation (2,26). These studies, however, have focused primarily on patients who are not critically ill, and few are interventional (27).

For those more ill, treatment delays can be associated with worse outcome, even if the source of those delays involves the care of other critically ill patients. For example, Fishman et al. showed that concurrent trauma activation introduced delays for patients with acute coronary syndrome and was associated independently with cardiovascular complications (18). Chalfin et al. identified increased morbidity and mortality in intensive care unit (ICU) patients with ED durations of stay greater than 6 h (28). Carr et al. found increased pneumonia in intubated blunt trauma patients with increased ED duration of stay (17). Singer et al. demonstrated that rates of mortality nearly doubled for patients boarding in the ED longer than 12 h compared with those less than 2 h (29).

Therefore, we conducted a before/after study of our revised ED–medical intensive care unit (MICU) policy. The intervention eliminated the role of the resident ICU screener in the ED. It facilitated immediate transfer of critically ill patients from the ED to the ICU when a bed was available. Our purpose was to quantify the difference in duration of stay or mortality associated with the intervention.

MATERIALS AND METHODS

We conducted a retrospective before and after study at an urban, level 1 trauma center with an ED an annual volume

of 70,000 adult visits and separate medical, surgical, and coronary ICUs. The admission intervention occurred July 1, 2010. The study period was the first 6 months of 2010 after the intervention (July–December), and the corresponding first 6 months of 2009 (July–December) before the intervention. We included all adults admitted directly from the ED to the MICU. We excluded patients younger than the age of 21 because of a separate children’s hospital and those transferred to another location before the MICU (e.g., floor, etc). This study was approved by the Institutional Review Board.

Data were extracted directly from electronic medical records: Emergency Department Information Manager (EDIM; Livingston, NJ) and ICUTracker® (Charlottesville, VA). The ED duration of stay was defined as the time from ED arrival (quick registration arrival electronic time stamp) until electronic time stamp when the patient physically left the ED. MICU duration of stay was MICU arrival to unit discharge. Hospital duration of stay was from ED arrival until hospital discharge. If there was disagreement regarding direct admission to the MICU, this was adjudicated by two investigators (J.M., A.G.). Data collected included demographics, duration of stay, mechanical ventilator use and duration, MICU costs, and in-hospital mortality.

The preintervention MICU admission procedure included identification of the patient by emergency medicine faculty who would discuss the case with the “ICU screener,” a postgraduate year 2 or 3 medicine resident who needed to evaluate the patient in the ED. For private cases, the emergency medicine (EM) attending also discussed the case directly with the private MICU attending. The screener would make an independent assessment of the need for ICU admission, then call the MICU fellow or private intensivist. If it was agreed that the patient needed an ICU admission, the screener would write MICU admission orders and contact hospital admitting to “clear” the admission so that bed assignment could begin. If there was disagreement on disposition, the EM attending would discuss the case directly with the critical care fellow or attending. Anecdotally, about 95% of “screenings” resulted in admission to the ICU.

The intervention eliminated the role of the screener in the ED. The EM attending and critical care attending or fellow discussed the case. If it was agreed ICU admission was warranted, a bed was requested and bed assignment would begin immediately. The MICU resident would be notified by both the ED and MICU attending or fellow of the pending admission. When a MICU bed was readily available, the patient would be moved to the MICU as soon as possible and the admitting resident would see the patient and write orders in the MICU. If no bed was available, the MICU resident needed to see the patient in the ED and write orders within an hour of the

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