

# Emergency Department Crowding Linked to Delays in Quality, Timely Care

Fee C, Weber EJ, Maak CA, Bacchetti P. Effect of emergency department crowding on time to antibiotics in patients admitted with community-acquired pneumonia. *Ann Emerg Med* 2007;50:501–9.

## Study Overview

**Objective.** To determine the association between emergency department (ED) volume and the timing of antibiotic administration for patients admitted with community-acquired pneumonia (CAP).

**Design.** Cross-sectional, retrospective review.

**Setting and participants.** Patients admitted through a university tertiary care hospital ED and discharged from an inpatient hospitalization for CAP between 1 January 2004 and 30 June 2005. The ED has 39,000 annual visits and 29 beds, and as mandated by state law, there is a strict nurse-to-patient ratio policy. Medical chart review was performed for patients who met the Joint Commission core measure PN-5b criteria [1] (ie, patients > 18 years discharged from the hospital with a primary or secondary ICD-9 classification of CAP). Patients were excluded if time to antibiotic administration was not available in the ED chart.

**Main outcome measures.** The primary outcome was receipt of antibiotics within 4 hours of ED arrival. Multivariable logistic regression was completed to determine the association of antibiotic administration with the total ED volume at the time of the index CAP patient's arrival and the number of ED patients requiring admission at the time of arrival.

**Main results.** Data were collected and analyzed for 405 patients. 61% received antibiotics within 4 hours of arrival to the ED. After adjusting for patient age, gender, race/ethnicity, mode of arrival, admission type, triage acuity, and shift (day, evening, night), patients with CAP were less likely to receive antibiotics within 4 hours as ED volume increased (odds ratio [OR], 0.96 [95% confidence interval {CI}, 0.93–0.99]) and with each additional ED patient requiring admission (OR, 0.93 [95% CI, 0.88–0.99]).

**Conclusion.** Higher ED volume and greater numbers of patients requiring admission in the ED is associated with delays to timely antibiotic treatment for patients diagnosed with CAP.

## Commentary

ED crowding has been heralded as a threat to patient safety

and care [2] and is now considered a growing national crisis [3]. Although the harmful impact of ED crowding on patient care may seem obvious, studies demonstrating the association of crowding with potentially negative outcomes are limited. In patients aged 65 years or older with CAP, antibiotic administration within 4 hours has been linked to improved inpatient and 30-day mortality [4]. Evaluating the effects of ED crowding on the accepted performance measure of antibiotic administration within 4 hours for patients with CAP [1] is an effective way to demonstrate a link between ED crowding and quality of patient care.

This study by Fee et al found that for each additional patient in the ED, a patient with CAP was 3% less likely to receive antibiotics within the recommended 4-hour guideline. This risk increased to 7% for each additional patient admitted in the ED. Although these decreases in risk may seem small, the additive effects of each additional patient may be deleterious to timely care. These findings add to the growing body of evidence showing the negative effects of ED crowding and the difficulty of delivering quality care under increasingly crowded conditions. Hospital administrators and policy makers should be aware of how ED quality measures are affected by ED conditions such as patient volume. ED quality of care may benefit from accounting for ED census at the time of index patient arrival.

The findings of this study are limited to a single academic tertiary care ED and results may not be generalized to other settings. Because there is no gold standard measure for ED crowding [5], this study's choice of ED patient volume and number of patients ultimately admitted in the ED are not reflective of other factors (eg, staffing levels, ED patient acuity, patients as a percentage of bed capacity) commonly used in proposed measures of ED crowding [6–8]. The outcome for this study, receipt of antibiotics within 4 hours, was a dichotomous measure. Ideally, future studies should evaluate the effect of multiple ED crowding factors on the actual time of antibiotic administration for patients with CAP.

## Applications for Clinical Practice

The results of this study provide evidence of the negative effects of ED crowding on patient care. Hospital policy makers and administrators need to be aware that ED census may have an impact on the time to antibiotic administration for patients with CAP. Attempts to improve the throughput

of ED patients, whether for the entire ED or for patients ultimately admitted to the hospital, may be a target for quality improvement. Improvements in ED compliance with time-sensitive quality measures may also need to include mechanisms dealing with ED census.

—Review by Ulla Hwang, MD, MPH

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