

When Overcrowded Means Unsafe:

A Research Review Of Patient Outcomes
In Over-Capacity Emergency Departments



“An overcrowded hospital should now be regarded as an unsafe hospital.”

Introduction

A growing body of research is conclusive: extended waits in the emergency department (ED) can be more than inconvenient. They can be deadly. As one editorial summarized: “An overcrowded hospital should now be regarded as an unsafe hospital.”¹

Overcrowding in hospital EDs has been around for years, and many aspects have been studied and well-documented. Meaningful research has lagged behind, however, on how diversion, wait times, and boarding affect patient safety.

A 2009 U.S. General Accounting Office (GAO) report noted that “quantitative evidence of this effect has been limited. Officials from ACEP reported that research has begun to analyze the effect of crowding on patient quality of care and that anecdotal reports indicate patients are being harmed.”²

The GAO report quoted officials from both the American College of Emergency Physicians (ACEP) and the Society for Academic Emergency Medicine who stated that additional studies were needed.

Two years later, more research is available and increasingly indicates that extended wait times to see a physician or to be admitted to an inpatient bed result in lower quality of care, reduced patient safety, poorer health outcomes, and increased mortality rates.

Wait Times Lengthen

In 2003, patients spent an average of 3.2 hours in the ED.³ By 2009, the average length of stay had grown 28%, to 4.12 hours.⁴

Looking at the wait time for the sickest patients—those ultimately admitted to the hospital—frames the problem even more clearly. On the front end, patients who need to be seen within 1 to 14 minutes wait an average of 37 minutes to receive a

full evaluation and begin treatment,² and just 14% of EDs meet the target of seeing patients deemed at triage to need care within an hour in the recommended time frame.⁵ On the back end, a minority of US hospitals consistently admit their critically ill ED patients within 6 hours. Less than 25% of hospitals admit patients from their EDs within 4 hours.⁵

Delayed admission leads to boarding of critically ill patients in the ED. In 2009, nearly 400,000 patients waited in the ED 24 hours or more.⁶ As these patients continue to occupy beds in the ED, the number of beds available for new patients declines, and the length of time patients coming into the ED must wait climbs. Recent research indicates that slow admission from the ED to inpatient floors may be the primary factor in ED overcrowding and lengthy patient waits.²

Long Waits Increase Mortality

In a 2007 survey, ACEP asked emergency physicians about critical issues facing their

patients. Half of the 1500 respondents said they had personally encountered a patient who had suffered because of “boarding,” and 200 said they knew off patients who had died waiting for inpatient hospital beds.⁷

Even when patients are admitted, the adverse effects of boarding continue. Critically ill ED patients who wait 6 or more hours for an intensive care unit (ICU) bed stay longer in the hospital and have a 5% higher mortality rate both in the ICU and in the hospital overall than those who do not wait as long.⁸

Research that examined the relationship between hospital and ED occupancy rates and other indicators of overcrowding and death at 2, 7, and 30 days after admission established a linear relationship between overcrowding and increased mortality on day 7. Overall, patients admitted from the ED during overcrowded periods had a 30% relative increase in mortality by day 2 and day 7, regardless of season, age, diagnosis, acuity, or facility.⁹

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For patients with necrotizing fasciitis, for example, prolonged boarding in the ED was associated with increased mortality, while having surgery within 24 hours correlated with lower mortality rates.¹⁰

Overcrowding Increases Adverse Outcomes

While increased mortality is clearly the worst result of ED overcrowding, other outcomes can be quite devastating. Patients with chest pain syndrome, for instance, had higher risks of adverse inpatient cardiovascular outcomes (delayed acute myocardial infarction, heart failure, hypotension, dysrhythmias, and cardiac arrest) when they were admitted during periods of high waiting room census and patient-hours.¹¹ Patients presenting with non-ST-segment elevation myocardial infarction who stayed in the ED more than 8 hours were also more likely to have a recurrence during their admission.¹²

Critically ill stroke patients who wait 5 or more hours before transfer to a

neurological intensive care unit (NICU) are also more likely to have a poor outcome (National Institutes of Health Stroke Scale of 4 or higher) on discharge than those who get a bed in the NICU more quickly.¹³

Impact On Aging Patients

Older adults are especially at risk for adverse effects from ED overcrowding. One retrospective study found that for every hour an adult over the age of 65 spends in the ED before being admitted, the odds of experiencing an adverse event while in the hospital rises by 3%. In addition, those who have adverse events after admission stay in the hospital more than twice as long, further reducing the number of beds available and contributing to longer waits in the ED.¹⁴

The implications of that study are especially significant because rates of emergency visits by the elderly are increasing more rapidly than any other group and could reach 11.7 million by 2013. Complexity also is increasing, with a

44% increase in elderly visits where 3 or more medications were prescribed and a 90% increase in visits with a diagnosis of “other and undefined.”¹⁵

More ED visits by the elderly has a detrimental effect on patient flow. Average wait times for all patients increase when the number of patients over age 65 in the ED increases, as do measures of overcrowding and the number of patients who leave without being seen. In particular, one retrospective study showed that the number of older patients accounts for 12% of the variation associated with the triage process.¹⁶

A retrospective study of emergency admissions showed that the elderly waited longer on average for admission. They also had the highest mortality and the greatest likelihood of a diagnosis of methicillin-resistant *Staphylococcus aureus* (MRSA) during their hospital stay.¹⁷

Medication Errors And Omissions Rise
ED overcrowding not only increases mortality and adverse events, it has a negative effect on clinically important processes of care such as timely and accurate administration of medication and treatment of time-sensitive conditions within established guidelines. It is also associated with higher numbers of patients who leave without being seen or against medical advice.¹⁸

A study of patients presenting with severe pain found a correlation between high waiting room census and occupancy rates and lack of treatment. Half of patients in severe pain received no pain medication during their stay in the ED when it was crowded. For those who did receive medication, overcrowding corresponded with delays of more than an hour in administration of pain medication from triage and from time of room placement.¹⁹

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Boarded patients may also not receive necessary medications while in the ED. A study that compared the administration of medication by ED nurses and inpatient nurses assigned to boarded patients to help with overcrowding found that the most likely result was that some boarders would not receive their medications. The inpatient nurses administered medications at a greater rate than ED nurses (83% vs 64% overall, 95% vs 54% at night) and in a more timely manner. The most common reason given by ED nurses for failure to administer medication was lack of time.²⁰

“Half of patients in severe pain received no pain medication during their stay in the ED when it was crowded.”

Not only is medication not dispensed as needed under crowded conditions, the frequency of errors also rises. Errors include incorrect doses, frequencies, durations, or administration as well as giving the wrong or contraindicated medications. An observational study in a large community hospital ED showed a positive correlation between an increased frequency of medication errors and increased crowding as measured by the

Emergency Department Work Index (EDWIN) score.²¹

Timely Treatment Lags

The Joint Commission and other organizations have established guidelines for the timely treatment of a number of diseases. In many instances, an ED's ability to meet these target times is substantially impaired by overcrowding.

Prompt percutaneous coronary intervention (PCI) is required when patients present with chest pain and whose subsequent electrocardiogram shows acute myocardial infarction (AMI). Overcrowding is associated with a decreased likelihood of timely treatment for AMI. During times of lower ED overcrowding (EDWIN < 1.5), the median time to balloon inflation was 84 minutes whereas median time to balloon inflation during more crowded periods (EDWIN ≥ 1.5) was 107 minutes.²² The National Quality Forum recommendation is 90 minutes or less from arrival to PCI. A study of 24 hospital EDs indicated that

a rise in the number of patients who leave without being seen, frequently an indication of overcrowding and extended waits, correlated with a reduction in the number of patients with community-acquired pneumonia who received antibiotic treatment within the recommended 4 hours of arrival.²³ Among older patients, in particular, prompt antibiotic administration markedly reduces length of stay in the hospital and mortality.²⁴

The Clinicians' View

The physicians and nurses in US EDs are keenly aware of the challenges they face in delivering timely, appropriate care to everyone who comes through their doors. More than 3500 clinicians surveyed in 65 US EDs rated their facilities in 4 systems critical to ED safety. Half of respondents reported that their EDs had more patients than they could safely treat some of the time. Another third felt they were overcapacity most of the time. One-quarter felt that they lacked sufficient space to deliver care most of the time, and

37% said they lacked enough space some of the time. In addition, just 41% reported that specialists arrived within 30 minutes of being asked to consult with a patient in the ED.²⁵

To address these kinds of concerns, the Society for Academic Emergency Medicine is sponsoring The 2011 Academic Emergency Medicine Consensus Conference, "Interventions to Assure Quality in the Crowded Emergency Department," in May in Boston.

Conclusion

More and more clinical studies are looking at how boarding, diversion, and long patient wait times affect patient safety. Evidence is mounting that the impact of overcrowding has dire, sometimes deadly, consequences, including lower quality of care, reduced patient safety, poorer health outcomes, and increased mortality rates. With these concerns growing, physician groups are trying to find ways to assure that patients receive top quality care in these less-than-optimal situations.

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Footnotes

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