Hospital Dysfunction
ED Crowding
Patient Safety

Sandra M. Schneider MD
FACEP
Ill and injured

ER
Ill and injured

ER

Uninsured/charity
SYSTEM FAILURE

Inpatients
\athens2004/niceones/images.html in a new window.
How To Survive Your Local ER

WHEN TAYLOR McCormack was 13 months old, the shunt that drained excess fluid from her skull stopped working. She needed a new shunt—a simple procedure that normally lasts less than an hour of surgery.

Taylor was brought to the emergency room at Boston’s Children’s Hospital by 7:15 p.m. that Saturday night. What followed was a series of delays and mistakes. The surgery resident couldn’t locate the senior surgeon (he was napping, and his pager was on silent), so the operation was scheduled for the next morning. And despite the fact that Taylor’s blood tests were abnormal and her symptoms alarming, she was not admitted to the intensive care unit. In fact, between 12:20 a.m. and 6 a.m., no doctor checked on her.

That’s when Taylor turned blue. By then it was too late. Six days later, John McCormack carried his daughter’s tiny body to the hospital morgue.

The McCormacks’ tragedy is a worst-case example of a problem that America’s emergency rooms can be dangerous place. Despite astonishing technology and armies of skilled, dedicated physicians who routinely save people who wouldn’t have stood a chance a generation ago, we simply aren’t enough of either—technology or doctors—to go around. Mistakes happen. Sometimes less-experienced doctors treat life-threatening illnesses. Diagnoses are missed or delayed. Patients are forgotten by overworked staff.

How often do things go wrong? No one knows for certain. Because so many mishaps are minor and so few have clear causes, accurate statistics are difficult to maintain, according to a 1999 study, though, more than half of all preventable hospital errors claim a victim from mistakes made in the ER. The main culprits aren’t incompetence but chance.

The nation’s emergency rooms are overburdened and underfunded, treating ever more patients with ever fewer resources. “You don’t want to scare the public, because hundreds of thousands of patients get cared for very well in emergency rooms every day,” says Gail Warden, president emeritus of Michigan’s Henry Ford Health System, who chaired a trio of studies of emergency care released in June by the National Academies’ Institute of Medicine. “But the system is stretched, and it could be at a breaking point in three to five years.” Federal law requires that ER doctors and nurses treat everyone who shows up, regardless of ability.
Code Blue for the ER

On Life Support: Sounding the Alarms on the ER Crisis

May, 2007
NY State survey 2/07
396 responses
My ED is overcrowded

- 60% almost always
- 40% frequently
In the past year crowding has
Boarding happens always most frequently busy times only never
Board as many as

- >30
- 21 to 30
- 11 to 20
- 6 to 10
- 1 to 5

- 27%
- 20%
- 20%
Board on average

- 1-2 hrs: 30%
- 3-6 hrs: 40%
- 7-12 hrs: 13-24 hrs: 
- 13-24 hrs: 30%
- >24 hrs: 40%
So what?
Crowded conditions are harmful to patient care

68%
Have you personally experienced a patient suffer harm as a result of crowding?
Have you personally experienced a patient dying as a direct result of crowding?
1000 EM physicians

- Important to patient safety ranked 1-5
- Timeout procedures 2.13
- MD order entry
- Ambulance diversion
- Medication errors 2.88
- Antibiotics for pneumonia
1000 EM physicians

- Important to patient safety ranked 1-5
- Handwashing 3.11
- Interpreters
- Low acuity patients
- Shift handoffs
- Aspirin for MI’s
- IT data sharing
- Lab/Xray times
- Nursing shortage 3.89
1000 EM physicians

• Important to patient safety ranked 4-5
• Availability of consultants 4.1
• Inpatient crowding 4.3
Most important factor

- Large and medium hospitals
- High and medium volumes (20K+)
- Those with higher LWBS
- Urban and suburban

- >4.5 in urban, high volume, large hospitals
Evidence

• Hospital dysfunction leads to ED crowding
Evidence Crowding leads to patient safety issues

- JCAHO
- 50% sentinel events occur in the ED
- 1/3 are related directly to crowding

- MMWR True emergencies wait >1 hour in ED
Frequency of Adverse Events and Errors among Patients Boarding in the Emergency Department

Shan Woo Liu, Stephen H. Thomas, James A. Gordon and Joel Weissman

Massachusetts General Hospital: Boston, MA

ABSTRACT

Background: As hospital overcrowding increases, the number of patients who "board" in the emergency department (ED) as they wait for their hospital beds to become available has skyrocketed. However, little has been published regarding the quality of care and outcomes of these patients.

Objectives: To assess the frequency of adverse events and errors among boarder patients.

Methods: With institutional board review approval, we performed a descriptive study at a busy, tertiary urban hospital through a retrospective chart review of all admitted patients during 3 randomly selected dates between February 2003 and July 2003. Boarding time was defined as time between moment of bed request and departure from the ED. Errors or adverse events were defined as upgrade in ED care, unexpected death, hypoxia, significant hypertension/hypotension, arrhythmia, missed laboratory tests, missed medications, or other unexplained adverse events.

Results: 162 patients were admitted during these three dates. Ultimately, 152 medical charts were reviewed. 10 were unable to be located. We found that average boarding time was 4.5 hours and frequency of errors or adverse events was among 43, or...
Confirmation of Association between Overcrowding and Adverse Events in Patients Who Do Not Wait to Be Seen

Drew B. Richardson and Michael Bryant

The Canberra Hospital: Canberra, ACT, Australia, Western General Hospital: Melbourne, VIC, Australia

ABSTRACT

OBJECTIVES: Daily total patient care time (PCT = time from treatment start to left ED) has been identified as a measure of ED workload and over-crowding. Recent study identified an association between this measure and the rare adverse event of a patient who does not wait for treatment ((DNW or left without being seen (LWBS)) but requires early subsequent admission to hospital. This study aimed to investigate this association over a long period in two different hospitals. METHODS: Retrospective descriptive study of 1,092 days of data from 2000 to 2002 (New Year’s Day excluded) in two different tertiary EDs. Existing workload databases were queried to generate the data elements. An "adverse event" was defined as a patient who DNW but was admitted to hospital through the ED arriving within 72 hours of the first presentation. PCT was calculated for each presentation and then proportions were ascribed to the day (midnight-midnight) during which the care was provided. Workload was described as "high" if daily total PCT exceeded the previously established over-crowding threshold of 18 patient-days per day, or "low" otherwise. RESULTS: In Hospital A, one or more adverse events occurred on 111 (11.9%) of 932 low-workload days and 30 (18.6%) of 161 high-workload days (P < 0.02). In Hospital B the figures were 84 (9.6%) of 872 and 38 (17.2%) of 221, respectively (P < 0.002). Both hospitals also had an increase in the number of adverse events per patient between low and high workload: from 0.14% to 0.20% (P = 0.06, Hospital A) and from 0.07% to 0.13% (P < 0.002, Hospital B). Subgroup analysis revealed an essentially linear relationship between daily PCT and adverse events per presentation in both hospitals. CONCLUSIONS: ED over-crowding as defined by daily total patient
Delays in Care
Emergency department overcrowding and ambulance transport delays for patients with chest pain

Michael J. Schull, Laurie J. Morrison, Marian Vermeulen, Donald A. Redelmeier

Abstract

Objective: Emergency department overcrowding sometimes results in diversion of ambulances to other locations. We sought to determine the resulting prehospital delays for cardiac patients.

Methods: Data on consecutive patients with chest pain who were transported to Toronto hospitals by ambulance were obtained for a 4-month period in 1997 and a 4-month period in 1999, which represented periods of low and high emergency department overcrowding respectively. Multivariate analyses were used to model 90th percentile system response (initiation of 9-1-1 call to arrival on scene), on-scene arrival time (departure from scene) and transport (departure from scene to arrival at hospital) intervals. Predictor variables were study period (1997 or 1999), day of the week, time of day, geographic location of the patient, dispatch priority, case severity, return priority and number of other patients with chest pain transported within 2 hours of the index transport.

Results: A total of 3609 patients (mean age 66.3 years, 50.3% female) who met the study criteria were transported by ambulance during the 2 study periods. There were no significant differences in patient characteristics between the 2 periods, despite the fact that more patients were transported during the second period (p = 0.001). The 90th percentile system response interval increased by 11.3% (28.0 v. 25.7 min, p < 0.001), whereas the on-scene interval decreased by 8.2% (13.4 v. 17.2 min, p < 0.001). The longest delay was in the transport interval, which increased by 28.4% from 1997 to 1999 (13.4 v. 17.2 min, p < 0.001). In multivariate analyses, the study period (1997 v. 1999) remained a significant predictor of longer transport interval (p < 0.001) and total prehospital interval (p = 0.004).

Interpretation: An increase in overcrowding in emergency departments was associated with a substantial increase in the system response interval and the ambulance transport interval for patients with chest pain.

Ambulance diversion systems help in the management of ambulance traffic during periods of ED overcrowding. Their purpose is to temporarily slow the influx of new patients to a participating hospital and hence to ease overcrowding. The result is that ambulances do not take patients to the closest hospital but travel instead to an alternate one further away, which inevitably results in some prehospital delay. However, many ambulance systems allow paramedics to override the diversion status of an ED when transporting critically ill patients. The extent of prehospital delay caused by these diversion systems is unknown, nor is it known whether override provisions diminish delays for critically ill patients.

Our objective was to determine whether greater ambulance diversion was associated with longer prehospital delays for patients with chest pain. We also sought to determine whether the delay varied with the severity of illness. We chose to study patients with chest pain since this condition is common, serious and urgent. Our hypothesis was that a period of greater ambulance diversion would be associated with ambulance delays for patients with chest pain, with the longest delay occurring during the transport interval (departure from the scene to arrival at the hospital). We further hypothesized that this association would not vary with severity of illness.

Methods

The study setting was the city of Toronto, which has a population of 2.5 million people and a single prehospital care provider, Toronto Emergency Medical Services (EMS). Approximately 120,000 patients are transported annually to Toronto hospitals (Brian Schwartz, Medical Director, Toronto EMS, personal communication, August 2001). For ambulance dispatch purposes, the city is divided into 4 geographic quadrants, each quadrant containing 3 to 6 EDs. Ambulance patients are preferentially taken to an emergency department within their quadrant of origin.
Office pediatrics: current perspectives on the outpatient evaluation and management of lower respiratory infections in children

Federal Hospital, Health Medical Center, Schneider Children's Hospital, Department of Emergency Medicine, Albert Einstein College of Medicine, New Hyde Park

PURPOSE OF REVIEW: To review the outpatient evaluation and management of children with lower respiratory infections (LRI), including those with respiratory syncytial virus (RSV), Mycoplasma pneumoniae, and human metapneumovirus. Also, to offer guidance for primary care providers on the management of children with lower respiratory tract infections.

OUTCOMES: The outpatient management of LRI is critical for the early detection and treatment of serious conditions. Current management strategies include the use of antibiotics, antiviral medications, and supportive care. The role of vaccination in preventing LRI is also discussed.

CONCLUSION: The early recognition and prompt management of LRI in children can significantly reduce morbidity and mortality. Future research should focus on developing more effective treatment strategies and improving vaccination rates.

The effect of emergency department crowding on the management of pain in older adults with hip fracture


OBJECTIVES: To evaluate the effect of emergency department (ED) crowding on assessment and treatment of pain in older adults. DESIGN: Retrospective review of ED records from a prospective cohort study. SETTING: A 425-bed, urban academic institution within an urban hospital-based, tertiary care medical center. PARTICIPANTS: One hundred fifty-eight patients, aged 65 and older, evaluated and hospitalized from the ED with hip fracture.

MEASUREMENTS: Patient-related risk factors, age, sex, nursing home residence, ED triage status, dementia, and mental health status. The primary outcome measure was the time from ED arrival to pain assessment. The secondary outcome measure was the time from pain assessment to pain treatment. The main study hypothesis was that ED crowding is associated with delays in the assessment and treatment of pain in older adults with hip fracture.

RESULTS: The mean age was 83 (range 67-91), 62% of patients were admitted to the hospital, and 44% were discharged to home. The mean time to pain assessment was 40 minutes (range 0-280), and the mean time to pain treatment was 141 minutes (range 0-598). The time from ED arrival to pain assessment was significantly longer in the ED crowding group compared to the non-crowding group (P = 0.05). The time from pain assessment to pain treatment was also longer in the ED crowding group compared to the non-crowding group (P = 0.01).

CONCLUSION: ED crowding was significantly associated with a lower likelihood of documentation of pain assessment, longer times to pain assessment, and longer times to pain treatment. Further research is needed to understand the mechanisms underlying these associations and to develop strategies to improve pain management in older adults with hip fracture.
• Occupancy by quartiles

• Pain Treatment delay >1hr (odds ratio)
  – 2\textsuperscript{nd} 1.9
  – 3\textsuperscript{rd} 2.8
  – 4\textsuperscript{th} 3.4
Ambulance diversion

- Bad for patients
- Costly for companies ($1M)
Hospital length of stay/cost
Healthcare

The access-block effect: relationship between delay to reaching an inpatient bed and inpatient length of stay

Drew B Richardson

Abstract — Introduction — Methods — Data sources — Data extraction and analysis — Results — Discussion — Competing interests — References — Author details

Abstract

Objectives:
To investigate the relationship between access block in the emergency department (ED) (defined as total time from arrival to transfer from the ED over eight hours) and inpatient length of stay (LOS).

Design and setting:
Retrospective cohort study of all admissions through the ED to a tertiary hospital in Canberra, Australian Capital Territory, during 1999.

Main outcome measures:
Total time in the ED and LOS, calculated in days from ED departure to hospital discharge (non-overnight admissions were assigned LOS of one day, and all LOS were truncated at 10 days).

Results:
11,906 admissions were included, and 919 experienced access block (7.7%). Mean LOS was 4.9 days in those who experienced access block (95% CI, 4.7–5.1), compared with 4.1 days in the no-block group (95% CI, 4.0–4.2; P < 0.0001). Subgroup analysis showed that this “access block effect” occurred across different severities of illness and diagnoses. A strong relationship was found between longer LOS and arrival of access-block patients on the inpatient ward outside office hours (0800–1600 weekdays).

Conclusions:
This is the first study to show an association between access block and a measure of outcome outside the ED. If the effect of access block on LOS is reproduced in other settings, there are major
Emergency department length of stay independently predicts excess inpatient length of stay

Don Liew, Danny Liew and Marcus P Kennedy

Introduction — Methods — Data sources — Data analysis — Results — Discussion — Limitations of the study — Conclusion — Acknowledgements — Competing interests — References — Author details

Abstract

Objective:
To examine the association between emergency department length of stay (EDLOS) and inpatient length of stay (IPLOS).

Design:
Retrospective review of presentations and admissions data.

Setting:
Three metropolitan hospitals in Melbourne, 1 July 2000 to 30 June 2001.

Main outcome measures:
Mean IPLOS for four categories of EDLOS (≤ 4 hours, 4–8 hours, 8–12 hours, >12 hours); excess IPLOS, defined as IPLOS exceeding state average length of stay; odds ratios for excess IPLOS adjusted for age, sex and time of presentation.

Results:
17,954 admissions were included. Mean IPLOS for the four categories of EDLOS were ≤ 4 hours,
Dolcourt B, Bilkovski R
Acad Emerg Med 2007; 14:84

- **CHF**
  - ED LOS <8h
    - Hosp LOS 5.3 D charges $23,572
  - ED LOS >8h
    - Hosp LOS 8.5 d charges $39,345

- **AMS**
  - ED LOS <8h
    - Hosp LOS 4.8 D charges $20,215
  - ED LOS >8h
    - Hosp LOS 6.8 D Charges $40,725
Increased mortality
Review

Clinical review: Emergency department overcrowding and the potential impact on the critically ill

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Abstract

Critical care constitutes a significant and growing proportion of the practice of emergency medicine. Emergency department (ED) overcrowding in the USA represents an emerging threat to patient safety and could have a significant impact on the critically ill. This review describes the causes and effects of ED overcrowding; explores the potential impact that ED overcrowding has on care of the critically ill ED patient; and identifies possible solutions, focusing on ED based critical care.

Introduction

Critical care begins immediately upon recognition of the critically ill (or potentially critically ill) patient, who has been defined as ‘any patient who is physiologically unstable, requiring constant and minute-to-minute titration of therapy according to the evolution of the disease process’ [1]. Therefore, the spectrum of critical care is not limited to the (AMls). Although EDs are designed to provide emergent stabilization and initial therapy for critically ill patients, most EDs do not have ICU-level resources for optimal longitudinal critical care delivery (such as uninterrupted 1 : 1 nursing care, focused subspecialty expertise, and invasive hemodynamic monitoring). Currently, the provision of critical care in the ED is increasing (in terms of both frequency and duration), largely because of ED overcrowding [5,7].

This review describes the causes and effects of ED overcrowding in the USA; explores the potential impact this has on the care of the critically ill ED patient; and identifies possible solutions, focusing on innovations in ED based critical care.

Emergency department overcrowding

In order to meet the increasing need for emergency services,
Increase in patient mortality at 10 days associated with emergency department overcrowding

Drew B Richardson

Introduction — Methods — Results — Discussion — Conclusions —
Acknowledgements — Competing interests — References — Author details

Abstract

Objective:
To quantify any relationship between emergency department (ED) overcrowding and 10-day patient mortality.

Design and setting:
Retrospective stratified cohort analysis of three 48-week periods in a tertiary mixed ED in 2002–2004. Mean “occupancy” (a measure of overcrowding based on number of patients receiving treatment) was calculated for 8-hour shifts and for 12-week periods. The shifts of each type in the highest quartile of occupancy were classified as overcrowded.

Participants:
All presentations of patients (except those arriving by interstate ambulance) during “overcrowded” (OC) shifts and during an equivalent number of “not overcrowded” (NOC) shifts (same shift, weekday and period).

Main outcome measure:
In-hospital death of a patient recorded within 10 days of the most recent ED presentation.

Results:
There were 34 377 OC and 32 231 NOC presentations (736 shifts each); the presenting patients were well matched for age and sex. Mean occupancy was 21.6 on OC shifts and 16.4 on NOC shifts. There were 144 deaths in the OC cohort and 101 in the NOC cohort (0.42% and 0.31%, respectively; P = 0.025). The relative risk of death at 10 days was 1.34 (95% CI 1.04–1.72). Subgroup analysis showed that, in the OC cohort, there were more presentations in more urgent triage categories, decreased treatment performance by standard measures, and a higher mortality rate by triage category.

Conclusions:
In this hospital, presentation during high ED occupancy was associated with increased in-hospital mortality at 10 days, after controlling for seasonal, shift, and day of the week effects. The magnitude of the effect is about 13 deaths per year. Further studies are warranted.
Phenomenology?

- Full capacity protocol 2006
- Pre/post analysis
- ED volume increase
- ED LOS fell by 9 hours for admitted medical patients, 5 hours for all
Phenomenology?

• Hospital LOS fell by 1.0 day for all admissions (p<0.001)
• No adverse events in ED WR or inpatient care spaces during 6 months
Patient safety initiatives

• Negative impact on patients needing to be seen
• Negative impact on EMS functionality, e.g., diversion, “circling the field”
• 10% of TRUE emergencies wait >one hour to be seen (MMWR)
• Increased adverse events in overcrowded ED
Patient safety initiatives (cont)

- Increased LOS for hospitalized after ED hold.
- Patients who LWBS or AMA as a result of crowding and boarding may suffer adverse outcomes
- Demonstrated increase in Mortality and Morbidity
Patient safety initiatives (cont)

- A/T JCAHO, 50% of sentinel events involve ED with 1/3 of these related to overcrowding.
- More patients suffer adverse outcomes from overcrowding and boarding than from failure to meet 4-hour rule for pneumonia or 3-hour rule for sepsis!!
Emergency department overcrowding in the United States: an emerging threat to patient safety and public health.

Trzeciak S, Rivers EP.

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Numerous reports have questioned the ability of United States emergency departments to handle the increasing demand for emergency services. Emergency department (ED) overcrowding is widespread in US cities and has reportedly reached crisis proportions. The purpose of this review is to describe how ED overcrowding threatens patient safety and public health, and to explore the complex causes and potential solutions for the overcrowding crisis. A review of the literature from 1990 to 2002 identified by a search of the Medline database was performed. Additional sources were selected from the references of the articles identified. There were four key findings. (1) The ED is a vital component of America's health care "safety net". (2) Overcrowding in ED treatment areas threatens public health by compromising patient safety and jeopardising the reliability of the entire US emergency care system. (3) Although the causes of ED overcrowding are complex, the main cause is inadequate inpatient capacity for a patient population with an increasing severity of illness. (4) Potential solutions for
Lack of hospital beds causes emergency departments to miss targets

Susan Mayor

BMJ 2007;334;111-
doi:10.1136/bmj.39098.461968.DB

Updated information and services can be found at:
http://bmj.com/cgi/content/full/334/7585/111
Best Practices

• Don’t start
Add Capacity
Impact of the Observation Unit on Diversionary Hours

2003
2004
• Move the patient upstairs.
Hospital overcrowding: a threat to patient safety?

Peter A Cameron

MJA 2006; 184 (5): 203-204

Introduction — What should be done? — Reduce hospital demand —

Optimise hospital bed capacity — Author details

Managing access block involves reducing hospital demand and optimising bed capacity

Hospital overcrowding causing “access block” — a lack of available inpatient beds for emergency department patients — remains a major impediment to the delivery of good health care both in Australia and overseas. It is obvious that making elderly or disabled patients wait on uncomfortable emergency trolleys in corridors, with sleep deprivation and minimal privacy, is inhumane. Previous research has shown that hospital overcrowding is actually inefficient: it is associated with increased length of hospital stay,1,2 thus potentially reducing throughput. The number of adverse events has also been shown to increase with worsening access block.3,4

An overcrowded hospital should now be regarded as an unsafe hospital

Two articles in this issue of the Journal have put pressure on efforts to solve this problem. Sprivilis and colleagues5 and Richardson,6 using different methods and different populations, have shown a strong association between access block and mortality rate. Their findings now make access block a patient safety issue for which all health care workers and the community must be responsible. It is incumbent on