ED crowding: Causes, Consequences, Solutions

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Overview

• What is it & how common?
  – Measures
• Review of the causes of crowding
• Economics
• Adverse outcomes
• Solutions
  – Public/local policy
What is crowding?

• Supply-demand mismatch
  – Long waits to be seen
  – Long waits for tests
  – Long waits for beds
How common is crowding?

• Derlet (Acad Emerg Med 2001)
  – Frequent crowding in U.S. Emergency Departments
  – 91% of medical directors say ‘overcrowding is a problem’.
How common is crowding?

• How about now?
• What is the ‘problem’?
How common is crowding?

- Medical directors in PA (68% response rate)

Is ED crowding a problem in your hospital? (n=104)

- Strongly agree: 46 (44%)
- Agree: 41 (39%)
- Neutral: 12 (12%)
- Disagree: 5 (5%)
- Strongly disagree: -
How common is crowding?

What % board for more than 4 hours after bed request in your ED? (n=105)

<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Number of Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% of patients</td>
<td>6 (6%)</td>
<td></td>
</tr>
<tr>
<td>1-10% of patients</td>
<td>35 (33%)</td>
<td></td>
</tr>
<tr>
<td>11-25% of patients</td>
<td>32 (30%)</td>
<td></td>
</tr>
<tr>
<td>26-50% of patients</td>
<td>16 (15%)</td>
<td></td>
</tr>
<tr>
<td>51-75% of patients</td>
<td>9 (9%)</td>
<td></td>
</tr>
<tr>
<td>76-100% of patients</td>
<td>7 (7%)</td>
<td></td>
</tr>
</tbody>
</table>
How common is crowding?

What percentage of the time is your ED crowded? (n=106)

<table>
<thead>
<tr>
<th>Percentage of Time</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10% of the time</td>
<td>18</td>
<td>(17%)</td>
</tr>
<tr>
<td>11-25% of the time</td>
<td>39</td>
<td>(37%)</td>
</tr>
<tr>
<td>26-50% of the time</td>
<td>26</td>
<td>(24%)</td>
</tr>
<tr>
<td>51-75% of the time</td>
<td>17</td>
<td>(16%)</td>
</tr>
<tr>
<td>&gt;75% of the time</td>
<td>6</td>
<td>(6%)</td>
</tr>
</tbody>
</table>
ED crowding
Measuring crowding

• How you measure crowding?
Measuring crowding

- The pink elephant problem:
  - What is crowding?
  - Does crowding mean we’re just busy?
  - How crowded is too crowded?
  - Are we crowded or “overcrowded”?
Measuring crowding

• Two perspectives
  – Patient
    • Waiting room time, total ED LOS, boarding time
      – Can obtain retrospectively
  – ED (real-time measures)
    • Waiting room number, occupancy, number of admitted patients, diversion status
    • Other measures: NEDOCS, EDWIN, etc.
Measuring crowding

• Is simpler better?
  – The emergency department occupancy rate: a simple measure of emergency department crowding?
    • McCarthy et al. (Ann Emerg Med 2008)
    • ED occupancy rate v. EDWIN
      – Correlated
      – Occupancy not sig different from EDWIN in identifying
        » Diversion Hours
        » Episodes of LWBS
Measuring crowding

• But maybe occupancy is not the panacea
  – McCarthy et al. (Ann Emerg Med 2009)
    • Crowding Delays Treatment and Lengthens Emergency Department Length of Stay, Even Among High-Acuity Patients
      – In 4 EDs, occupancy had a variable effects on ED LOS
    • Occupancy may not generalize
  – Next steps
    • Instead of predicting ED LOS, measure it!
    • Trailing indicators
ED crowding

• The causes of crowding – a brief review
  – Increasing visits
    • Poor urgent primary care availability
      – “…if you’re really sick, go to the ER.” BEEP
    • Primary care clinics operate at high capacity
    • Limited ‘rapid’ availability of outpatient tests
    • PCPs can’t provide urgent work ups
    • People vote with their feet
      – ED = One-stop shop
ED crowding

• The causes of crowding – a brief review
  – Decreasing space
    • Shrinkage in ED & hospital bed capacity
  – AHA data
    • 1981: 1.36 million beds, 6933 hospitals
    • 1991: 927K beds, 5370 hospitals
    • 1999: 829K beds, 4950 hospitals
ED crowding

• The causes of crowding – a brief review
  – What is the effect of crowding on hospitals’ bottom lines
Crowding & economics

• ED Admissions More Profitable Than Non-ED Admissions
  – $759 (ED admits) v. $595 (non-ED admits)

• Financial Impact of Ambulance Diversion on Inpatient Hospital Revenues and Profits.
  – Handel et al – Acad Emerg Med 2008
  – Revenue is higher during weeks of ambulance diversion - $265K higher
Crowding & economics

• The profitability of Medicare admissions based on source of admission
  – McHugh et al. – Acad Emerg Med 2008
  – $(712)$ for ED admissions v. $22 for non-ED admissions
ED admissions → Hospital ← Elective admissions
ED admissions $\rightarrow$ Capacity-constrained Hospital $\leftarrow$ Elective admissions

$\rightarrow$
Capacity-constrained Hospital

ED admissions -> $ -> Capacity-constrained Hospital

Capacity-constrained Hospital -> $ -> Elective admissions
Adverse outcomes

• Crowding has several adverse consequences
  – We know this!
Adverse outcomes

• Crowding has several adverse consequences
  – We know this!
  – It’s been hard to prove it.
Adverse outcomes

• Crowding / analgesia
    • Severe pain:
    • Less likely to get treated
    • More likely to experience a delay in treatment
    • Abdominal pain (Acad Emerg Med 2009)
    • Back pain (Acad Emerg Med 2010)
  – Hwang et al.
    • (JAGS 2006) Older adults with hip fracture
    • (Acad Emerg Med 2008) General ED population
Adverse outcomes

• Crowding/antibiotic delays
  – Patients with pneumonia
    • Pines et al. (Ann Emerg Med 2008)
      – 69% get abx within 4 hours – not crowded
      – 28% get abx within 4 hours – very crowded
    • Fee et al. (Ann Emerg Med 2008)
      • Less likely to get timely antibiotics when it’s crowded
Adverse outcomes

• Crowding / patient satisfaction
  – Pines et al. (Acad Emerg Med 2008)
  – ED crowding, LOS, and hallway placement
    • Lower ED satisfaction
  – Boarding times, hallways placement
    • Lower OVERALL hospital satisfaction
    • Less likely to recommend the hospital to others
Adverse outcomes

- ED boarding times / higher death rates
  - Chalfin et al. (Crit Care Med 2007)
  - ED LOS > 6 hours in ICU patients
    - 17.4% Mortality (boarded > 6 hours)
    - 12.9% Mortality (boarded ≤ 6 hours)
    - Differences persisted after risk-adjustment
Adverse outcomes

• Crowding / CV complications
  – Pines et al. (Ann Emerg Med 2009)
  – Crowding associated with a higher rates of inpatient CV complications
    • Patients with ACS-related chest pain - OR 3-5x
    • Patients without ACS-related chest pain – OR 2-3x
  – Is crowding the marker of a dysfunctional hospital?
Adverse outcomes

• Is the crowding/outcome link ubiquitous?
  – Likely no
  – Certain populations are more vulnerable
• ED crowding may not affect many outcomes
  – Critically ill
  – Hospitals with systems to deal with boarding/crowding
  – Singer et al. (manuscript in progress)
    • The association between ED LOS and outcomes is different at different hospitals
Solutions to crowding

- The real question:

  What to do?
Solutions to crowding

• Improving ED operations
  – 42 (40%) had in previous 2 years
  – 41/42 (98%) – has reduced crowding
Solutions to crowding

• ED staffing
  – More extenders
  – More nurses
  – More doctors

• Capacity
  – Increase ED size
  – Increase hospital size
  – Open obs unit
Solutions to crowding

• ED staffing
  – More extenders 71%
  – More nurses 51%
  – More doctors 41%

• Capacity
  – Increase ED size 48%
  – Increase hospital size 47%
  – Open obs unit 25%
Solutions to crowding

• Outside the ED
  – Moving admitted patients to inpatient hallways
    • 1/5 (20%) has reduced crowding
  – Surgical schedule smoothing
    • 4/6 (67%) has reduced crowding
Solutions to crowding

• Outside the ED
  – Moving admitted patients to inpatient hallways
    • 1/5 (20%) has reduced crowding
    • 42 (40%) tried to implement but unable
  – Surgical schedule smoothing
    • 4/6 (67%) has reduced crowding
    • 22 (21%) tried to implement but unable
Solutions to crowding

• Solutions that originate inside the ED
  – Easier to implement
  – Low-hanging fruit
  – Affect crowding

• Solutions that originate outside the ED
  – Politically more difficult
  – Need buy-in / Collaboration
Solutions to crowding

• Policy solution
  – Creating public accountability

• NQF measures (2012)
  – Median time from ED arrival to departure (admits)
  – Median time from ED arrival to departure (Dc’s)
  – Median time from decision to admit to departure
  – Door to provider
  – LWBS
Next steps

• Policy
  – Accountability
  – Real-time reporting systems
  – P4P
  – UK: 4-hour rule
  – Australia: 8-hour rule
  – Hong Kong: 20-minute rule
Next steps

• Research
  – Multi-center studies
  – Testing solutions
    • Safety
    • Comparative effectiveness
Next steps

• Until then....
  – Crowding is a local hospital problem
    • There are several solutions
    • Deploying solutions effectively
      – In the ED
      – Outside the ED
      – Mitigating the effect of crowding on quality
Wrap-up

• Definitions
• Measurement
• Economics
• Adverse effects on patients
• Solutions
• Questions?
Optimizing Emergency Department Front-End Operations

Jennifer L. Wiler M.D., M.B.A., F.A.C.E.P.
What is the ED “Front-End”?

- No standard definition
- *Time from patient’s initial arrival in the ED to the time an ED health care provider formally assumes responsibility for the evaluation and management of the patient.*
Why Focus on the Front-End?
Front Door to Healthcare
Traditional ED Front-End Model
The Problem of Crowding
Shift from Defining ED Crowding to Measuring Patient Flow

Measuring Crowding: Time for a Paradigm Shift

Main Entry: Paradigm Shift
Part of Speech: noun
Definition: a fundamental change in approach or assumptions

Main Entry: Paradigm Shift
Part of Speech: noun
Definition: acceptance by a majority of a changed belief, attitude, or way of doing things

The phenomenon of emergency department crowding has become recognized throughout North exceed the crowding threshold of an ED that rarely experiences significant delays in patient care.

The research community has been wrestling with these questions for the past several years. Although some progress has certainly been made, I predict that we will continue to struggle with fundamental measurement problems as long as our goal is to measure “crowding.” We will always be stuck in the world of trying to define how bad is bad enough. In addition, even if we are able to agree on a common quantitative threshold that defines when an ED is officially crowded (a prospect that at this point appears doubtful), how do we classify the severity of crowding beyond the threshold? The categories of crowded, overcrowded, and “don’t even think about trying to get emergency care in this place” come to mind. At times it feels like we are competing to see who has the worst crowding problem, with the winner garnering

Why Focus on the Front-End?

• Decrease Wait Times to Provider (Door to Doc)...
  – Improve Throughput (Flow)
  – Decrease Ambulance Diversion
  – Decrease LWBS (Walk-aways)
    • Improve Patient Care
    • Decrease Malpractice Risk
    • Decrease Lost Revenue
  – Improve Patient Satisfaction
  – Improve Staff Satisfaction
  – Improve “Goodwill”

Why Focus on the Front-End?

- Clinical Outcomes & Performance Measures*  
  - STEMI*, Stroke*, PNA*, Sepsis, Trauma
- 2008 NQF Endorsed Quality Measures  
  - LOS (Door to Departure / Admission)
- 2009 CMS Proposed Quality Measures  
  - LWBS
- Regulatory  
  - TJC Flow Standards (LD.3.11 LD.3.10.10)
The Task...

- 2006 ACEP Council Resolution
- “Develop a position paper which defines optimal emergency care related to the “Front End” processing of patients presenting to an ED.”
Optimizing Emergency Department Front End Operations
An Information Paper
January 2008

Jennifer L. Wiler, MD, MBA; Subcommittee Chair
Diana L. Fite MD; FACEP; Chair, Emergency Medicine Practice Committee

Subcommittee Members: Christopher Gentle, MD; James M. Halfpenny, DO, FACEP; Azita Hamedani, MD, MPH, FACEP; Alan Heins, MD, FACEP; Abhi Mehrotra, MD, FACEP; Michael G. Mikhail, MD, FACEP; and Angela Siler Fisher, MD

INTRODUCTION

For nearly two decades emergency department (ED) crowding has been recognized as a growing problem. From 1995 through 2005, the annual number of ED visits in the US increased nearly 20% from 96.5
Front-End Improvement Strategies

• Team approach patient care (“Team Triage, Rapid Intake Team”)
• Resource-based triage system(s)
• Waiting room design enhancements
• Time to evaluation guarantee
• Full / surge capacity protocols
• Wireless communication devices
• Incentive based staff compensation
• Immediate bedding
• Bedside registration
• Physician/practitioner at triage
• Advanced triage protocols and triage-based care protocols
• Dedicated “fast track” service line
• Tracking systems and “white boards”
• Kiosk self check-in
• Personal health record technology (“smart cards”)
Optimizing Emergency Department Front-End Operations

From the Division of Emergency Medicine, Washington University in St. Louis School of Medicine, St Louis, MO (Wiler); the Department of Emergency Medicine, Christiana Care Health Services, Newark, DE (Gentle); Forrest Hills Hospital, Forrest Hills, NY (Halfpenny); the Department of Emergency Medicine, University of South Alabama College of Medicine and Medical Center, Mobile, AL (Heins); the Department of Emergency Medicine, University of North Carolina, Chapel Hill, NC (Mehrotra); the Department of Emergency Medicine, St. Joseph Mercy Hospital, Ann Arbor, MI (Mikhail); and the Department of Emergency Medicine, University of Texas Medical School at Houston, Houston, TX (Fite).

As administrators evaluate potential approaches to improve cost, quality, and throughput efficiencies in the emergency department (ED), “front-end” operations become an important area of focus. Interventions such as immediate bedding, bedside registration, advanced triage (triage-based care) protocols, physician/practitioner at triage, dedicated “fast track” service line, tracking systems and whiteboards, wireless communication devices, kiosk self check-in, and personal health record technology (“smart cards”) have been offered as potential solutions to streamline the front-end processing of ED patients, which becomes crucial during periods of full capacity, crowding, and surges. Although each of these operational improvement strategies has been described in the lay literature, various reports exist in the academic literature about their effect on front-end operations. In this report, we present a review of the current body of academic literature, with the goal of identifying select high-impact front-end operational improvement solutions. [Ann Emerg Med. 2010;55:142-160.]
Immediate Bedding & Bedside Registration
Traditional ED Front-End Model

Registration → Triage → Bed Placement
Immediate Bedding

- Bedside Registration
- "BED" PLACEMENT
- Triage & Primary Nursing Assessment
Does It Work?

- 3 Published Studies In Isolation
  - 3 others part of comprehensive strategies

- Findings:
  - Avg LOS decrease 259 to 239 minutes (8%).
  - Initial modest, but statistically significant reductions in triage-to-room times, not sustained for all time-of-day periods (except morning).
  - 15 minute (9.3%) average decrease LOS.
Limitations of IB & BR

• Not Successful As An Isolated Strategy (?)
• Cultural Factors Can “Sabotage”
• Requires Open Beds

• All Studies :
  – Methodological limitations
  – 1 center
How to Improve Chances of Success

• Open Beds (2-Way Communication)
• Bedside Registration (Staff & Equipment)
• Culture Change
  – Concept of triage
  – Role primary nurse
  – Motivated staff
    • Pull vs. push
    • Physician, RN, tech
    • Incentivize (MI, PNA, CVA)
Advanced Triage
(Triage-Based Care) Protocols
Does It Work?

• 9 Studies, Various Protocols
  – Imaging, analgesia, ECG, elopement precautions

• Results:
  – Decreased time to ECG, lytics
  – Increased patient satisfaction
  – Decreased LOS*, time to imaging* and time to abx
  – Some imaging over-utilization (~5-7%*)

Limitations of TBC/ATPs

- Protocols Are Only As Good As Those Who Use Them ( Appropriately & Consistently )
- Practice Has Been Challenged ( SOP )
- Work Around?
How to Improve Chances of Success

• Have Trained Clinician / Intake Team Instead
• Experienced ED Nurse Straightforward Protocols
• Education / Training Workshops
  – Decrease variation
• QI Implementation (Feedback)
  – Appropriate use, under/over utilization
  – Patient satisfaction
  – Effect on operations (LOS, TAT)
• Should Not Delay Getting Pt In Front Of Provider
Physician / Practitioner in Triage
Does It Work?

• 8 Articles (6 International)
  – Russ Annals 2010 & Unknown ED Mang 2010

• Results:
  – Decreased door to doc, LWBS
  – Decrease total ED LOS
  – Improved patient & staff satisfaction
  – Improved reported [quality] of pt care
  – 35-49% pts discharged from triage
Limitations of Provider in Triage

• Unclear How To Interpret Study Results, Geographic Variability

• Need Adequate Staffing & Space
  – Tech, RN, scribe (?)
  – $$$

• Increased Handoffs & Rework (?)
  – Variability in provider practice

• Provider Liability
How to Improve Chances of Success

• Have Adequate Staff, Equipment, & Space (Rapid Medical Exam “Intake Team”)
  – RN, tech, registar, housekeeping

• Well Defined Streaming Protocols Based On Acuity (RN or MD)

• Decrease Variability / Standardize Practice

• Decrease Handoffs, Optimize Communication

• Identify “High Impact” Shift
Implementation of “Fast Track” (FT) Service Line
Does It Work?

• 11 Articles
  - Devkaran BMC EM 2009 (UAE), Considine EMJ 2008 (AU)

• Results: Variable ... Except Dec LOS

  – Improve patient satisfaction
  – Dec door to doc
  – Dec LWBS
  – Dec ED LOS
  – Dec test utilization, cost
  – Dec 72 hr returns

  – No change patient satisfaction
  – No change door to doc
  – No change LWBS
  – No change ED LOS
  – Inc total cost (15%)
  – Inc 72 hr returns, No change in revisit or mortality rate (2)
Limitations of Fast Track

- Need Dedicated Space
- Mis-triage Of High Acuity Patient
- Significant Subset Of Pts Don’t Require A Bed
  - Take up valuable bed space, can keep vertical
- Often Overflow Area For Main ED
  - Often function as “slow track”
- Often More A Stampede Than Queue
  - Need more acuity based segmentation
How to Improve Chances of Success

• Better To Create Comprehensive Pt Streaming Approach
• Need Standard Triage Criteria To Define Appropriate Pt (eg. ESI 4&5)
• Place POC Lab & Radiology Near Fast Track
• Keep Pts Vertical & Moving
• Create Results Waiting Area To Keep Exam Area Open
• Define “High Impact” Shifts
ED Technology
Technology Beyond EDIS & HIS

• Pre-Triage
  – Manage queue by online scheduling ED appointments, posting wait times
  – PMD, EMS data synergy

• Registration
  – Self Service Kiosk, Web-based Sign In
  – Smart Card (obsolete)
  – Palm Vein, Retina/Iris scan, Fingerprint, etc.

• Patient Care
  – Mobile wireless communication devices
  – Wireless monitoring
  – CPOE, CNOE

• Patient Tracking
  – RFID
  – Barcording
Summary

• No One Strategy Is Likely To Work For All EDs
  – Resources (staff, residents, MLP, space)
• Publication Does Not Mirror Practice
• Opportunity For Peer Reviewed Operations Research To Direct Process Improvement
  – AHRQ Funded ED Intake Summit
• What Has Worked (Not Worked) For Your ED?
And The Answer Is...