ED Overcrowding and CEDOCS:
The Community Emergency Department Overcrowding Scale

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Overcrowding

- **Introduction**
- Causes
- Consequences
- Solutions
- NEDOCS studies
- CEDOCS

Introduction

- EDs provide an important public service mission
- Overcrowding diminishes the capability of the ED to manage emergencies effectively
Introduction

• In the 1990s
  o US hospitals: due to downsizing, mergers and closures lost
    • > 100,000 beds
    • 7800 medical/surgical ICU beds
  o # ED visits grew 15%

Introduction

How crowded is overcrowded?

“Although ED crowding has been a topic of frequent investigation, current definitions of the problem are often implicit or focus on factors outside of the ED itself”

“A more consistent approach to defining ED crowding would help to clarify the distinctions between causes, characteristics, and outcomes.”
Introduction

- No gold standard
- No standardized scale or definition
- “We do not know what overcrowding is but we know it when we see it!”

Academic ED overcrowding

- Survey of 84/120 Academic EDs
- 51% reported daily overcrowding
- 94% reported overcrowding 3+ days/wk
- Causes
  - Hospital Beds 88%
  - Consultant delays 82%
  - Radiology delays 80%
  - Nursing shortage 78%
Rochester NY

- Multiple strategies tried
- ED internal strategies “less successful”
- Best results were from rapid removal of inpatients from the ED.

Arizona

- Diversion 30-50% of the time
- Long ED waits
- Major cause is shortage of inpatient beds
## Publications on ED crowding

<table>
<thead>
<tr>
<th>Year</th>
<th># Publications</th>
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<tr>
<td>2013</td>
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## International Publications on ED crowding

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Overcrowding

- Introduction
- **Causes**
- Consequences
- Solutions
- Previous studies
- CEDOCS

Causes of Overcrowding

1. Increases in ED patient volumes
2. Increased complexity of diseases and associated evaluations
3. Lack of inpatient hospital beds and resources
4. National shortage of nursing and other hospital staff
5. On-call physician issues
Causes of Overcrowding (cont.)

6. Reduced primary care services
7. Managed care barriers
8. Inadequate funding
9. Prudent layperson standard
10. Non-urgent use of the ED
11. The uninsured

Overcrowding

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Consequences of Overcrowding

1. Patients who leave without being seen
2. Patient dissatisfaction
3. Ambulance Diversion
4. Increased ED length of Stay
5. Quality Indicators

6. Medical Errors
7. Death and disability
8. Resident Education
9. Loss of autonomy
10. Issues of justice
Overcrowding

- Introduction
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- **Solutions**
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Short term solutions

- A. EMS Practices
- B. ED Practices
- C. Hospital Practices
A. EMS Practices

1. Medical Direction
2. Diversion protocols
3. Regional information management systems
4. Regional diversion saturation override

B. ED Practices

1. Real time monitoring of ED crowding metrics
2. Expanded observation services
3. Best demonstrated practices
4. Advanced triage protocols
5. Flexible triage staffing
B. ED Practices (cont.)

6. Intra-ED communications
7. Flexible bed assignments
8. Flexible staffing
9. State-of-the-art fast-track
10. ED case management

B. ED Practices (cont.)

11. Foreign language translators
12. Point-of-care payment/testing
13. Staff support and moral boosters
14. Diversion criteria
15. Use of temporary facilities
C. Hospital Practices (cont.)

1. Changing hospital culture
2. Bed monitoring process
3. Focus on inpatient operational metrics
4. Practitioner control and oversight
5. Streamlining discharges
6. Rapid admission unit

C. Hospital practices (cont.)

7. Discharge hospitality suite
8. High patient census management – e.g. boarding
9. Diversion readiness
10. Expedite admissions
11. Code Help”
12. Internal disaster plans
Overcrowding

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Part 2 Results – NEDOCS score

- The reduced model of overcrowding
  - number of ED patients
  - number of respirators in use in the ED
  - Total admits in the ED
  - Waiting room time for last patient called
  - Longest admit time
### Limitations

- Lack of a true gold standard definition
- Differences in definition of terms such as “diversion” and “critical care patients”
- Generalizable only to other academic EDs
- Pediatric EDs not specifically addressed
- Community hospitals not specifically addressed
Comparison with EDWIN

- EDWIN is defined as
  \[ \sum_{i} n_{i}t_{i}/Na(BT-BA), \]
  - \( n_{i} \) = number of patients in the ED in triage category \( t_{i} \)
  - \( t_{i} \) = triage category based on ESI categories (1-5, 5 being most acute)
  - \( Na \) = number of attending physicians on duty
  - \( BT \) = number of treatment bays
  - \( BA \) = number of admitted/Obs patients in the ED

LWBS

- Overcrowding was found in 44% of our sampling times
- There was a significant correlation between LWBS and the NEDOCS score
- Correlation was best for LWBS and overcrowding scale 2 hours after patient registration
Overcrowding

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Prospective Validation of scale
Stage 3B

Fusion of the scales for evaluation of entire community ED overcrowding issues.
Stage 4

Application of scale to complex issues
1. Patients leaving prior to full medical care.
2. Medical Errors
3. Diversion
4. Patient ED Acuity levels.
5. Patient Satisfaction
Stage 5
16 Total Hospital
(\text{Red}=\text{lowest}, \text{Bold}=\text{Highest})

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\text{Spearman rho-squared}

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The Psychiatric Patients

- 35% of sampling times had at least 1 psychiatric patient on hold
- Median of 2 patients (1, 2)
- Median time was 8 hrs (4, 14hrs)
- Maximum was 27 patients and 109 hours waiting in the ED
NEDOCS vs CEDOCS

NEDOCS
- Number of ed beds
- Number of hosp beds
- ED patients
- Respirators
- Admits in the ED
- Admitted patient wait time
- Waiting room wait time

CEDOCS
- Number of ed beds
- Number of ED visits/year
- ED patients
- Critical care patients
- Waiting room patients
- Admitted patient wait time

Correlation Values

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R² comparison to Overcrowding
NEDOCS – 39%
CEDOCS – 47%
### CEDOCS CALCULATOR

**FIXED VARIABLES**
- ED visits per year
- Number of ED beds

**COUNT VARIABLES**
- Total Patients in the ED (see below)
- Number of admitted critical care pts in the ED
- Number of patients in the waiting room

**TIME VARIABLES**
- Waiting time of longest admitted patient (since admission-in hours)
- Code:
- Scaling Factor (Advanced users only)

**CEDOCS SCORE**

| 1 to 20 Level 1 | 21 to 60 Level 2 | 61 to 100 Level 3 | 101 to 140 Level 4 | 141 to 180 Level 5 | 181 to 200 Level 6 |

**Interpretation of results:**

- 1 to 20: Level 1
- 21 to 60: Level 2
- 61 to 100: Level 3
- 101 to 140: Level 4
- 141 to 180: Level 5
- 181 to 200: Level 6

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**Website**

- [http://hsc.unm.edu/emergmed/](http://hsc.unm.edu/emergmed/)
  - CEDOCS
  - NEDOCS
QUESTIONS?

Thank you

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