Strategies to Improve Emergency Department Patient Flow – Our Experience

NewYork-Presbyterian Hospital

Columbia University Medical Center

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NYS DOH Patient Safety Conference

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Year 2000

• ED LOS 14 hours
  (Admitted Patients)

• Left without being seen 8%

• Diversion hours 1081 annually
  21 hours/week
NewYork-Presbyterian Hospital
Columbia University Medical Center
Monthly Patient Visits Jan 1997 - April 2004
Indicators of ED Throughput Efficiency

- ED Length of Stay (Overall)
  - Admitted
  - Discharged

- Diversion
- Walkouts
Intrinsic versus Extrinsic causes of Throughput Problems

• Intrinsic
  – Staffing levels
  – Productivity

• Extrinsic
  – Inpatient bed availability
  – Lab/Radiology Turnaround Time
  – Transport
  – Nursing Report to Inpatient Unit
  – Inpatient Physician Assignment
Key Points

• Hospital Administration: Understanding and willingness to tackle extrinsic causes of ED throughput issues

• Highest level involvement at regularly scheduled multidisciplinary meetings focused on the function of the ED

• (Extrinsic) Change does not occur or reverts quickly back to baseline without this high level involvement
Key Points (2)

• The case for change and new initiatives was made with DATA
  – If we can’t measure it, we can’t improve it.
• Development of novel ideas specific to your ED
• Change serial processes into parallel processes
• Optimize current staffing allocation based on arrival patterns and queueing theory
• Series of incremental small changes resulted in significant improvement in throughput
Multidisciplinary Team

• Led by Chief Operating Officer and VP for Operations

• Committee composition:
  – Dept of Emergency Medicine and Dept of Medicine Senior Leadership
  – Nursing Administration (ED and Hospital)
  – Admitting/Census Director and Associate Director
  – Housekeeping Director
  – Finance
Initiatives
2001-2007

• Intrinsic
  – Queueing Model and reallocation of physician staffing hours
  – Productivity feedback to physicians
  – Additional nursing and physician resources added
  – Movement of Patient To Inpatient Location after bed assigned $S \rightarrow P$

• Extrinsic
  – Inpatient Hallway Bed Policy $S \rightarrow P$
  – No-delay Faxed Nursing Report
  – Pre-Diversion Policy
  – Department of Medicine Admission Assignment Policy (MAR) $S \rightarrow P$
  – Early Bed Request $S \rightarrow P$
  – Transportation Request Policy (Pending) $S \rightarrow P$
  – Bed Tracking System for Inpatient Bed Identification and Housekeeping
  – Transport of Patients To ICU
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Scatter Plot of Length of Stay and Walkouts

\[ y = 1.6341x - 3.6348 \]
\[ R^2 = 0.4574 \]
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Diversion Hours

Hours: 0, 200, 400, 600, 800, 1000, 1200

Pre – Diversion Policy
Prior Admitting System - MAR

Inpatient Admitting Teams
New System of Admitting

Inpatient Admitting Teams
Admitting Program

- Developed by ED personnel for use in new admitting system for the Department of Medicine
- Resulted in 1 hour decrease in overall Length of Stay
- See Computerized Admit Board
Queueing models

- Efficiency is often a key dimension of good service. In the ED it is an important factor in patient satisfaction and ED throughput.

- Delays result from short-term, unpredictable fluctuations in demand and capacity.

- Queueing phenomenon is complex and impossible to predict without appropriate tools.

- Good performance is particularly difficult when:
  - Relative amplitude (ratio of peak to average demand) is high.
  - Staffing periods are long (e.g., more than 1 hour).
  - Service times are long (e.g., more than 1/2 hour).
Monday

ED Arrival Pattern at Allen Pavilion Hospital

![Graph showing ED arrival pattern for Monday]
An Example of the Lag Phenomenon

\[ \lambda = 0.2, \mu = 0.2, RA = 1, s = 7 \]
Staffing Levels and Estimated Pr (Delay > 1 hr)

Avg. service time = 45 minutes
## Allen Pavilion ED

Results of Physician Staffing Rearrangement Utilizing Queuing Theory Model

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Patients treated</td>
<td>4807</td>
<td>5354</td>
</tr>
<tr>
<td>Patients who LWBS</td>
<td>431 (8.2%)</td>
<td>412 (7.1%)</td>
</tr>
<tr>
<td></td>
<td>13% Reduction</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5238</td>
<td>5766</td>
</tr>
</tbody>
</table>
Inpatient Hallway Bed Policy

• Prior policy – patients wait for a clean assigned bed
• Serial processing versus parallel processing
• Patients can wait in the hallway next to room if not yet ready upon arrival
• Communication with the patient – Manage Expectations