Case Study
Inpatient Throughput Improvement

The Challenge - A large 27 unit, 918 bed Community Hospital was challenged with admission holds in the Emergency Department and discharge delays in the Inpatient units. With an over 30% admission rate and a high acuity ED, the Emergency Department was at capacity and unable to handle day to day volume. Furthermore, two Critical Care Units and a high-volume Medical-Surgical floor were also at capacity, contributing to the delays in the ED. Discussions with hospital staff and on-site observations revealed concerns with the hospitalist practice workflow for admissions and discharges, along with concerns with the overall hospital responsiveness to the admission holds in the department. The discussions uncovered operational issues within the following processes:

- Multiple steps in the front-end triage process with inconsistent practices
- High number of patients in the waiting room during peak arrival times
- No single process to track patients in the front end

The Solution - Using Discrete Event Simulation and data analysis, US Acute Care Solutions worked with the highest volume Med-Surg, Medical and Cardiac ICU floors to help determine the causes of the delays in the patient processes. During the initial assessment, patient processing times were inefficient and contributing to delays in the Emergency Department.

There were several factors contributing to the long throughput times of the patients. Some of the key findings are outlined here:

- Report process was not streamlined to allow rapid patient movement to beds
- Supply of open beds did not meet peak demand period
- Off line beds (beds unavailable due to isolation, gender or maintenance) averaged around 10 on the Med-Surg Unit, pressuring an already high capacity demand
- Lengthy admission and discharge cycles
- Diagnostic Services issues delayed ability to discharge patients
- Slow and unpredictable discharges
- Delays in notification of housekeeping to clean beds
- Discharges were being extended to the end of the shift in order to avoid additional admissions

Med-Surg, CICU and MICU Bed Demand Timing

![Bed Demand Timing Graph]

- **Total arrivals**
- **Total leaving**
- **Total requests**
The Results - Through the use of Discrete Event Simulation; scenarios were run to demonstrate the changes needed to improve both Inpatient and ED throughput. The combination of these strategies helped to alleviate the stress the floors and ED were facing and also improved bed demand timing throughout the hospital. (see Table 2: Simulation Outcomes and Figure 3: Bed Demand Graph– Improved State)

Strategies modeled included:

- Moving the peak discharge order hours earlier in the day– allowing for patients to be discharged earlier
- Streamlining the report process between the ED and Inpatient units and also between floors
- Creating processes to improve the coordination of discharges early in the admission stay
- Push to Bed strategy to allow for improved floor visibility of ED capacity challenges

<table>
<thead>
<tr>
<th>Patient Processing</th>
<th>Med-Surg</th>
<th>Cardiac ICU</th>
<th>Medical ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed Requested to Bed Available</td>
<td>1:45 (± 1 hour 30 min)</td>
<td>3:11 (± 1 hour 38 min)</td>
<td>5:07 (± 1 hour 25 min)</td>
</tr>
<tr>
<td>Bed Available to Patient in Bed</td>
<td>3:30 (± 1 hour 6 min)</td>
<td>5:30 (± 1 hour 19 min)</td>
<td>5:30 (± 1 hour 6 min)</td>
</tr>
<tr>
<td>Bed Requested to Patient in Bed</td>
<td>2:15 (± 2 hour 37 min)</td>
<td>3:41 (± 3 hours)</td>
<td>5:37 (± 2 hour 31 min)</td>
</tr>
<tr>
<td>Total Discharge Time (Order Until Patient Leave)</td>
<td>2:42 (± 26 min)</td>
<td>4:46 (± 2 hour 13 min)</td>
<td>4:09 (± 2 hour 26 min)</td>
</tr>
<tr>
<td>Total In-House Transfer Time (Order Until Patient Leave)</td>
<td>N/A</td>
<td>3:45 (± 3 hour 10 min)</td>
<td>3:48 (± 3 hour 9 min)</td>
</tr>
<tr>
<td>Bed Requested to Patient Leave</td>
<td>3.55 days (± 24 days)</td>
<td>4.48 days (± 15 days)</td>
<td>4.91 days (± 16 days)</td>
</tr>
<tr>
<td>Bed Requested to Bed Available For Another Patient (Bed Turn)</td>
<td>3.60 days (± 24 days)</td>
<td>4.52 days (± 15 days)</td>
<td>4.96 days (± 16 days)</td>
</tr>
<tr>
<td>Average Bed Utilization</td>
<td>83.4% (± 6.3%)</td>
<td>83.5% (± 5.6%)</td>
<td>88.6% (± 2.8%)</td>
</tr>
<tr>
<td>Bed Turn Per Week</td>
<td>1.95 (± .45 turns per week)</td>
<td>1.55 (± .05 turns per week)</td>
<td>1.41 (± .04 turns per week)</td>
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</tbody>
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Med-Surg, CICU and MICU Bed Demand Timing