Strategies to Achieve System-Wide Hospital Flow

Pat Rutherford, Vice President, IHI

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Orlando, Florida

Hospital Flow: Impact on Healthcare Costs

MGH continues to grapple with patient overcrowding
Five years after expansion, problem returns

Massachusetts General Hospital is struggling with an overcrowded emergency department less than five years after it sought to fix the problem with a $500 million expansion.

Boston Globe article (March 2016)
Hospital Flow: Impact on Healthcare Costs

Before the public, payers, policymakers and donors get on the hook — again — for more staff and more extraordinarily expensive capital expenditures, let’s ask these questions first.

- What’s the mix and volume of patients presenting at the emergency department?
- What portion of discharges occur on time, and of the rest, how long are they delayed?
- From when a patient first presents in the ED, what’s the lag until that patient is examined and treatment begins, the time from “door to doc?”

Effects of High Utilization and Variability in Demand

- When the Emergency Department is overcrowded –
  - Patients may be diverted to other hospitals (external diversion)
  - Patients leave without being seen
  - Patients with acute illnesses experience delays in treatment and potential safety risks
  - Physicians, nurses and staff are overloaded (which often leads to medical errors and burnout of clinicians and staff)
  - Throughput is decreased
Patient Story: Impact of ED Overcrowding and Delays on Patient Safety

Last March, I went to the ED at a nearby hospital because I was experiencing severe headache, extreme vertigo, some numbness on my left side, and was rather confused. I got there around 7PM, and I was seen for the first time around midnight. Since I suffer from migraines, they assumed that’s what was going on (regardless of me telling them that it was very different than my usual episodes). I was sitting there for so long because the place was filled with people and there were only 2 nurses in the ED. It was close to 4:30AM when I finally saw a physician, who said there’s really not much they can do for me. He said it would be best to go home and wait in my own bed, since the hospital was way too crowded for me to stay. So I went home.

I woke up around 9AM and felt like things were getting worse. I spoke to my friend who is a PA at another ED in Boston, and she told me to go back immediately and request imaging. I did. However, it was a fight to get neurological tests done. Pushing and pushing they finally agreed. I had suffered a vertebral artery dissection and a massive blood clot had formed near the tear. From that, I experienced a Transient Ischemic Attack that could have resulted in a stroke. When they saw that, they apologized for sending me home because of the back up the night earlier. I wound up in the Neuro Unit for more than a week, and it took over six months to recover.

Effects of High Utilization and Variability in Demand (2)

- When hospital census is high –
  - Patients are “boarded” in the ED, waiting to be admitted to a hospital bed
  - Patients have overnight stays in the Post-op Recovery Rooms
  - Patients are admitted to alternative units or ICUs (internal diversions or “off-service patients”)
  - Patients may experience delays in treatment or delays or cancelations of surgery
  - Physicians, nurses and staff are overloaded (which often leads to medical errors and burnout of clinicians and staff)
  - Throughput is decreased (there are delays in transferring patients to appropriate units based on their clinical conditions and in discharging patients)
On Wasting My Time – The Numbers
Posted by Jess Jacobs

If you've wondered why I've been under the radar lately, look no further than my odyssey of medical maladies; in addition to my ongoing struggle with POTS, this year I've had: a kidney infection, shingles, pneumonia, a pulmonary embolism, and four blood transfusions. Since I'm a numbers person, I downloaded my claims data from my insurer to get a better idea of how much time I've wasted in the healthcare system since January 2014.

Useful Visits
This last year I had 56 outpatient doctor visits, 20 emergency room visits, and spent 54 days inpatient. But how many of these visits were useful? As you can see in the table below, not many. http://jessjacobs.me/on-wasting-my-time-the-numbers/

On average I wait 20 hours to get a bed in the hospital. My last two admissions were doozies – last time I spent 48 hours in an on-call room, the time before that I spent 27 hours in a hallway (with a pulmonary embolism). I didn't sleep the entire time I was in these makeshift environments which is obviously detrimental to the healing process.

I understand that my case is complicated and it takes a significant amount of time to coordinate. However, there's no reason I need to physically be in the physician's office or at the hospital while they make phone calls on my behalf. I'm a social person and every second I spend in the hospital or ill is another second I'm missing out on friends and family, that I'm missing out on life.

So yes, I owe the medical system my life for giving me blood when my hemoglobin drops deathly low. But there's no reason a 4 hour transfusion required 84 hours of negotiation and frustration. There's no reason that only 4.75% of outpatient visits and .08% of my hospitalizations are spent actively treating my condition. There's no reason that I spent two solid months (1540 hours, 64.2 days) of this year waiting instead of healing.

So, please, stop wasting my time. Stop wasting my life.
ED Boarding and Mortality

- Emergency department (ED) boarding has been associated with several negative patient-oriented outcomes, from worse satisfaction to higher inpatient mortality rates.
- This was a retrospective cohort study set at a suburban academic ED with an annual ED census of 90,000 visits.
- Boarding was defined as ED LOS 2 hours or more after decision for admission. Descriptive statistics were used to evaluate the association between length of ED boarding and hospital LOS, subsequent transfer to an intensive care unit (ICU), and mortality controlling for comorbidities.
- Hospital mortality and hospital LOS are associated with length of ED boarding.


The Association Between Length of Emergency Department Boarding and Mortality

A bar graph showing the association between boarding time and hospital mortality rate. The mortality rate increases with longer boarding times.
Adoption of Effective Interventions


What are your performance goals for improving patient flow?

What would success look like?

What is your operational definition of a “flow failure”?
What are your performance goals?

- Decrease overutilization of hospital services?
  - Relocate care to more appropriate care settings outside the hospital
  - Decreasing medical errors and harm to patients
  - Manage LOS “outliers”
- Optimize patient placement to insure the right care, in the right place, at the right time?
  - Reducing delays in diagnostic testing, treatments, surgery, transfers, discharges, etc.
  - Decrease external diversions
  - Decrease internal diversions ("off-service" patients)
- Maintain adequate staffing levels to maintain quality and safety?
- Increase clinician and staff satisfaction with hospital operations?
- Demonstrate a ROI for the hospital or the health system?
  - Is your goal to have a high utilization of your hospital resources (procedures, beds and staff)? What is the right goal?
  - When do you consider adding more bed capacity?

Hospital Occupancy Rates in MA (2012)

A hospital’s average occupancy rate measures the percent of the hospital’s inpatient staffed beds that have been occupied over the course of a year. Statewide, the median acute hospital occupancy rate is equal to the national average—both at 65%. However, both the academic medical center and teaching hospital cohorts have higher occupancy rates than other cohorts, as shown in Table 4:

<table>
<thead>
<tr>
<th>Cohort</th>
<th>FY2012 Occupancy Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Medical Centers</td>
<td>84%</td>
</tr>
<tr>
<td>Teaching</td>
<td>74%</td>
</tr>
<tr>
<td>Community</td>
<td>62%</td>
</tr>
<tr>
<td>Community-DSH</td>
<td>61%</td>
</tr>
<tr>
<td>Specialty*</td>
<td>64%</td>
</tr>
</tbody>
</table>

*A national average occupancy of 78% applies to hospitals with 1,000 beds in the USA*
“If I had to reduce my message for management to just a few words, I’d say it all had to do with reducing variation.”

W. Edwards Deming
Managing and Reducing Variability

**Natural Variability** (Clinical Variability, Flow Variability, Professional Variability)
- Random
- Can not be eliminated (or even reduced)
- Must be optimally managed

**Artificial Variability**
- Non-random
- Non-predictable (driven by unknown individual priorities)
- Should not be managed, must be identified and eliminated

Eugene Litvak, PhD  Institute for Healthcare Optimization

Lessons from Queuing Theory

![Graph showing the relationship between MICU utilization and rejection rate with a polynomial trend line and equation](image_url)

- \( y = 0.0003x^2 + 0.22x \)
- \( R^2 = 0.5294 \)
Queuing Theory

- When (patient) inflow and service times are random, their response to increasing utilization is non-linear.
- With fixed capacity and unscheduled demand, high utilization results in long waits and delays.
- As utilization rises above 80-85%, waits and rejections increase exponentially.
- At times when utilization is high, small increases in capacity or small reductions in demand will result in large reductions in waits and delays.

Hospital Occupancy Rates

- Based on AHA data, overall nationwide hospital inpatient occupancy was 67.8% (AHA 1991–2011); range was from 33.6% to 74%
- Once managed efficiently, US hospitals, on average, could achieve an 80–90 percent bed occupancy rate—without adding beds at capital costs of approximately $1 million per bed.
- As a result of “smoothing” the scheduling of elective surgeries, improving discharge efficiencies and other interventions to improve flow at CCHMC, the hospital’s quality of care improved even as the occupancy rate grew from 76 percent to 91 percent. Hospital officials also report improved overall safety for patients and reduction in stress on the doctors and nurses who treat them.
Complexity and Simplicity

We need to recognize the complexity of patient flow in the hospital in order to improve it on a sustainable basis:

• Need to avoid oversimplification and
• Need to avoid over complication
Strategies to Achieve System-Wide Hospital Flow

Outcomes

- Decrease overutilization of hospital services
- Optimize patient placement to ensure the right care, in the right place, at the right time
- Increase clinician and staff satisfaction
- Demonstrate a ROI for the systems moving to bundled payment arrangements

Strategies

- Delivering the Right Care, at the Right Time and in the Right Place is a Strategic Priority
- Mutuality between Physicians and Hospital Executives with Aligned Incentives
- Integrated Health Care Systems and/or ACOs (shifting from volume to value-based strategies and payment reforms)
- Patient Flow Improvements Result in an Avoidance of Capital Expenditures
- Flow Improvements Result in a Positive ROI and Ensure Financial Viability
- Shaping the Demand
- Match Capacity and Demand
- Redesign the System
- Accountable Executive Leadership Providing Oversight of System-Level Performance
- Utilization of Hospital-wide Metrics to Guide Learning Within and Across Projects for Achieving Results
- Data Analytics to Provide Real-time Capacity and Demand Management and Forecasting
- Cooperation Across Organizational Boundaries and Clinical Settings Across the Continuum of Care
- Micro-system Quality Improvement Capability and Empowerment of Clinicians and Staff

Primary Drivers

Will

Idea

Execution
Building Will

- Delivering the Right Care, at the Right Time and in the Right Place is a Strategic Priority
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Hospital Flow: Primary Drivers for System Optimization

**Shape the Demand** (reduce bed days; reduce ED visits; smooth elective surgeries and downstream bed utilization)

**Match Capacity to Demand** (reduce delays in moving patients to appropriate units throughout hospital; ensure patients are admitted to the appropriate unit)

**Redesign the System** (increase throughput; reduce bed days, manage LOS outliers, and reduce delays and waiting times)

Driver Diagram: Ideas to Improve Hospital Flow

**Outcomes**
- Decrease overutilization of hospital services
- Optimize patient placement to ensure the right care, in the right place, at the right time
- Increase patient and staff satisfaction
- Demonstrate ROI for the systems moving to bundled payment arrangements

**Primary Drivers**
- Shape and Reduce Demand
- Match Capacity and Demand
- Redesign the System

**Secondary Drivers**
- Reduce ED visits & hospital admissions
- Enhance ED efficiency, reduce delays, and streamline processes
- Improve OR throughput through efficiency changes
- Reduce unnecessary variations in care and manage LOS outliers

**Specific Change Ideas**
- Early recognition for high census and complex medical and social needs
- Increase OR throughput through efficiency changes
- Decrease ED visits and hospital admissions
- Reduce unnecessary variations in care and manage LOS outliers
Draft Hospital Flow Metrics

**Hospital Macro**
- Average Occupancy Rate
- Readmissions within 1 week of discharge
- Readmissions within 30 days after discharge
- Patient experience (HCAHPS measures related to waits & delays)
- Clinician and staff satisfaction related to workload (ex. NDNQI)
- Number of “off-service” patients
- Number of HACs (ex. falls with injury, VAPs, etc.)

**Med/Surg Units**
- Average Census
- Average Length of Stay
- Number of “LOS outliers” per month
- Number of decedents spending 7 or more days in the ICU in the last 6 months of life
- Number of ICU diversions due to lack of capacity (# of “off-service patients”)
- Nursing Overtime
- Number of HACs
- Delays in Transferring Patients to Med/Surg Units

**Emergency Department**
- ED diversions
  - # of diversions
  - hours per month
- Patients who “left without being seen”
- Visits per day
- Average length of stay
  - for patients who are discharged
  - for patients who are admitted
- Door to provider time
- Time from decision to admit to transfer to inpatient unit
- Number of “ED boarders” waiting to be admitted to a hospital bed
- Time from decision to have emergency surgery to OR
- Percentage of ESI level 4 & 5 patients (low acuity)
- Percentage of patients who were admitted

**Critical Care Units**
- Average Census
- Average Length of Stay
- Number of “LOS outliers” per month
- Number of deaths per month
- Number of decedents spending 7 or more days in the ICU in the last 6 months of life
- Number of ICU diversions due to lack of capacity (# of “off-service patients”)
- Nursing Overtime
- Number of HACs
- Delays in Transferring Patients to Med/Surg Units

**Operating Rooms**
- Number of emergency cases by day
- Number of scheduled cases by day
- Percentage of OR utilization
- Number of changes from schedule for Elective Surgical Cases
- Actual and Scheduled Start Times for Elective Surgical Cases
- Nursing Overtime
  - OR
  - PACU
- Number of overnight PACU patients
### FY 2009 Hospital System-Level Measures

<table>
<thead>
<tr>
<th>Goal</th>
<th>FY 09 Goal</th>
<th>Long Term Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overall Satisfaction Rating: Percent Who Would Recommend (includes inpatient, outpatient, ED, and Home Health)</td>
<td>60%</td>
<td>80%</td>
</tr>
<tr>
<td>2. Wait for 3rd Next Available Appointment: Percent of Areas with appointment available in less than or equal to 7 business days (n=43)</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>3. Safety Events per 10,000 Adjusted Patient Days</td>
<td>0.28</td>
<td>0.30</td>
</tr>
<tr>
<td>4. Percent Mortality</td>
<td>3.50</td>
<td>3.00</td>
</tr>
<tr>
<td>5. Total Infections per 1000 Patient Days</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

### Legend for Status of Goals (Based on Annual Goal)

- **Goal Met (GREEN)**
- **Goal Not Met (RED)**
- **Goal 75% Met (YELLOW)**

### Another View of Hospital System Level Measures

Source: The Health Care Data Guide. Provost and Murray 2011
Shape or Reduce Demand

- S1 Relocate care in ICUs in accordance with patients EOL wishes
- S2 Decrease demand for Med/Surg beds by preventing avoidable readmissions
- S3 Relocate low-acuity care in EDs to community-based care settings
- S4 Prevent ED visits and acute care hospital admissions
- S5 Decrease artificial variation in surgical scheduling
- S6 Decrease demand for hospital beds by reducing hospital acquired conditions
- S7 Reduce ED visits & hospital admissions through delivering appropriate care

Right Care, Right Place, Right Time

Successfully relocate:

- ICU patients/bed days to Med/Surg Units, Palliative Care or Hospice by partnering with patients and family caregivers to proactively make decisions about advanced illness planning;
- Med/Surg patients/bed days to community-based care settings by reducing avoidable readmissions;
- ED patient visits by enrolling patients in Mental Health Services and/or Primary Care, by utilizing EMT services and Urgent/Retail Clinics and by developing RRTs for SNF and LTAC residents
The Conversation Continuum

End of Life Wishes

- Healthy
- Living with Chronic Illness
- Approaching End of Life

- Expressed
- Respected

- Spoken
- Documented
- Accessed
- Implemented

Changing the Cultural Norm

A national campaign encouraging everyone to have a conversation about their wishes for end-of-life care

Collaboration to ensure health care systems are ready to receive and honor wishes for end of life care
Advanced Illness Planning: Respecting Choices


Strategies to Reduce Readmissions

- Rehospitalizations are frequent, costly, and actionable for improvement
- Focus on addressing the medical and social needs patients and family caregivers, not penalties.
- IHI approach acts on multiple levels – engaging hospitals and community providers, communities, and state leaders in pursuit of a common aim to reduce avoidable rehospitalizations
- Working to reduce rehospitalizations focuses on improved communication and coordination over time and across settings
  - With patients and family caregivers;
  - Between clinical providers;
  - Between the medical and social services (e.g. aging services, etc.)
- Working to reduce rehospitalizations is one part of a comprehensive strategy to promote patient-centered care and appropriate utilization of health care resources
30 Day Readmissions:
Primary & Secondary Heart Failure 65+

30 Day Readmissions
Primary & Secondary Heart Failure
UCSF Medical Center Heart Failure Program

Goal Line:
Annual Averages
2009 = 24%
2010 = 19%
2011 = 13%
2012 = 12%

Reducing Non-Urgent Emergency ED Services

- Use of Telemedicine in Emergency Departments
- Urgent Care Centers (many now part of health care systems)
- Retail Clinics
- Paramedics and Emergency Medical Services managing non-emergency calls*
- Community Health Workers connecting frequent ED users with community-based services*
- Coordinated, Intensive Medical, Social, and Behavioral Health Services*

Atrius Health ACO

Utilization of emergency rooms, hospitals and drugs tends to be lower than average:

- With Medicaid, demonstrated 39% fewer admits/1000 on hospital (medical) admissions and 37% fewer Emergency Room visits/1000 as compared with the health plan’s network.
- With Medicare Advantage, demonstrated 12% fewer Emergency Room visits/1000 and 5% fewer SNF admits/1000 as compared with the plan’s network.
- For a commercial PPO product, 30-day readmission rate that is half of the plan’s network rate, and 25% fewer Emergency Room visits/1000.
- For a commercial HMO, demonstrated 8% fewer inpatient admits/1000 and 9.5% less Rx scripts/1000.

Separate Flows for Elective and Non-Elective Surgical Cases

Mayo Clinic Florida

- Surgical volume and surgical minutes increased by 4% and 5%, respectively;
- Prime time use increased by 5%;
- Overtime staffing decreased by 27%;
- Day-to-day variability decreased by 20%;
- The number of elective schedule same day changes decreased by 70%;
- Staff turnover rate decreased by 41%. Net operating income and margin improved by 38% and 28%, respectively.

Smooth the Flow of Electively Scheduled Surgical Cases

By applying variability methodology, queuing theory and the I/T/O model, hospitals can identify and eliminate many of the patient flow impediments caused by operational inefficiencies.

By smoothing the inherent peaks-and-valleys of patient flow, and eliminating the artificial variability, that unnecessarily impair patient flow, hospitals can improve patient safety and quality while simultaneously reducing hospital waste and cost.

2006 IOM Report: The Future of Emergency Care in the U.S. Health System (Hospital-Based Emergency Care: At the Breaking Point)
C. diff Infection Rates in Hospitals

Many hospitals acknowledge that *C. diff* infections are a widespread problem, especially as the CDC estimates that 94 percent of cases occur in hospitals. *C. diff* infections increase patient length of stay by more than 55 percent and may increase the cost of their care by 40 percent or more. More worrying, 500,000 patients are infected annually and 29,000 patients die each year from the drug-resistant superbug, so researchers are focused on finding potential treatments.

Two solutions for hospitals to cut down on the infection risk: make sure staff follow hand-hygiene protocols and establish antibiotic stewardship programs.

Match Capacity Demand

- S8 Oversight system for hospital-wide operations to optimize patient flow
- S9 Real-time demand and capacity management processes
- S10 Flex capacity to meet hourly, daily and seasonal variations in demand
- S11 Early recognition for high census and surge planning
RN Capacity for Predicted ED Demand

Aggregate Demand/RN Capacity

Projected Total RN Demand
Total RN Staffing

Demand/Capacity Management

What nurse staffing is needed to consistently provide safe and quality care?

Staffing for >95% census/occupancy
Staffing for > average census/occupancy

Eugene Litvak, PhD, Institute for Healthcare Optimization
Nurse Staffing, Hospital Operations, Care Quality, and Common Sense

1. Staff hospitals 24/7 according to the peaks in both bed occupancy and admissions.
2. Be "creative" by introducing dynamic PNRs that will fluctuate in a synchronous manner with census and admissions.
3. Legislate PNRs
4. Preserve the status quo and do nothing.
5. Change hospital patient flow management.

Litvak E, Laskowski-Jones L; Nurse staffing, hospital operations, care quality, and common sense; Nursing. August 2011.

Managing Unnecessary Variability in Patient Demand to Reduce Nursing Stress and Improve Patient Safety

- The variability in the daily patient census is a combination of the natural (uncontrollable) variability contributed by the emergency department and the artificial (potentially controllable) peaks and valleys of patient flow into the hospital from elective admissions.
- Once artificial variability in demand is significantly reduced, a substantial portion of the peaks and valleys in census disappears; the remaining census variability is largely patient and disease driven.
- When artificial variability has been minimized, a hospital must have sufficient resources for the remaining patient-driven peaks in demand, over which it has no control, if it is to deliver an optimal level of care.

Litvak, Eugene; Buerhaus, Peter I.; Davidoff, Frank; Long, Michael C.; McManus, Michael L.; Berwick, Donald M. Understanding Variability: Journal on Quality and Patient Safety, Volume 31, Number 6, June 2005, pp. 330-338(9)
Flex Capacity to Meet Seasonal, Day of the Week and Hourly Variations in Demand

- Can you predict a surge in admissions for patients with medical conditions in the winter months?
  - Use seasonal flex units to manage increases in medical patients during the winter months
- Can you anticipate which units need more bed capacity? (which services consistently have a large number of “off-service” patients?)
  - Use data analytics to quantify needs of each service
- Do you have a regular surge of activity mid-week with the hospital census regularly reaching >95% occupancy?
  - Smooth elective surgical schedules (particularly for patients who will require ICU care post-op)
  - Develop plans to meet natural (patient-driven) peaks in census

An additional strategy – Increasing Nurses’ Time in Direct Care

<table>
<thead>
<tr>
<th>Before Redesign</th>
<th>After Redesign</th>
</tr>
</thead>
<tbody>
<tr>
<td>40% of a 12 hour shift = 4.8 hours in direct care</td>
<td>60% of a 12 hour shift = 7.2 hours in direct care</td>
</tr>
<tr>
<td>8 patients = .6 hours per patient</td>
<td>8 patients = .9 hours per patient</td>
</tr>
<tr>
<td>6 patients = .8 hours per patient</td>
<td>6 patients = 1.2 hours per patient</td>
</tr>
<tr>
<td>4 patients = 1.2 hours per patient</td>
<td>4 patients = 1.8 hours per patient</td>
</tr>
</tbody>
</table>

Increasing Nurses’ Time in Direct Care

- Eliminate waste (hunting and gathering, re-work, workarounds, etc.)
  -- mandated ratios isn’t the only solution
- Nurses spend more time in direct care (goal = 60%)
  -- show that waste has been eliminated and nurses’ time is reallocated to direct patient care activities that create value for patients and family members
- Nurse spend more time in value-added care
  -- includes important work, such as customization of care to meet needs and preferences of patients
  -- more appropriate measure than direct patient care (but more subjective)

Real-Time Demand and Capacity (RTDC) Management Processes

Using Real-Time Demand Capacity Management to Improve Hospitalwide Patient Flow; Resar, R; Nolan, K; Kaczynski, M, Jenson, K; The Joint Commission Journal on Quality and Patient Safety; May 2010, Vol 37, No 5
Real Time Demand Capacity (RTDC) Management

Start Here

4-5PM before CM leaves:
1. Huddle with Charge RN
2. Review today’s predicted d/c’s – who remains, what needs to be done
3. Start tomorrow’s “R” sheet

Day to Night Shift report
Charge RN to Charge RN
Update “R” Sheet If Needed

7:30p – 7:00a:
1. Evening / Night shift to complete tasks for the following day (i.e.: teaching wound care w/ family, update changes in condition, communicate discharge w/ family)
2. Update “R” sheet (update pending/confirmed discharge list, add approximate time of dc

Night to Day
Shift report
Charge RN to Charge RN
Update “R” sheet If needed

8:30-9:00AM - Hospital Wide Red Meeting
1. Review demand/capacity #’s from each unit
2. Plan for red units with mismatches
3. Review previous day’s plans and successes

7AM 8:30 AM Unit Based Huddle
1. Review pending discharge list; identify needs
2. Assign responsibility for specific discharge tasks
3. Decide on whether the discharge will occur before 2PM

9:15a – Return to Unit
1. Review assignment of specific tasks for discharges before 2PM
2. If Unit plan needed discuss w/ Charge RN & Unit Secretary and team

Results at UPMC

Monthly Accuracy of Discharge Predictions, January 2007 - November 2009

Percentage of Patients Who Left Without Being Seen (LWBS), January 2006 – September 2010

Cardiothoracic (CT) ICU to 3 Main Transfer Time, January 2006 – September 2010

Emergency Department (ED) Median Length of Stay (LOS) for Admitted Patients, July 2005 – July 2010

Surge Plan Concepts

<table>
<thead>
<tr>
<th></th>
<th>Green</th>
<th>Yellow</th>
<th>Orange</th>
<th>Red</th>
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<tbody>
<tr>
<td>Census</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Acuity</td>
<td></td>
<td></td>
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<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Staff</td>
<td></td>
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</tbody>
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**Green**
- Reflects an optimally functioning system, a state of equilibrium, homeostasis. Staff describe it as, a good day.

**Yellow**
- Reflects the state of early triggers which identifies and allows the system to initiate early interventions.

**Orange**
- Reflects escalating demand without readily available capacity. In this state aggressive action required to avoid system overload and ultimate gridlock.

**Red**
- Reflects a state of gridlock as a result of system overload. The system should respond by using its organizational Disaster Plan.

Redesign the System

Redesign the System

- S12 Improve efficiencies and throughput in the OR, ED, ICUs and Med/Surg Units
- S13 Improve efficiencies & coordination of discharge processes
- S14 Service Line Optimization (frail elders, SNF residents, stroke patients, etc.)
- S15 Reducing unnecessary variations in care and managing LOS “outliers”
**KP Sacramento ED Flow**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Before</th>
<th>After</th>
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<tbody>
<tr>
<td>Hours on Divert per year</td>
<td>450</td>
<td>0</td>
</tr>
<tr>
<td>Percent LWOBS</td>
<td>6.6%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Door-to-Doc (minutes)</td>
<td>55</td>
<td>19</td>
</tr>
<tr>
<td>LOS – Treat &amp; Release (hours)</td>
<td>4.5</td>
<td>2.4</td>
</tr>
<tr>
<td>LOS – Treat &amp; Admit (hours)</td>
<td>8.0</td>
<td>6.0</td>
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**Managing Discharge when Medically Ready**

% Discharged within 2 Hours of Medically Ready

- Includes patients on ARS, AN, A4, LA, A9, and A9S

Week Start Date (Patients Discharged)
16-Bed MICU
We need more beds!

- Reduced EC – ICU admit time
- Sepsis Management
- Reliable weaning protocol
- VAP, CR-BSI bundles
- Standardize family meetings

We have plenty of ICU beds!

- VAP/BSI rates Zero - $54,000/$35,000
- EC- ICU 53% to 75% in 4 hrs
  - Hospital LOS decreased by 1.5 days $$
- Floor codes decreased 50%
- End of Life – ICU stay – decreased 3.3 days
- Mortality decreased by 13%, CMI up 15%
- Occupancy decreased from 94.5% to 85.5%
- Monthly admissions: from 89.4 to 104.6
- $5.1 Million saved
Hospital Flow: Key Learning To-Date

- Most hospitals are engaged in individual projects throughout the hospital to improve efficiencies and flow, but few have hospital-wide oversight systems to manage overall operations and patient flow throughout the hospital; there is a need for system-wide metrics to assess and manage patient flow at the macro whole-system level and in microsystems (OR, ED, ICUs, Med/Surg Units)
- Most hospitals are engaged in multiple efforts to improve flow, but few have shown quantitative results; need to develop performance targets to dramatically improve hospital operations and flow
- Few hospitals seem to be linking the “shaping demand” concept of decreasing overutilization of hospital services as a concurrent strategy to improve patient flow through the hospital [decreasing readmissions; proactive palliative care; reducing admissions for patient with complex needs; reducing low acuity ED visits; managing artificial variability in surgical scheduling]

Hospital Flow: Key Learning To-Date (2)

- There is a definitive need to simplify, standardize and sequence various matching capacity and demand strategies (variability management and daily real-time capacity and demand strategies)
- Current problems of patient flow in hospitals cannot be solved solely by efforts within the walls of the hospital (need partnerships with primary care, urgent care centers, specialty practices, mental health services, community-based care services, SNFs and nursing homes);
- Demonstrating a ROI for the systems moving to value-based payment models (or ACOs) should help to build will for improvement; avoiding capital expenditures is another incentive
<table>
<thead>
<tr>
<th>Hospital (Macro)</th>
<th>Shape Demand</th>
<th>Match Capacity and Demand</th>
<th>Redesign the System</th>
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</thead>
<tbody>
<tr>
<td>Reduce readmissions</td>
<td>Hospital-wide oversight system for hospital operations looking at seasonal variation and changes in demand patterns</td>
<td>Single rooms</td>
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<tr>
<td>Reduce admissions for patients with complex needs</td>
<td>Daily and weekly hospital-wide capacity and demand management</td>
<td>Seasonal Swing Units</td>
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<tr>
<td>Proactively shift EOL care to Palliative Care Programs</td>
<td>Surge planning</td>
<td>Service Line Optimization (frail elders, SNF residents, stroke patients, etc.)</td>
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<tr>
<td>Emergency Dept</td>
<td>Move patients with low acuity needs to community care settings</td>
<td>Improve predictions of admissions for critical units</td>
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<tr>
<td>Enroll patients in mental health programs</td>
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<td>ED efficiency changes to decrease LOS (for patients being discharged and for patients being admitted)</td>
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<td>Cooperative agreements with SNFs</td>
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<td>Separate flows in the ED</td>
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<td>Cooperative agreements with EMS</td>
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<tr>
<td>Critical Care Units</td>
<td>Decrease complications/harm (sepsis)</td>
<td>Decrease LOS (timely consults and procedures; aggressive weaning and ambulation protocols)</td>
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<td>Shift EOL care to Palliative Care Programs</td>
<td>Improve real-time capacity and demand predictions</td>
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<tr>
<td>Med/Surg Units</td>
<td>Decrease complications/harm</td>
<td>Decrease LOS (case management for patients with complex medical and social needs)</td>
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<tr>
<td>Decrease readmissions</td>
<td>Improve real-time capacity and demand predictions</td>
<td>“Lean” the discharge processes</td>
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<td>Proactively shift EOL care to Palliative Care Programs</td>
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<td>Stagger discharges throughout the day</td>
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<tr>
<td>Cooperative agreements with rehab facilities, SNFs and nursing homes</td>
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<tr>
<td>Operating Rooms</td>
<td>Decrease variation in surgical scheduling</td>
<td>Improve predictions re: transfers to various units</td>
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<tr>
<td>Separate flows for scheduled and emergency OR cases</td>
<td>OR efficiency changes to improve throughput</td>
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