CE 2.0 CONTACT HOURS

Quantifying efficiency by improving patient flow

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Healthcare organizations continue to struggle with delivering high-quality healthcare services in an environment that continues to raise the bar, seemingly just out of reach of what defines high quality. Although the continuous emphasis on improvement seems warranted in the healthcare industry, healthcare organizations stretch to use current resources effectively to maximize inpatient bed capacity.[1] With an estimated 32 million Americans for which the Affordable Care Act will eventually grant health insurance, organizations must strive for value while simultaneously meeting the increased demands placed upon their capacity. They must begin to understand that "the current financial situation is the new normal."[2,3] Added stress can impact an organization as a result of inefficient processes such as long waits to receive tests or treatments, patients being placed on units not familiar with the patients' disease process, and uncoordinated discharge processes.[1,4]

Limited capacity due to inefficiencies in the system has many implications for the organization and stakeholders. Frequently mentioned in the literature are the negative impacts related to patient satisfaction.[1,4,5] When patients seek care, long wait periods for beds and treatment negatively reflect on the organization's commitment to meeting patients' needs. Delays in admission times aren't only issues in EDs, but also for elective surgery patients who are placed on wait lists because of a lack of available beds.[5] Other fallouts of capacity constraints include increased lengths of stay, poor quality of care, and decreased revenue for the organization.[1,4,6]

Discovering inefficiencies within an organization is a daunting task. Further, the quantification of these inefficiencies, so that specific processes can be improved, is an even greater challenge for healthcare organizations.[7] The ability of an organization to discover these inefficiencies and make improvements is essential to increasing satisfaction and providing value-added care. This requires organizations to examine routine processes and dissect them to identify where improvements can be made in specific measures.[6] A 909-bed Level I

trauma academic medical center decided to take on this challenge and identify inefficiencies and design, and assess process improvements.

Electronic bed briefing

In 2012, the structure and process of the daily bed briefing meeting in this academic medical center transitioned to an electronic format. Bed briefing occurs daily at 0900, and is a collaborative meeting to discuss daily patient throughput expectations, barriers, and resolutions. In attendance are the nursing patient placement facilitator, nurse (house) supervisors, representatives from each clinical service line and environmental services, and organizational administrators. (Service line facilitators are divisional nursing representatives who collaborate with bed control staff to mitigate patient placement barriers from the ED and OR for their respective areas.)

Before the transition, service line representatives would announce their expectations for daily discharges for each unit in their respective coverage area. This information was recorded on a white board by the nurse supervisor. The totals of projected discharges, projected admissions, and operating volumes were used to calculate daily (positive or negative) bed availability. The majority of the meeting, which lasted approximately 45 minutes, was utilized for the announcement of projected discharges, with little time used to identify throughput issues or collaborate to determine solutions. Information transferred by this method wasn't saved for future reference, nor did the organization have the ability to track how projected discharges compared with what actually happened during the day. It was recommended that an electronic format for capturing projected discharges be created to allow for presentation of historical data, automatic projection calculation, and data analysis.

As part of daily operations, a daily bed status report is communicated in an e-mail to organizational leadership. This report is a dashboard of hospital occupancy, regional admissions, and surgery volume for the day. The template was used as a foundation for building the bed briefing electronic report. An additional worksheet tab was added for the placement of discharge predictions per unit. Patient census, OR volumes, and regional admissions were used in combination with the number of projected discharges to calculate daily bed availability.

Since implementation of the electronic format, time spent announcing discharges has been eliminated. Discharge projections are entered into the electronic workbook located on a shared intranet folder by service line facilitators before the 0900 bed briefing meeting from remote computer stations throughout the organization. During the meeting, the report is displayed on a large flat screen monitor and bed projections are automatically calculated. Completing this before the meeting has allowed for those present to spend the majority of the meeting discussing barriers to patient throughput and proactively implementing solutions. Environmental services personnel use the information to adjust staffing to ensure that adequate personnel are present to turnover a room in an optimal amount of time. Physical and occupational therapy departments are also using the report to prioritize assessments of patients who are projected to be discharged. This allows for earlier assessment and clearance of patients by this discipline as patients progress toward discharge. Data entered on the report can now be analyzed for accuracy and identification of barriers to patient throughput.

No national benchmarks could be identified for accuracy of discharge predictions, so the organization is currently gathering baseline data for two separate accuracies: total number of discharge projections and individual patient projections.

Measuring accuracy

The first level of accuracy addresses the total number of discharge projections compared with the actual number of discharges. This accuracy is used by bed placement personnel to gain an understanding of actual numbers from a patient throughput lens. Currently, the organization's predictions fluctuate between 70% and 80% accuracy. Accuracies at this rate prove to be beneficial for organizational planning for daily operations. Confidence in the number of discharges translates into a more realistic picture of the organization. This improves leadership's ability to make informed decisions regarding prioritization of patient placement.

The second level of accuracy is the unit's ability to predict an individual patient's discharge. Initial analysis of the accuracy of these data shows organizational prediction ranges from 35% to 45%. These data are analyzed with an understanding that no industry standard or benchmark exists as common knowledge. The organization is currently working to create a model of communication with the charge nurse, case management, providers, and unit leadership with the intention of improving this projection.

The value of predicting patient discharges is beginning to be quantified.

Analysis of initial data has shown a positive correlation with the organization's ability to accurately predict hospital discharges and wait time in the ED. This finding further supports the importance of discharge planning at admission and implications for patient throughput. Implementation of recording and analyzing discharge predictions permits the organization to gain a deeper understanding of throughput and proactively plan for barriers that may hinder progress.

The discharge delays plunge

Historically, the general assumption in the organization was that inpatient discharge delays were a result of the time of daily rounds by the medical resident team and the time the discharge order was entered. Much speculation and exploration was performed to understand the root cause of these delays. Until recently, there have been barriers to accessing meaningful patient throughput data to enable the achievement of comprehensive analysis, decision making, and change management.

The operations division sought to gain a deeper understanding through a collaborative effort of the available data, the factors that contribute to patient throughput, and the methods used to analyze the data. Factors were identified and assembled into a master data set that included additional demographic data elements related to the discharge of the patient and the reoccupation of the bed. Data, identified in three different databases, had to be collated for analysis. The examination of the discharge process identified nine major factors: discharge order time, discharge unit time, clean room request time, start clean room time, end clean room time, reoccupy room time, bed reassigned time, regional patient initiate transport time, and accepting location admit time.

Analysis focused on understanding the time differences between data elements. Because there were little data regarding target industry standards for durational time differences, thresholds along with two elements related to discharge order and unit discharge hour were applied based on observations and experience. Thresholds were based on organization-specific conditions such as the time physicians wrote discharge orders before discharge criteria being met (for example, physical therapy or occupational therapy clearance); historical physician rounding patterns; the automated process of environmental services receiving requests for cleaning notifications; prioritization of room clean requests; historical trends in the time required for room cleaning; and the elements associated with reoccupying a room after it was cleaned such as patient transport, multiple bed reassignments, and registration efficiency. (See *Nursing Management* iPad app for supplemental content.) Thresholds were color coded according to the level of achievement with green signaling the best case trending down to red, signaling a worst case.

Improving the outcomes

Findings indicated several opportunities for improvement, specifically, the time it took for a patient to reoccupy a clean room, the time between requesting a room cleaning and the time the room starts being cleaned, and the time between discharge order and unit discharge. Further investigation showed that there were multiple instances of failed pages, activated through the bed management software, to environmental services when a request for cleaning was placed. This resulted in an increased amount of time for environmental services personnel to respond to an actual request. As a result of the utilization of an automatic paging system, there was no notification that failed pages were occurring. The factors that contributed to the time between completions of cleaning and reoccupying the bed space led to further analysis and discussions. These included the time to reassign a waiting patient to a bed and the time utilized to transport the patient to the room.

Discharge order times were generally clustered around 1000 and 1300 hours, dispelling the preconceptions regarding a delay in discharge orders being placed. Although there were additional opportunities regarding timeliness of physician discharge orders and unit discharge times, prioritizing the correction of the failed environmental service paging attempts and the time to reoccupy a bed space were the initial focuses of reducing patient discharge delays. Timeliness of discharge order entry and unit discharge will be addressed separately once improvements are made in the identified areas.

As a result of the initial findings, an integrated task force will be created to review policy and procedure of the workflows regarding how a recently unoccupied bed is requested to be cleaned. This task force will consist of information services paging governance, bed management software technical liaisons, environmental services leadership, bed control personnel, and operations administration leadership. This team will closely examine the data set to identify the causes or trends of the failed cleaning requests, and implement policy that will reduce the lost time associated with failed cleaning requests. It will then be

disseminated to all organizations within the healthcare system. Additional data elements will continue to be added to the data set to ensure a more focused effort on analyzing identified barriers between the time a bed is cleaned and the time the bed is reoccupied. After a complete data set illustrating patient throughput is assembled, the team can then quantify the barriers and implement policy that will reduce the lost time associated with the reoccupation of a bed.

Quicker throughput

An ED throughput (capacity management) initiative began several years ago when the focus was setting targets of bedding a patient in an inpatient bed within 3 hours from admit order in the ED. This goal is well within recommendations from The Joint Commission to keep boarding time frames less than 4 hours.[8] The 3-hour target was eventually changed to 2 hours when additional beds were added and a cardiovascular tower was built. Although 3-hour levels were recorded, the goal was for all admissions from the ED to occur within 2 hours. Currently, the average number of patients admitted from the ED within 2 hours is about 63%, whereas 85% are admitted within 3 hours. Additionally, a daily bed status report is provided to hospital leadership each morning by 0700 outlining unit occupancy and bed availability. The report collects incoming patient volume for the OR, as well as providing predictions for potential ED admissions based on historical data.

Analysis of our current processes showed that there was access to vast amounts of data that provided capacity information throughout the hospital. However, there was little information to support predictions of capacity throughout the day. As a result, production began on an ED report to illustrate our performance with ED throughput, known as the ED23 report. (See *Figure 1*.) There was an awareness of the struggles to admit patients within 2 hours before reporting these data. Investigation was driven by the desire to determine what variables have the greatest impact on the amount of time required for effective patient throughput in the ED.

Initial analysis focused on organizational total occupancy and its relation to ED wait times. As a 909-bed academic medical center, the daily occupancy rates fluctuated between 88% and 95%. Admissions are stratified from each portal of

Figure 1: ED23 report

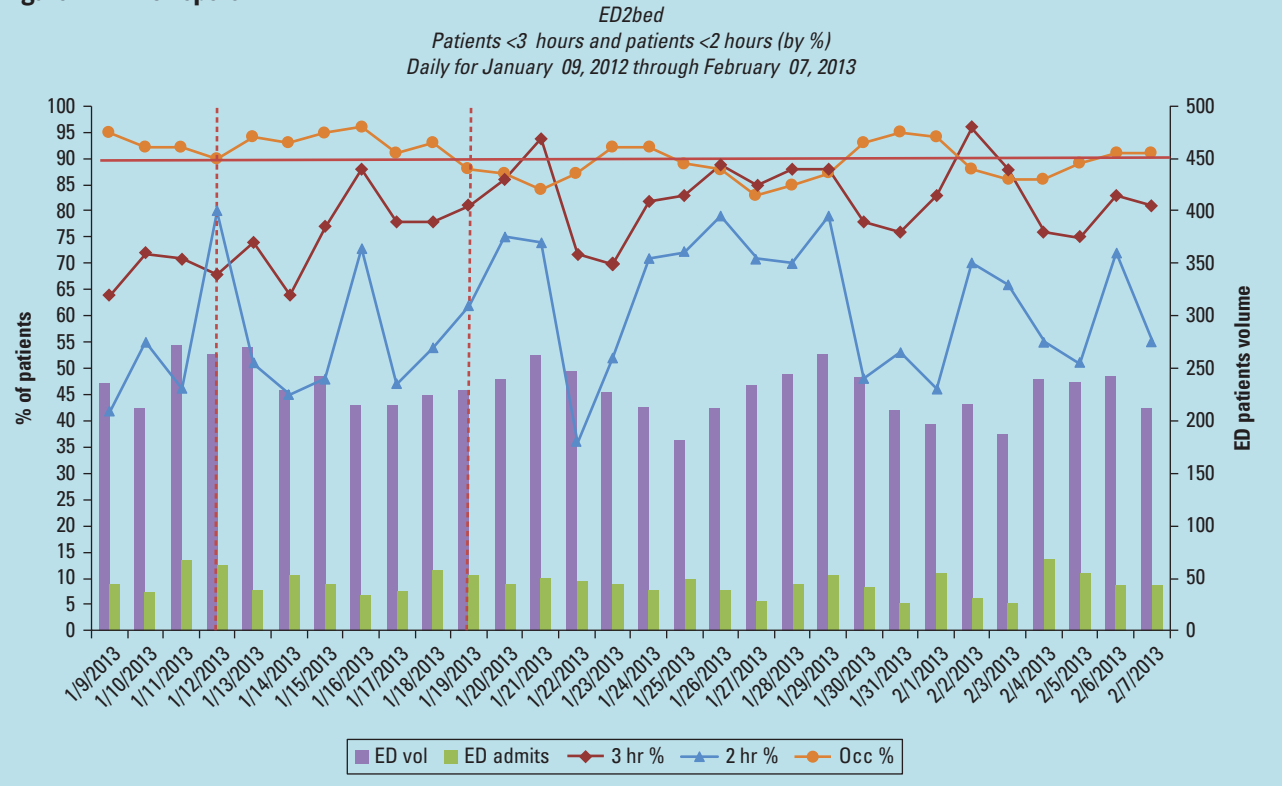
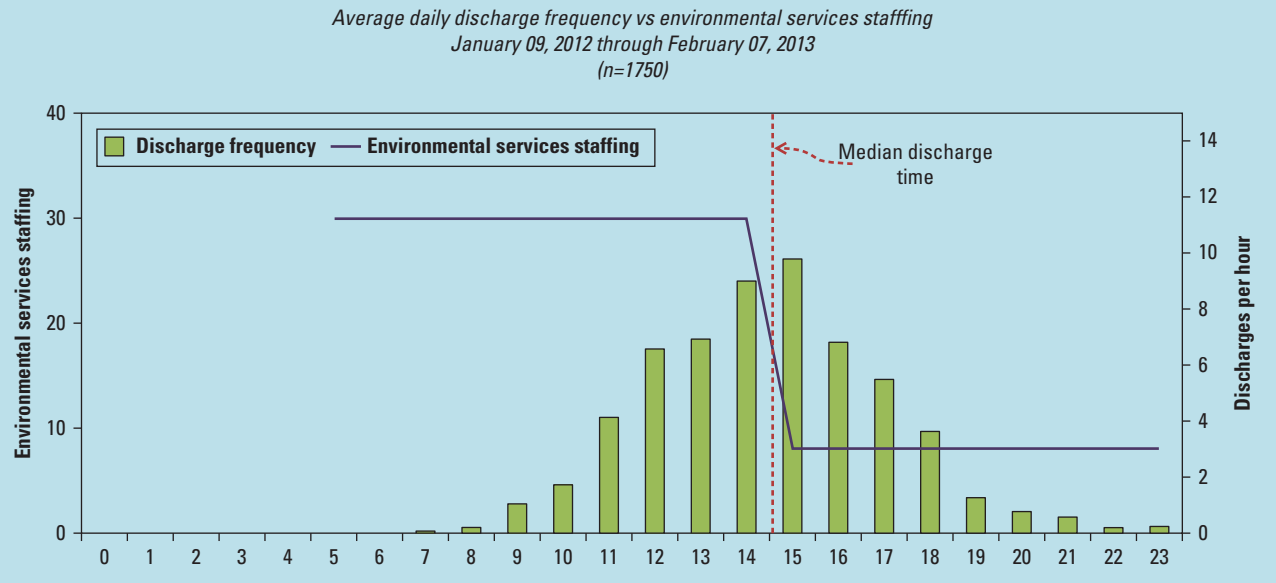


Figure 2: Average daily discharge frequency



entry with 50% coming from the ED, 17% from OR same day admissions, 23% from regional hospitals, and 10% direct admits. The occupancy rates conflicted with our current line of thought; even though there was excess capacity in the hospital, our ED wait times continued to fall outside of benchmarks. Analysis indicated available capacity in units that were in lower demand by ED patients. Units with consistent available capacity were the rehabilitation and women's and children's divisions. Discovering that our ED bed requests (70%) were primarily for the medical-surgical patient population, we modified our reporting to include only units where those patients would be placed. Medical-surgical occupancy was found to be consistently above 90%, often at 100%, altering preconceived perceptions of occupancy rate.

Modifying behaviors

ED volume and admissions data were compared with occupancy and ED23 scores with the expectation that they'd have a major impact on patient flow. After being graphed, data illustrated that ED volume had little impact on ED inpatient admissions, which remains fairly constant at approximately 55 requests per day. Analysis also showed that occupancy decreases on the weekend, with the highest capacity on Sundays. This seems to correspond with the highest ED23 placement scores for the week, leading us to presume that medical-surgical occupancy has an impact on patient placement efficiency.

Confirming that medical-surgical occupancy affects ED placement led to analysis of daily discharge patterns. Discharges were tracked daily, and then plotted graphically. The results show a normal distribution with a midpoint at 1500 hours. Occupancy over 90%, coupled with discharges beginning at 1000 hours and ending at 2000 hours, causes many of our ED patients to be placed in off-service beds. When all the beds are filled, patients are boarded in the ED until beds become available. Off servicing, or placing medicine patients in surgery beds, caused delays in OR throughput and required ready beds early in the day and throughout the day to keep up with the continuous flow of patients from the ED and OR.

Discharge frequency was correlated with environmental services staffing patterns. The results showed far more bed cleaning personnel than necessary before our 1500 hours peak in discharges, then a severe drop in the afternoon when rapid turnover for consistent placement is needed. (See *Figure 2*.) These findings led to a collaborative partnership with environmental services leadership to examine the possibility of modifying their staffing to more closely align with discharge patterns.

The issues that contribute to patient flow and capacity management are much more complex than are represented here. This inquiry begins to provide empirical evidence to validate anecdotal perceptions of what was intuitively known and provides a stepping stone for further investigation. By continuing to examine data and refine this research methodology, we'll add rigor to our

process and analyses to improve throughput through the organization in a logical and intentional manner.

Make a positive impact

Examining key factors that affect patient flow at a large academic medical center, such as discharge delays and ED throughput, aren't unique inquiries. However, making connections among multifactorial processes and aligning data sets for a common view may be, as the literature appears scarce on this specific topic. This process has revealed opportunities that have heightened awareness and strengthened relationships between operational leaders and departments, while promoting ownership and accountability among all stakeholders. As this academic medical center continues to refine throughput and capacity processes and examine data, not only will wait times be reduced, but satisfaction and patient outcomes will likely improve.

Intuitively, improving throughput and discharge delays will have a positive impact on the patient experience and quality of care. It will also enhance access to the right level of care at the right time for patients. However, future research is needed to quantify and illustrate these relationships. Additionally, if efficiencies are improved within key hospital operations, readmissions may be impacted. Connecting this link will be important, as healthcare continues to transform and insist upon efficient quality care. NM

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