Unit 7 Case Study

Instructions

A lengthy, inefficient process for discharging inpatients is a common concern of hospitals. It not only causes frustration for patients and family members, but also leads to delays for incoming patients from Admitting, the Post Anesthesia Care Unit, or the Emergency Department.

When Valley Baptist Medical Center in Harlingen, Texas, faced this issue, it decided to apply Lean, Six Sigma, and change management techniques within one pilot unit. A multidisciplinary project team led by a Black Belt included nursing staff, case managers, an information technology Green Belt, and the chief medical officer, also a Green Belt.

The project was to reduce the time between when a discharge order for a patient was entered into the computer and when the room was ready for the next patient. During the initial scoping of this project, the team divided the process into four components:

1. From discharge order entry to discharge instructions signed
2. From discharge instructions signed to patient leaving
3. From patient leaving to room cleaned
4. From room cleaned to discharge entered in the computer (thus indicating the bed was ready for another patient)

Because of the hospital's commitment to customer service, the team was asked to concentrate on the first two components. The goal was for this first sub-process to be completed in less than 45 minutes.

To minimize the time a bed was empty, the team realized it also would need to address the time between when a patient's room was cleaned and the time a discharge was entered into the computer, or the second sub-process. This would address the problem that arises when Admitting does not have the necessary information to assign a new patient to a clean and empty bed.

Mapping the Process

The team began with a process map to visually understand how the process was currently working. When several nurses were asked to help develop a detailed process map on the discharge process, they initially could not reach consensus, since they each followed their own methods for discharging the patient. This lack of standard operating procedures had led to widespread process variation.

The team developed a representative process map, printed a large copy and placed it in the nurses' lounge. Each staff member was encouraged to review the map and add comments on the flow. After a week, the team retrieved the inputs and revised the "as-is" process map accordingly.

Elements of Lean thinking were combined with this map to help identify "muda" (a Lean term, Japanese for waste). To understand which steps were not contributing to timely discharge, aspects of the existing process were categorized as value-added, non-value-added, and value-enablers.

Using the Lean concepts, the team completed the revised map—identifying rework loops, non-value-added steps, communication flows and staff movement, and adding key metrics. It was apparent from the map that many of the current steps were needed for discharge; however, it also showed significant non-value-added time components and rework.

Baseline data revealed the "from-discharge-order-entry-to-patient-leaving" sub-process required 184 minutes with a standard deviation of 128 minutes. The second sub-process of "patient leaving-to-discharge-in-computer" had an average of 36 minutes with a standard deviation of 36 minutes. When compared against an upper specification limit of 45 minutes, the first sub-process had a yield of 7 percent while the second sub-process did better, with a yield of 25 percent compared to its upper specification of 5 minutes.

Behind the Waste and Variation

The most important tool for determining the critical drivers of waste and variation was the Lean process map. The staff segmented the process into key steps and used the value-added and non-valued-added times to understand the delays and rework involved.

The segments of the process were:

- Secretary processes discharge order entry
- Discharge order processed to nurse begins (delay)
- Nurse begins computer entry (to create discharge instructions)
- Computer entry to patient signature

Using Mood's Median to test various hypotheses, the team found that three factors were

critical drivers of waste and variation.

1. Clarification: In 21 percent of the cases, clarification from the physician was needed before the nurse could enter the information in the computer. The team confirmed that clarification processes added a significant amount of time. The median of the process increased from 12 minutes to 45 minutes when clarification was required, indicating both a statistical significance and a practical significance ($p = 0.01$).

2. Handoff: The current process required a handoff as the charge nurse placed vital signs and other relevant information in the computer system, printed out the discharge instructions and then placed them in a bin for the primary nurse to pick up. In many cases, the primary nurse would then review the information with the patient and obtain the patient's signature.

3. In a small number of cases, however, the primary nurse completed all tasks without any handoff. The use of Mood's Median revealed a statistically significant difference between no handoff versus the more common handoff approach. The median increased from 9 minutes when one nurse completed all tasks, to 73 minutes when a handoff between nurses was required ($p = 0$). Without a signal for the handoff, the patient's paperwork often waited up to an hour before it was acted on.

4. Aftercare: Finally, the team tested the hypothesis that when aftercare was required (for example, the social services department ordering equipment), there was an increase in median cycle time from 121 minutes in the current process to 160 minutes when aftercare was required ($p = 0.035$).

The process generally suffered from rework and a lack of visual signals which caused

additional delays. In addition, little thought had been given to correct sequencing or

designating some activities which could be done ahead as set-up items for the discharge

process.

Improving the Process

Since variations in the "as is" process were contributing greatly to long cycle times and delays, a new standard operating procedure (SOP) was developed containing six steps:

- Unit secretary enters discharge order
- Unit secretary tells primary nurse via spectra link phone that he or she is next in the process
- Primary nurse verifies order and provides the assessment
- Primary nurse enters information into computer system
- Primary nurse prints instructions and information
- Primary nurse reviews instructions and obtains patient signature

Only value-added steps were targeted, but steps causing bottlenecks and rework were also moved from workflow on the day of discharge to set-up activities. A daily meeting

would coordinate these activities and patients would be assessed the day before

discharge. The charge nurse, case manager, primary nurse, and other professionals

participated in the daily meeting, and a new tool was developed to help document and

assign tasks to be completed prior to discharge. Areas reviewed were: lines, elimination

(Foleys), activity level, diets and tube feeding, consults, aftercare orders, and medical

records. The daily meetings reduced the need for physician clarifications and aftercare on

the day of discharge—two significant causes for delays.

Having the primary nurse complete all discharge tasks eliminated the bottlenecks created

by time-consuming handoffs, the need for signaling those handoffs, and the fact that the

charge nurse, who has many responsibilities, was not always readily available.

With the first sub-process of their deliverable improved—from discharge order entry to patient leaving—the team focused on getting information into the computer so the bed could be filled. A session was conducted with transporters and unit secretaries to determine the best way to improve the computer entry process. It was immediately clear that the current process was not working. Unit

secretaries were not always aware when a patient was transferred from the unit. No signal was provided when a transporter moved a patient. Since the secretaries performed numerous activities (not always at the nurses station), they could easily forget a patient had been discharged.

A small discharge slip was developed containing the patient name, room number, and time of call. The transporter would pick up the patient and then go to the nurses' station and ask the secretary to provide the time on the computer. The transporter would write the time and hand the slip to the secretary. This served as a trigger and transferred the process from the transporter to the secretary.

Maintaining Improvement

Two tactics employed simultaneously helped to sustain the improvements. The first was the use of change acceleration process (CAP) and the second was an ongoing tracking system. Four CAP sessions were guided by the Black Belt and process owner, increasing understanding as to why the initiative was undertaken, providing baseline data, and establishing the rationale for improvements.

Each session also included exercises to help participants better appreciate Lean and Six Sigma, with a catapult exercise as a learning tool. Participants split into groups and worked to meet customer needs. They then reviewed the process, made adjustments, and developed standard operating procedures. Upon execution, the new plan showed improved performance.

A tracking system included three components:

- A daily report of the prior day's discharges, including discharge times, primary nurse, and unit secretary responsible for discharging the patient from the computer
- A performance tracker to ensure individual accountability for primary nurses and unit secretaries in terms of mean, standard deviation, and yield
- A control chart that tracked the means and standard deviations

Summary: Process in Control

With the process now in control, the components were re-measured. The from-discharge-order-entry-to-patient-leaving sub-process showed a mean improvement of 74 percent with a 70 percent decrease in the standard deviation. The second sub-process, from patient-leaving-to-discharge-in-computer, showed an improvement of 90 percent in the mean and 58 percent in the standard deviation. (See the following table.) With success in this unit, a translation effort would be undertaken for the entire hospital. This will be an ongoing effort requiring change management for the entire hospital and training sessions on the new standard operating procedures.

	From Discharge Order Entry to Patient Leaving Upper Specification Limit: 45 Minutes		From Patient Leaving to Discharge in Computer Upper Specification Limit: 5 Minutes	
	Baseline	Current	Baseline	Current
Mean	184.8	47.8	36.6	3.47
Standard Deviation	128.7	37.2	36.1	16.9
Yield	6.9%	61.7%	24.6%	95.4%

Reference: DeBusk, C. and A. Rangel, Jr. 2000. Creating a Lean Six Sigma hospital discharge process: An iSixSigma Case Study. iSixSigma. http://healthcare.isixsigma.com/library/content/c040915a.asp.

1. How did developing a process map of the current discharge process help the team get started? How was the staff involved?

2. What was the most important tool for determining the critical drivers of waste and variation?

3. Identify factors that contributed to process variation in the discharge process from the discharge order to the patient leaving.

4. What specific changes were made in the subprocess of the discharge order to the patient leaving as a result of workflow analysis?

5. What specific changes were made in the subprocess of the patient leaving the hospital room to the computer showing the bed as available as a result of the workflow analysis?