Abstract

The Brigham and Women’s Hospital (BWH) Observation Unit (OU) is a 10-bed area within the Emergency Department (ED) that is used to hold, test, and observe approximately 7,200 patients each year to determine whether further care is necessary. This project analyzes their every day operations including, transportation of patients, layout design, and billing processes and proposes improvements. The route to a commonly used testing area was improved. The OU layout was redesigned for decreased congestion, increased visibility, and standardization. Standard operating procedures (SOPs) and revisions of documents should save physicians over $1.5M in OU reimbursements per year. The recommended designs and controls aim at improving the efficiency, functionality, and profitability of the Observation Unit as an entire system by decreasing the frequency of errors and non-value added activity.
Need for Project

Three areas of the OU are inefficient and lead to poor flow, wasted time, and decreased profits. Currently, the OU has various issues regarding everyday operations. The extent of these operations can be classified into three areas that include transportation of patients to testing areas, layout, and billing process. A Failure Modes and Effects Analysis (FMEA) was used to analyze potential failure modes and prioritize the main problems within the OU. The FMEA diagram to the left takes into consideration the severity of the error, the probability of occurrence, and the likelihood of detecting the error. The top priority of this project is the layout, followed by billing issues and routing problem. However, the project scope covers all of the issues.

Routes to take patients to tests are time consuming and confusing to the degree that oftentimes the transporter gets lost. There is a need to optimize and standardize this commonly used route.

The layout of the OU is not designed in the most ergonomic fashion which leads to unorganized areas as seen in the pictures to the left. The layout design also leads to congestion, limited visibility of patient rooms, and unsuitable placement of commonly used tools.

The variability of documentation style and lack of completion of billing documents lead to a loss in facility and professional reimbursements. Assigning a code to OU visits is necessary for obtaining reimbursement. This criteria is not being achieved at least 43% of the time. One month of data from 2007 concluded that there was a loss of professional OU reimbursements amounting to approximately $500,000 due to inadequate documentation. An investigation of the process and documents used for billing OU visits was necessary.

The Design Project Objectives and Requirements

The objective was to improve the operations of the OU to improve patient and employee satisfaction and decrease errors, which leads to increased profits.

Design Objectives

The main goal of this project is to make the OU’s everyday operations more efficient so patients receive better treatment. In order to build a successful observation unit, a hospital must pay attention to some key elements. These elements include: focusing on patient care, patient stay and intensity of care, location, and staffing among others. In order for the management and employees to be successful in
Design Requirements

The individual design requirements of each operational section are listed below:

- **Routing**: Avoid unsanitary areas, Decrease travel time, Standardize, revise, and improve facilitators (see left)
- **Layout**: Create SOPs for some specific operations, Standardize and improve usability of rooms, Improve ergonomics and organization of layout, tools, medicines, machines and documents
- **Billing**: Standardize and clarify process and criteria without drastic changes (diagram of current process to left), Increase overall reimbursements for care in the OU, Improve documents to increase comprehensiveness of documentation completion and avoid errors

Design Concepts considered

Design concepts include improvements to physical aspects and processes of operation as well as new technology.

Some industrial engineering design concepts considered include facility layout, transportation design, ergonomic human machine analysis, process flow, statistical process control, and error analysis. Other possible changes considered for the routing problem included using different elevators, travelling through another floor, or creating a more specific name for the testing area. In regards to the layout, alternative designs included knocking down walls and using different style desks.

Recommended Design Concept

New route, layout, and billing procedures have been recommended and will be up to the sponsor’s discretion as to if and when to be implemented.

Design Description

To approach this problem, the DMAIC process was used. Define, Measure, Analyze, Improve, and Control (DMAIC) are the five steps for improving an existing process. Our application of DMAIC to the process can be viewed on the first page.

In the routing section, it was found that the hospital needed to improve their maps and signage to make it easier for people to navigate around. This also would help in transporting patients from
the OU to the two most common test areas, the stress test and the nuclear test. Various suggestions were proposed after analyzing the current route by using spaghetti diagrams (see left), speaking with employees, and performing research about the topic. Facilitators such as maps and directions and hanging signs in the hallway directly in front of the test area were accepted ideas. The proposed routes to the tests which proved to be more direct, faster, and sanitary were rejected. One route would create too much traffic in a specific hallway and the other would create uncomfortable patients because a doorway was barely wide enough to fit a bed through. Painting colored lines on the floors or walls, that lead to certain areas of the hospital, was also rejected because the hospital did not want to maintain the lines and did not want to start a wave of creating many route lines, causing confusion.

When looking at the OU’s layout and observing employees and patients navigate around, a lot of congestion and limited visibility was found. By using a spaghetti diagram (see left), the work and med areas were found to be congested. By using the 5S method, which includes Sort, Set-in-Order, Shine, Standardize, and Sustain, the layout was re-organized to reduce congestion, increase overall employee visibility, and to sort supplies into more ergonomic locations. All patient rooms are supposed to have a standard layout and the same equipment. Items lacking in some rooms are in the process of being ordered. Also, labels and a 5S poster are pending approval to be put up around the OU. Other changes include moving visually obstructive monitors, expanding the med area, and switching the location of the PA and Business Analyst desks, which will give the PA better visibility and more workspace.

Using route cause analysis and the Ishakawa diagram (see left), the causes of billing issues surfaced. Billing documents should be revised to have more fields for a more comprehensive level of care and a standard operating procedure will help to clarify the process. Clarification would include when to follow certain documentation procedures, what criteria is necessary, and defining the various fields. Additionally, a checklist was put together that would serve as a reminder to fill the areas which are commonly missed or left blank. The billing dept has the means to perform data collection and data of
OU visits and associated billing codes based on information in billing documents was analyzed. It was found that many documents were not complete enough to assign a billing code, 57% of “Admit” documents and 76% of the “Discharge”. Analysis tools for continuous monitoring and process improvements were devised to further analyze the data and when changes in documentation are implemented, they will aid in tracking the results. (see the charts to the left and on previous page)

Financial Issues

There are no financial issues at this point in time.

Recommended Improvements

Other recommended improvements include continuous process control, improved communication, and the expansion of IE tools to other areas of BWH.

In addition to the previously proposed changes the following suggestions are not in the project scope. The Statistical Process Controls (SPC) can be utilized in the future to monitor implemented changes within the billing process as long as the data obtained to create them is available. This data is currently manually complied from various sources. Creating automatic data compilation would make this continuous observation much easier. In regards to SPC of billing reimbursements, implementing one change at a time will act as a control so the result of each change is clear.

Furthermore, many of the tools used in this project can be extended to other areas of the hospital, such as to remediate congestion in other areas of the ED or organize any part of the hospital using 5S (see left). Ultimately, efficiency of documentation would greatly improve if a digital medical record system, similar to what is used in the inpatient area of BWH, was implemented in the OU. Lastly, in order to close a communication gap, BWH could set up system creating an active dialog between hospital staff, compliance, coding, and billing departments. This way, involved parties are able
to communicate and assess any known issues more effectively.