Process Analysis Case Study: Pharmacy At A Hospital

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With a daily staffing of about 23 pharmacists and technicians, the pharmacy of a large pediatric hospital delivers medications to the nurses who care for patients aged from 0 to 18 years. Medicines are labeled, compounded, filled, sorted in the pharmacy, and distributed throughout the hospital by Unit-Based Technicians (UB Techs) to nurses, medication rooms, Medical Computers on Wheels, Pyxis machines, computerized medication, or by using the Pneumatic-Tube (P-Tube) System. With an average hospital daily census of 290 in April 2013, the pharmacy delivers more than 25,000 doses of medications weekly. Since the pharmacy found a new location one and half year ago, a lean process was put in place to deliver Just-In-Time medications 24 hours a day, 365 days a year. The pharmacy continuously receives new prescriptions to fill and delivers routine medications scheduled according to the time at which the medications will be administered to the patients. Solid, liquid, oral, and bulk medications are prepared in the 5th floor pharmacy while IV medications are made in the 2nd floor IV medications preparation room. Therefore, UB Techs pick up medications from the 5th floor pharmacy, the IV room, and another pharmacy situated at the 4th floor before heading to delivery. New-order medications should be delivered within 60 minutes, STAT medications within 15 minutes and routine medications 60 minutes before administration. Nurses who receive the pharmacy concierge service judge the process to be more than satisfactory. However, the pharmacy process is frequently interrupted by nurses’ phone calls enquiring and/or requesting the replacement of missing medications which causes delays and increases the possibility of errors during the preparation of the medications. In addition, the distribution of medications to nurses and to medication storage areas was performed differently from one UB Tech to another, which makes it unpredictable and therefore difficult to improve. In the sprint of lean improvement, we undertook the analysis of the pharmacy process to reduce the occurrence of missing medications and standardize the UB Techs’ workflow.

Observations, time study conducted inside and outside the pharmacy, and the medication transactions data were used for the process analysis.

From the observations of daily operations, workflow maps were documented and work patterns of the pharmacy were observed. Informal interviews of the leadership, pharmacists, technicians, and nurses were conducted to qualitatively assess perception of the pharmacy’s operations.

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Three weeks of medication transactions were provided and used to quantitatively assess the extent of the problem of missing medications. More than 21,000 transactions were recorded each week and missing IV medications were differentiated from other missing medications, which are termed as missing non-IV medications. Moreover, orders for the missing medications and related doses were separated in the analysis because an order can give rise to more than one dose. Data were segregated by week, day, time (AM/PM), nursing unit, and shift (3 shifts of 8 hours from 7:30 am) to put in evidence trends and patterns.

The time study was performed on UB Techs at work in nursing units, 5th floor pharmacy, 4th floor pharmacy, IV room, and in transit during the entire 8-hour morning shift. Timings were recorded from the beginning of the shift to the last medication delivery and the hand-over of work progress to the night-shift technician.

Upon completion of the data analysis and the time study, results were assessed using Lean Six Sigma principles. The following notes were our observations of the pharmacy process, and suggestions for improvement:

The perception of the interruptions in the pharmacy from nurses’ phone calls for missing medications was subjective. Missing medications data analysis provided the means for a quantitative assessment of the issue. Missing medications accounted for two to three percent of all medications processed in the pharmacy. The evaluation of the impact of factors such as day, time, shift, and nursing unit did not show clear trends because of the limited data set. The weekly average number of interruptions was estimated. The time to handle the missing medications over the 3 weeks was 45 hours, that corresponds to 1.1 FTE based on a 5-day/40 hours work plan without taking into account the pharmacy utilization and employees’ benefit days.

A sequence of UB Techs’ tasks was established and benchmark times were determined for each task. A set of best practices was proposed to reduce variability and improve the delivery of the medications.

**Recommendations**

The reasons for the missing medications are numerous and can come from any step of the process, that is, from the prescription order issuance to the misplacement of the medication by the nurse after administration to the patient. This information is absent from the data system and should be part of it, since it is needed to find the root causes of the problem in order to eliminate or reduce it. Data over the entire year will provide an accurate assessment of the issue.

UB Techs should meet under the aegis of the pharmacy managers to finalize the standardization of their workflow based on the proposed benchmark times and best practices.

A ‘Workflow Efficiency Committee’ composed of the pharmacy staff, physicians and nurses can be created and served as a platform to address the problems related to medications and act as a catalyst to implement improvements.
The above results and recommendations were presented to the pharmacy staff and hospital executives who are currently working to further review the analysis and to implement the recommendations proposed.

This study was based on weekly observations in the hospital. The pharmacy and clinical staff was very friendly and supportive, although some of them were not comfortable with being shadowed during the whole shift.

version 10.27.2013