Validating Pilot Program to Improve Discharge Medication
in 12 West at C.S. Mott Children’s Hospital

Final Report

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EXECUTIVE SUMMARY

Results of a Press-Ganey survey showed that patients of 12 West at C.S. Mott’s Children’s Hospital are not satisfied with the discharge medication process of their visits. The hospital team, consisting of physicians, nurses, pharmacists, and engineers, developed a pilot program to improve the efficiency of the discharge medication process. The pilot program used a multidisciplinary approach to combine lean techniques with evidence-based practice modeling.

The Clinical Nurse Specialist of 12 West and Lean Coach asked an IOE 481 student team from the University of Michigan to validate the new program by collecting and analyzing qualitative and quantitative data. The team conducted time studies of the current discharge medication process in patient bedside rounds, timed the discharge medication process, analyzed nurse surveys, and quantified pharmacy delay lengths and modes. The following report describes the methods, findings, and conclusions used to determine if the pilot program is improving the efficiency of the discharge medication process.

BACKGROUND
This section of the report gives background information about why and how the hospital team designed the pilot program. The second part of this section describes the pre-pilot, the discharge medication process, and key areas the student team focused on to validate the pilot program.

Pilot Program: Discharge Medication Process Improvement
The 12 West Unit offers a variety of services as specialized as nephrology and as broad as general medicine. With high demand for diverse services, the hospital unit needs to be continuously improving to accommodate the patients’ needs. Most recently, improving the patient’s discharge medication experience has been the focus of improvement. The Clinical Nurse Specialist of 12 West provided results of a Press-Ganey survey that showed Mott ranks in less than the 20th percentile nationally in satisfaction with the discharge medication process.

In response, the hospital team identified areas of improvement using a lean analysis of the current discharge medication process. The conclusion was that the current process is complex, prone to errors, and incurs delays at multiple points. To gain a better understanding of each step and where sources of errors could be reduced, the hospital team performed a 5 Why’s analysis to identify key problem areas, listed below:

1. Inaccurate medication prescription list on admission to the hospital
2. Unclear medication plan for discharge
3. Non-standardized prescription writing
4. Incomplete/inaccurate information to Ambulatory Care Pharmacy (ACP) for processing
5. Lack of prescription drug coverage information

The hospital team created a pilot program to address these problems. The three main goals of the pilot were to first, have the pharmacist perform a medication reconciliation at
admission. Second, have a focused discussion of the discharge medication plan with the physician’s team and family. Lastly, have accurate prescriptions written at least 24 hours before discharge to give Ambulatory Care Pharmacy (ACP) enough time to have discharge prescriptions ready for pick-up the day of discharge.

**Student Project: Pilot Program Validation**
The student team’s project goal was to validate the pilot program. The team used four methods. First, the hospital team provided nurse survey results. Second and third, the student team performed time studies of two different steps in the discharge medication process: one for the patient bedside rounds, and the second for medication reconciliations. Last, the team quantified the length and rate of delay modes in the pharmacy.

**DATA COLLECTION AND FINDINGS**
This section of the report describes the methods and findings, and how the findings were used to accomplish the project goal of validating the pilot program.

**Nurse Surveys**
The nurses of 12 West participated in a survey that asked about their perception of the pre pilot discharge medication process. The hospital team administered and collected the nurse surveys, and the student team organized and analyzed the responses. Of the 60 nurses in 12 West, 15 responded.

The student team analyzed the nurse surveys and concluded that the current discharge medication process is unsatisfactory. The student team identified trends within the responses, for example, where most nurses believe most inefficiency occur throughout the discharge medication process.

**Patient Bedside Rounds**
The purpose of the time study of the patient bedside rounds was to quantify the rounding time of the physicians using the discharge medication sheet. The student team shadowed the bedside rounding and timed the physician medical discussion, which included the total time of discussion, the time of medication discussion, and any interruptions.

The student team analyzed 150 bedside rounds data collected from October to November. The averages and standard deviations of the discussion times were compared. The team also recorded the presence of a pharmacist and parents during the patient bedside rounds.

**Medication Reconciliation**
The student team performed a time study on the medication reconciliation process. The purpose of the time study was to quantify the time it takes a pharmacist to complete the three phases in the process. These phases are preparation, discussion, and documentation.

The student team designed a standardized template for the time study of the medication reconciliation process and this template ensured the accuracy of the data collected. The data collection occurred in five sessions in October, resulting in a sample of 15
medication reconciliations. The student team used these data to quantify the length of the medication reconciliation.

Overall, the medication reconciliation data reinforces the validation process’ overarching goal, which is to pinpoint where inefficiencies occur in the discharge medication process. Based on student observations and pharmacist input, it is hypothesized that the most time wasted is during the discussion stage, where parents may be confused or uncertain regarding medication type and dose.

**Pharmacy Order Entry Delay Modes**
The hospital team developed a value stream map of the discharge medication process (refer to Appendix A). The student team confirmed the pharmacy delay modes at the “order entry” stage of the value stream map. The “order entry” stage is the process in which a pharmacist enters the prescriptions for a patient into the computer system before they are filled. Four delay modes were identified by the hospital team: prior authorization, doctor page, insurance information and social work.

The student team developed a self-collection data sheet for the pharmacist in charge of entering the prescriptions to record delays (refer to Appendix B for a sample self-collection data sheet). Data were collected in one week of October during normal working hours of the pharmacy. The data collected included 51 independent observations. Based on the pharmacy delay data obtained, prior authorization has the longest delay and doctor pages have the shortest delay. This confirms the pharmacist’s perception that prior authorization delays generally take the longest to resolve.

**CONCLUSIONS AND RECOMMENDATIONS**
The student team validated that the pilot program improved the efficiency of the discharge medication process. This section highlights results from analysis, and the long and short-term recommendation.

The nurse survey responses indicated disconnect between nurses and the other participants in the discharge medication process. The data from the patient bedside rounds showed that the addition of the piloted discharge medication sheet does not add significant time to rounding, and it is possible that the addition of the discharge medication sheet shortens the patient bedside rounds and increases their efficiency. Confirming the pharmacy delay modes indicated the delay modes of prior authorization, insurance information, and doctor pages occur about an equal amount of times, and social work is significantly less. Timing the different steps of the medication reconciliation process quantified how long the additional step took.

The student team developed short-term and long-term recommendations to improve the discharge medication process. The short-term recommendations involve minor changes such as enhanced communication of the procedure, while the long-term recommendations involve substantial changes in processes where extensive research and planning are required before implementation.
INTRODUCTION

According to results from an annual Press-Ganey survey, patients of 12 West at C.S. Mott Children’s Hospital are not satisfied with the discharge medication process. 12 West is a pediatric-surgical unit at C.S. Mott Children’s Hospital hosting up to 32 patients at a time from departments in the hospital including trauma, nephrology, and general pediatrics. The patients and families report long delays at time of discharge, general low satisfaction with the discharge medication process, and in extreme cases, incorrect prescriptions prior to release. A questionnaire shows that 68% of the respondents felt that internal factors caused delay of discharge. Internal factors include waiting for discharge summaries, discharge plan not being documented, etc. [1]. Also a research study shows that it is important to have effective communication between the patient and healthcare professional for a successful discharge plan to be implemented, based on “an open dialogue where a common vision is shared” [2].

To combat these issues, a hospital team developed a pilot program to improve the discharge medication process that launched on October 2, 2013. To validate the pilot, 12 West needed data collected on the process before and after the pilot implementation. The data will be used to determine levels of improvement and provide supporting evidence to implement the pilot in other departments of the hospital.

The Clinical Nurse Specialist of 12 West asked an IOE 481 student team from the University of Michigan College of Engineering to validate the new program by collecting qualitative and quantitative data. The team conducted time studies of the current discharge medication process and of the pilot program and analyzed surveys of staff involved in the process. This report presents the team’s goals, methods, findings and recommendations.

BACKGROUND

Quality and efficiency of patient care are a priority at 12 West. According to the Clinical Nurse Specialist, results from a Press Ganey survey showed that Mott scored lower than the 20th percentile nationally in patient satisfaction with the discharge process. Patients reported delays in the discharge process, errors in discharge prescriptions, and confusion with instructions prior to release.

In response to these findings, 12 West organized a team of physicians, nurses, pharmacists, and engineers to find a solution. The hospital team developed a value stream map of the current discharge medication process and designed a pilot program to reduce delays and increase first time quality for discharge medications. The pilot consists of changes in five key problem areas identified on the current value stream map: pharmacist medical reconciliation, resident prescription writing training, discharge medication plan on rounds, resident pharmacy criteria for compound medicine training, and insurance information collection.

In order to quantify the pilot, the team collected pre pilot and post pilot data. With a quantifiable improvement and supporting evidence, the new system will gain the support
of hospital management. The plan for expansion is that the pilot will be a success and eventually be used in every department of the hospital.

**Key Issues**
The following key issues were the driving need for this project:

1. The medication reconciliation at the time of admission needs to improve; currently there is a high rate of medication discrepancy.
2. There is a disconnect in the communication between the pharmacist, nursing staff, families, and physicians when providing prescription information.
3. The routing slip, carrying both patient and prescription information, is not consistently clear with required information (accurate time needed, whom to page when ready, etc).
4. There is a lack of standardization in prescription writing by residents and physicians.
5. There is an inconsistent understanding of the complexity in the discharge process (pre-authorization, compounded medications, etc).

**Goals and Objectives**
The objectives of the project included the following tasks:

- Confirm the model of the current discharge medication process
- Provide sufficient pre pilot data to be used in pilot evaluation
- Provide sufficient post pilot data to be used in pilot evaluation

To collect pre pilot data, the student team completed the following tasks:

- Conduct time-studies on bedside rounds with physicians, nurses, patients, and families
- Confirm the rates and average length of time of delays at “order entry” stage of value stream map
- Analyze pre pilot nurses’ survey

To collect post pilot data, the student team completed the following tasks:

- Conduct time-studies on:
  1. Pharmacist medication reconciliation
  2. Bedside rounds with physicians, nurses, patients, and families
- Quantify post pilot rate of delays

**Project Scope**
This project included two subsets of the population in the 12 West discharge medication process: the nephrology service group and the blue service general group. The discharge medication process begins when the medical reconciliation is completed by the pharmacist in the unit, and ends when the patient receives the medication.

Any task not connected to the validation of the new discharge medication process of 12 West is not included in this project. Furthermore, the team did not work with prescriptions filled outside of the UMHS Ambulatory Care Pharmacy. Specifically, the student team did not participate in the redesign of the prescription slip, or the current and possible future discharge medication process. Any patient not in one of the two subsets of
12 West receiving prescriptions was not studied under this project; the hope is that the findings can be extended to other similar units in the future.

DATA COLLECTION AND FINDINGS

The student team analyzed nurse survey results, performed time studies on patient bedside rounds and medication reconciliations, and quantified the delay rates and modes in the pharmacy. This section of the report describes these methods and findings, and how the findings were used to accomplish the project goal of validating the pilot program.

Method: Literature Review
To understand the discharge medication process and possible improvement methods, the student team researched discharge medication processes at other hospitals and their methods to improve the discharge medication processes. This research provided a better understanding of the discharge medication process and helped develop recommendations.

Findings: Literature Review
From research studies at other hospitals, internal factors including unclear documentation of discharge plan caused delays in the discharge medication process [1]. Effective communication between the patient and healthcare professional was found to be necessary for a successful discharge plan to be implemented [2]. The design and implementation of an electronic medication management system at Deaconess Billings Clinic in Billings, Montana had improved chart accuracy, timeliness, clinician and patient satisfaction and cost savings [3].

With a better understanding of the discharge medication process, the student team was able to define and perform necessary methods and analyses. In line with the pilot program’s goal of evidence-based practices, the student team utilized these findings to develop recommendations that had achieved success in similar applications.

Method: Nurse Survey
To gain insights on the disconnection between the parties of the system, a Qualtrics survey was administered by Mott Children’s hospital to the nurses of 12 West. At the implementation of this project, the nursing staff had no involvement in the discharge medication prescription process. The objective of this survey was to gain valuable insight on what the nurses believe is the current state of the discharge medication process, and what improvements they think can be made to make the discharge medication process an effective multidisciplinary approach.

The nursing staff were given a 3 week period to finish the survey. By the end of the survey, 15 of the 60 nurses of 12 West responded, therefore providing a 25% response rate. The survey consisted of ten questions, with nine multiple choice questions and one free response question. The questions used are listed below:

1. On average, how long does it take for your patient’s medications to be filled by outpatient pharmacy?
2. Are you satisfied with how long it currently takes outpatient pharmacy to fill patient’s medications?
3. If no, why? (Free-Response Question)
4. Are your patient’s discharge prescriptions usually sent down to the outpatient pharmacy the day before discharge or the day of discharge?
5. How often are you notified when the medications are ready to be sent down to outpatient pharmacy?
6. How often are you notified when your patient’s medication have been filled by outpatient pharmacy?
7. How often are you contacted by outpatient pharmacy to fax updated prescription coverage?
8. How often are discharge medications not being filled in a timely matter solely responsible for delays in discharge?
9. How many times per day on average do you call the outpatient pharmacy?
10. What percentage of your patients need prescriptions filled from the outpatient pharmacy?

The team analyzed this data by generating graphical representations on the output to each question on the survey. Furthermore, the team performed a content analysis on the free response question (Question 3) to bucket recurring words and themes that are elicited through the responses (delays, embarrassment, blame, etc).

**Findings: Nurse Survey**

The student team analyzed the number and types of responses from each question. This section reports the key findings from the nurse survey responses. Refer to Appendix B for a complete list of responses. Figure 1 shows that no nurses were satisfied with the discharge medication process.

![Figure 1](image)

Figure 1. Are you satisfied with how long it currently takes outpatient pharmacy to fill patient’s medications? (Source: Data obtained from Clinical Nurse Specialist, Sample Size: 15)

Figure 2 shows that the most common perceived wait time for prescriptions to be filled was 3 - 5 hours.
Figure 2. On average how long does it take for your patient's medications to be filled by outpatient pharmacy? (Source: Data obtained from Clinical Nurse Specialist, Sample Size: 15)

The following shows the key findings from the nursing surveys:

- 63% of nurses believed that on average, it takes 3-5 hours for patient medications to be filled by outpatient pharmacy
- 100% of nurses are not satisfied with how long it currently takes outpatient pharmacy to fill patient’s medications
- 93% of nurses state that medications are usually sent down to outpatient pharmacy the day of discharge
- 53% of nurses state that they are rarely notified when the medications are ready to be sent down to outpatient pharmacy
- Only 47% of nurses say they are notified when their patient’s medications have been filled by outpatient pharmacy
- 40% of nurses say that discharge medications for a few times, discharge medications not being filled in a timely matter is the only factor responsible for delays in discharge
- 80% of nurses say that they call the outpatient pharmacy 1-2 times daily
- 74% of nurses say that their patients need prescriptions filled from outpatient pharmacy 60-100% of the time

With regards to the free-response question, a thorough content analysis was done. The most frequently used words were:

- Pharmacy
- Frustrated
- Delay
- Long
By grouping the responses into categories, the student team also discovered the following, from a sample size of 15 nurses:

- 3 nurses stated that they feel awkward or embarrassed to tell their patients to wait for a prolonged amount of time, or even stay an extra night, due to delayed discharge medications
- 8 nurses stated explicitly that there are delays and inefficiencies with the discharge medication process
- 3 nurses attributed the inefficiency to a significant disconnect between the physicians and the pharmacists

**Method: Patient Bedside Rounds**
The student team performed a time study on patient bedside rounds. The purpose of the time study was to quantify the physicians’ rounding time using the discharge medication sheet. The team members shadowed the bedside rounding and timed the physician medical discussion, which included the total time of discussion, the time of medication discussion, and any interruptions. Table 1 below is a sample of the data collection sheet the team used to record parts of the discussion with the patient and who was present.

Table 1. Sample data collection sheet used for patient bedside rounds

<table>
<thead>
<tr>
<th>Room</th>
<th>Service</th>
<th>Start Talk</th>
<th>Start Discharge Medication Sheet</th>
<th>End Discharge Medication Sheet</th>
<th>Teaching Time</th>
<th>Parent Questions (Time)</th>
<th>Parent Present (0/1)</th>
<th>Pharmacist Present (0/1)</th>
</tr>
</thead>
</table>

Per the client’s request, the student team recorded the room number to track the patient while protecting the patient’s private health information. The service column indicated whether the patient was in General Blue (PB), or Nephrology (PNP). These two services were selected for the pilot program because general medicine is considered a broader service, while nephrology is more specified and requires more specialty care. The comparison of a broad and large service with a smaller and specified one will be a good indicator of how similar services within the hospital would respond to the pilot. It was necessary to record the two services’ discharge time to see if there would be a difference, and how much additional time the discharge sheet would add to the patient discharge process.

The first part of the bedside round time study took place four times a week from October 2 to October 14 9am-12pm. The second part of the time study was November 11 to November 15, to accommodate the change in physicians and residents at the bedside rounds. The total data collected included a sample of 150 bedside rounds.

**Findings: Patient Bedside Rounds**
To analyze the time study data collected, the student team used Microsoft Excel to first calculate the mean and standard deviation of the discussion times, and second, the mean
number of times the pharmacist and parent of the patient was there. The student team compared these measurements for each unit.

The student team compared the mean times of the total discussion and the mean discharge medication time of the general blue versus nephrology patients. The comparison enables the team to quantify the mean difference between using the discharge medication sheet and not. Table 2 shows that a focused discussion of discharge medications during rounds was not a large part of the total discussion.

<table>
<thead>
<tr>
<th>Service</th>
<th>Discharge medication discussion time (Minutes)</th>
<th>Total discussion time (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Blue (PB)</td>
<td>0.9</td>
<td>6.1</td>
</tr>
<tr>
<td>Nephrology (PNP)</td>
<td>3.0</td>
<td>10.6</td>
</tr>
</tbody>
</table>

Note: Target time for each patient round is 10 minutes
(Source: Data collection from C.S. Mott Children’s Hospital from Oct 2 - 14, Nov 11 - 15, Sample Size: 150)

Figure 3 shows that the discussion lengths of PB and PNP are similar except discharge medication discussion took on average 2.6 minutes less in November than in October.

![Figure 3](image-url) Figure 3. Discussion times in one week sample in October and November (Source: Data collection from C.S. Mott Children’s Hospital from Oct 2 - 14, Nov 11 - 15, Sample Size: 150)

As shown in Figure 3, the discussion times in October and November are similar in all cases except for the discharge medication discussion in nephrology patients. The time taken to discuss discharge medication is longer in October than that of November by an average of 2.6 minutes. Figure 4 shows that pharmacists are present in less than 50% of the bedside rounds.
As shown in Figure 4, parents of nephrology patients are always at the bedside rounds, with a percentage range of 96% to 100%, and parents of general blue patient are at the bedside rounds about half of the time, with a range of 49% to 55%. Pharmacists are at the patient bedside rounds for less than half of the time, with a range of 27% to 50%.

**Method: Pharmacy delay modes**

The student team was asked to confirm the pharmacy delay modes at the “order entry” stage of the value stream map developed by the hospital team. The “order entry” stage is the process in which a pharmacist enters the prescriptions for a patient into the computer system before they are filled.

Four modes of delays were identified by the hospital team: prior authorization, doctor page, insurance information and social work. A time study was originally considered to collect the delay times due to the four modes; however, after the student team observed the process and communicated with the hospital team, it was deemed that a time study would not be feasible due to the irregularities in delays and long delay times. The team developed a self-collection data sheet for the pharmacist in charge of entering the prescriptions to record a delay when encountering one. Data were collected from October 15 to November 7 during normal working hours of the pharmacy. The data collected included 75 independent observations.

In addition to the self-collection data sheet, the student team identified the 12W unit-related delays by sorting and organizing the routing slips collected by the pharmacy technicians from October 15 to October 21. The student team sorted and organized 110 routing slips, of which 5 of them are 12W-related routing slips. The identified 12W unit-related delays provided evidence for the student team to evaluate if the delays had been improved during the pilot program.
Findings: Pharmacy delay modes
To analyze the pharmacy delay data, the student team used Microsoft Excel and Minitab 16.0 to calculate means and standard deviations and to graph the data. The analysis determined the length and frequency of the different delay modes. Figure 5 below shows the distribution of the pharmacy delay modes, i.e. of all the delays that occurred, how many went into each delay mode.

![Pie Chart: Distribution of pharmacy delay modes]

From the pie chart in Figure 5, delays due to prior authorization, insurance information and doctor page are found to be occurring at a similar rate, ranging from 28% to 31%, while delay due to social work is lower, at 11%.

Figure 6 below shows that on average doctor page delays took the least amount of time to resolve.

![Boxplot of Delay modes]

Figure 6. Lengths of pharmacy delay modes (Source: Data collection from Ambulatory Care Pharmacy from Oct 15 - Nov 7, Sample Size: 75)
From the boxplot in Figure 6, doctor page delays are found to be resolved in the shortest amount of time (median = 0.1 hour or 6 minutes). Delays due to prior authorization take most time (median = 1.5 hours) to resolve and have the greatest variance.

Table 3 below shows the frequency when a prescription is in one of the four delay modes.

<table>
<thead>
<tr>
<th></th>
<th>Discharge prescriptions</th>
<th>12W</th>
</tr>
</thead>
<tbody>
<tr>
<td># Prescriptions</td>
<td>332</td>
<td>38</td>
</tr>
<tr>
<td># Delays</td>
<td>49 (14.8%)</td>
<td>2 (5.3%)</td>
</tr>
</tbody>
</table>

From Table 3, 12 West had 2 out of 38 prescriptions delayed within the data collection period. Both delays were doctor page, which has the shortest resolution time.

Multiple prescriptions may be included in one routing slip, and therefore 14.8% of prescriptions being delayed may result in higher percentage of routing slips delayed. According to the hospital team, the percentage of routing slips in one of the delay modes is about 75%.

**Method: Medication Reconciliation Process**

The student team performed a time study on the medication reconciliation process. The purpose of the time study was to quantify the time it takes a pharmacist to complete the three phases in the process. These phases are:

- **Preparation time**: Finding patient information and printing medications onto document for rounds.
- **Discussion time**: Discussing medication plan after discharge.
- **Documentation time**: Walking to a computer, confirming medications and finishing a template to send to pharmacy.

The student team designed a standardized template for the time study of the medication reconciliation process and this template ensured the accuracy of the data collected. The data collection occurred in five sessions from 9am-11am from October 8 to October 10 and from October 21 to October 23, resulting in a sample of 15 medication reconciliations. The student team used these data to determine workload distribution and staffing needs to improve efficiency in the medication reconciliation process during the pilot.

An obstacle the student team faced was when pharmacists completed the preparation phase prior to the start of the time study. Therefore, the preparation phase would not be recorded in some of the medication reconciliations. Asking the pharmacists to delay the preparation phase for every prescription until the student team’s arrival would create
disruption in their daily routine. In response to this issue, only full medication reconciliations, consisting of all three phases, were used in data analysis.

**Findings: Medication Reconciliations**
Table 4 shows the mean times and standard deviations of the three phases of the medication reconciliation process.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Mean (Minutes)</th>
<th>Standard deviation (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation</td>
<td>3.3</td>
<td>2.6</td>
</tr>
<tr>
<td>Discussion</td>
<td>4.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Documentation</td>
<td>9.8</td>
<td>5.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18.0</strong></td>
<td><strong>6.7</strong></td>
</tr>
</tbody>
</table>

As shown in Table 4, the average time to complete a medication reconciliation was 18 minutes. The documentation phase took the longest time at 9.8 minutes, followed by the discussion at 4.8 minutes and the preparation with 3.3 minutes.

**CONCLUSIONS**

This section outlines the conclusions of the four major methods and their findings respectively. The purpose of the conclusion is to summarize how the methods relate to each other for the student team to develop recommendations.

**Nurse Survey**
The findings from the nurses’ surveys reinforced the fact that there is a significant disconnect between the nurses and the rest of the medical staff and discharge medication process. From the sample size and analyses, the student team concluded that an improvement in communication between the outpatient pharmacy and the nursing staff is necessary. From the findings, 50% of nurses say that they are rarely contacted when their patient’s medications have been filled. Furthermore, 93% of the nurses say that the medications are sent the day of discharge. This project’s key goal is to send down the medications before discharge, and this key finding will reinforce to the team that the medication scripts need to be sent during the days before discharge. With the nurse survey, the responses validated the disconnection between the nurses and the other stakeholders of this project.

**Patient Bedside Rounds**
The main objective of using time studies on the patient bedside rounds was to assess the addition of the new discharge medication sheet, and validate the multidisciplinary approach of this project by seeing what percentage of the time a parent and a pharmacist were present during patient bedside rounds. Key findings from the patient bedside rounds show that parents of nephrology patient are always at the bedside rounds, with a percentage range of 96% to 100%, while parents of general blue patient are at the bedside rounds about half of the time, with a range of 49% to 55%. Pharmacists are at the patient bedside rounds for less than half of the time, with a range of 27% to 50%. Furthermore,
the time taken to discuss discharge medication is longer in October than that of November by an average of 2.6 minutes. This data shows that the addition of the piloted discharge medication sheet does not serve as a significant burden on the rounding team, and it is possible that the addition of the discharge medication sheet shortens the patient bedside rounds and increases their efficiency.

**Pharmacy Delay Modes**

The key finding from the pharmacy delay mode data shows that prior authorization delays for medications take the most time to resolve at a median of 1.5 hours have the greatest variance, and doctor page delays take the least time to resolve at a median of 6 minutes. The team must note that findings of prior authorization delays contain several significant outliers, spanning to approximately 40 working hours (one working week) for some prior authorization delays. Nonetheless, these findings suggest that gathering relevant patient information prior to discharge is important for reducing frequency of delays in the Ambulatory Care Pharmacy.

**Medication Reconciliation**

The purpose of conducting a time study on the medication reconciliation process was to quantify the time for a pharmacist to complete three phases of the process: preparation time, discussion time with parent/guardian regarding drugs and dosage, and documentation time. From the key findings, the most time taken is during the documentation phase, with an average time of approximately 10 minutes. On average, the full medication reconciliation process takes approximately 18 minutes. No key inefficiencies were revealed within the process, although it was clear that it is important to have the parent in the room when the pharmacist arrives for the discussion portion. However, the findings suggest that the medication reconciliation process is efficient and that the documents should be used and referred to in the other phases of this project.

**RECOMMENDATIONS**

The student team developed short-term and long-term recommendations to improve and control the discharge medication process. The short-term recommendations involve minor changes such as enhanced communication of the procedure, while the long-term recommendations involve substantial changes in processes and extensive research and planning are required before implementation.

**Short-term recommendations**

*Pharmacy delay modes:* In this project, the data of pharmacy delay modes were collected by the pharmacy technician, who was responsible for the processing of routing slips. The pharmacy technician would not be able to collect the relevant delay modes data when the processing of routing slips was overloaded. Therefore, the team recommend assigning a specific person for data collection regarding rate and length of pharmacy delay modes for more accurate data.

*Patient bedside rounds:* From the findings of the bedside rounds time study, the use of additional discharge medication sheet did not lead to a decrease in time efficiency of the bedside rounds. The student team recommend the medical team to continue using the
discharge medication sheet which provides a guideline for a more focused discussion at bedside rounds.

**Long-term recommendations**

*Medication reconciliation:* From the findings of the pharmacy delay modes, prior authorization, insurance information and social work delays took more than an hour to resolve. The respective rates of delays can be reduced with prior collection of relevant information about insurance policy. The student team recommend the pharmacists to include discussion and create accessible storage of patient insurance information at the medication reconciliation stage, to reduce rates of delays at the pharmacy due to lack of information.

*Patient bedside rounds:* From the same findings in the pharmacy delay modes, the rates of delays can be reduced with prior collection of relevant information. The student team recommend the medical team to reference the medication reconciliation records before and during the bedside rounds, to reduce rates of delays at the pharmacy.

*Implementation of electronic medication management system:* Considering the current issues and challenges faced by the hospital team on discharge medication process, the student team recommend an implementation of an electronic medication management program including digitalization of prescriptions order entry. An electronic program was developed and tested in Deaconess Billings Clinic and resulted in improved chart accuracy, timeliness, clinician and patient satisfaction and cost savings [3].

**EXPECTED OUTCOMES**

The student team expects decrease rates in pharmacy delay modes by the combination of including insurance discussion in medication reconciliation and referencing the medication reconciliation records during bedside rounds. The decrease rates in pharmacy delay modes will result in a more efficient discharge medication process.

On the other hand, the student team expects improvements in physician and patient satisfaction, reduction in rates of pharmacy delays and a more consistent storage system of prescription data, by implementing an electronic medication management system for the discharge medication process.
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REFERENCES


APPENDIX

Appendix A. Value stream map of discharge medication process
Appendix B. Response graphs of nurse survey results
Appendix C. Pharmacy delay modes self-collection data sheet
Appendix B. Response graphs of nurse survey results

Figure B1. When are your patients’ prescriptions usually sent to outpatient pharmacy? (Source: Data obtained from Clinical Nurse Specialist, Sample Size: 15)

Figure B2. How often are you notified when the medications are ready to be sent down to outpatient pharmacy? (Source: Data obtained from Clinical Nurse Specialist, Sample Size: 15)
Figure B3. How often are you notified when your patient's medication have been filled by outpatient pharmacy? (Source: Data obtained from Clinical Nurse Specialist, Sample Size: 15)

Figure B4. How often are you contacted by outpatient pharmacy to fax updated prescription coverage information before your patient's prescriptions can be filled? (Source: Data obtained from Clinical Nurse Specialist, Sample Size: 15)
Figure B5. How often are discharge medications not being filled in a timely matter solely responsible for delays in discharge? (Source: Data obtained from Clinical Nurse Specialist, Sample Size: 15)