University of Michigan Health System
Program and Operations Analysis

Analysis of Problem Summary List and Medication Reconciliation
Final Report

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Executive Summary

Medication reconciliation is the process of ensuring that the medication list is current and accurate between different providers including modifying patient medication history. The medication reconciliation process at the University of Michigan Hospital (UMH) takes place for inpatients from admission of the patient throughout hospitalization to discharge. Medication reconciliation involves physicians, nurses, pharmacy technicians, and pharmacy students. Though this process is integral to the success of the patient’s hospital stay, it does not currently follow a standard procedure. The problem summary list (PSL), the computer document that lists the patient’s medication, is expected to be the source of truth for medication reconciliation. In other words, if there are discrepancies of patient medication information, the information on the PSL is considered to be correct. The patient’s final medication list is printed from this document at discharge. The IOE 481 team’s client reports that the PSL is usually updated once, during the discharge process. Updating the PSL once is a concern because it prevents caretakers from accessing information that has been collected, which could lessen confusion and rework during discharge. The lack of a standard procedure for medication reconciliation can lead to errors in medication lists as well as unbalanced workload for those involved in the process. Also, there is no person who has sole responsibility to update the PSL therefore, potential rework and inefficiencies are likely to occur. The IOE 481 team was asked to evaluate the current state of medication reconciliation at UMH and develop a value stream of the current process. The IOE 481 team has completed evaluation of the medication reconciliation process through observations and interviews.

Background

The medication reconciliation committee was formed to ensure an ideal transition of care, related to medications, occurs. A goal for the committee is to create an ideal final medication list to present to patients upon discharge. The committee has addressed this by improving the accuracy, workload, and workflow problems of the current medication reconciliation process throughout the hospital. The student team assisted the committee by working specifically on developing an ideal standard process for collecting and recording the patient’s medication history and updating the PSL.

During a patient’s stay in the hospital, both physicians and nurses on the floor and in the Emergency Department (ED) collect the patient medication history and record the information in various computer systems. This process creates rework, confusion, and can lead to medication inconsistencies. For example, the triage nurses use Centricity in the ED, physicians use CareWeb, and nurses use CareLink for the Electronic Medical Administration Record (EMAR).

Methodology

The team conducted the following tasks to evaluate medication reconciliation and develop recommendations to improve the process.

- Emergency Department Observations. Sixty percent of the University of Michigan Hospital’s inpatient hospitalizations enter from the Emergency Department (ED). The team observed this area of the hospital because it represents the most patients first
encounter with medication reconciliation during their hospital stay. The team was able to observe 15 patients entering the triage, noting the patient’s priority, number of medications, and total time to gather patient’s information.

- **Admission and Discharge Observations on Unit 5B.** Unit 5B was selected for the team to observe physician and nurse admissions and discharges. 5B was selected because the unit is usually very open with piloting projects and there are members of the medication reconciliation committee located on the unit.
- **Pharmacy Technician Data Collection.** The team generated a worksheet for pharmacy technicians to complete during their patient interviews. The worksheet notes the number of PSL changes and discrepancies in the patient’s History & Physical (H&P).
- **Pharmacy Student Data Collection.** The team collected medication information from patients on Unit 5B, who are interviewed by the pharmacy students. The team noted progress notes, pharmacy notes, Admin H&P, PSL, and discharge summaries.
- **Emergency Department Physician Interview.** The team interviewed an Emergency Department Physician to understand the process of gathering and recording medication information and history from patients in the ED.
- **Pre-OP Assistant Interview.** The team interviewed a Pre-Op Physician Assistant to better understand the process of gathering and recording medication information and history from patients in the Pre Op Clinic at Domino’s Farms.

**Findings & Conclusions**

The team identified the following conclusions throughout the semester:

**Emergency Department:**

*Triage medication reconciliation for patients with five or more medications is non-value added time and increases the amount of time a patient waits to see a physician.*

- Concluding from interviews and observations in the ED, patient medication information is often inaccurate and not used in following processes.
- During a patient’s emergency department visit, time spent on medication reconciliation was typically 14% of the total time in the triage.
- For the most part, medication reconciliation time increased with higher number of medications. The only exception was in the 10+ medication group.

*ED Physicians place little trust in the triage medication lists.*

- List generated by ED triage nurses is not consistently accurate.
- ED Physician proposed a dedicated Medication Reconciliation staff in Triage.

**Unit 5B**

*Data collection of admissions and discharges should follow physician teams rather than units.*

- Coordinating with Unit 5B was very challenging, and resulted in poor data collection.
- Physicians handle the bulk of the Admission and Discharge processes.
- Nurses do not update the PSL.
- PSL updating happens only during the Physician Discharge process.

*Variability in patient recollection, patient condition, and availability of medication information leads to inaccuracies in the Admin H & P*
From pharmacy technician data, 28% of Admin H&P’s have discrepancies.

**Pre-OP**

*Pre-OP process depends heavily upon upstream processes since Pre OP is not the first visit.*

- If PSL and other medication history information are not reconciled during prior visits, surgical procedures can be delayed or cancelled.
- Physician Assistants record and update medication information in CareWeb. PA’s update the Pre-OP H & P (Health & Physical) and the PSL. They are able to access ED notes, Surgeon notes and past Pre-OP H & P.
- Inconsistencies in medication information are usually due to the length of time between updates. Most information that causes discrepancies is outdated.

**Recommendations**

From the conclusions, the team would like to make recommendations to continue research into specific areas of the medication reconciliation process.

**Emergency Department Observations**

- Continue to assess hiring a Pharmacy Technician to assist patients that have a longer or more complicated medication list.
- If the patient brought a medication list, copy the list at Triage welcome center and send along with paper records and goldenrod form to the ED physicians.

**Pharmacy Technicians**

- Recommend hiring more Pharmacy Technicians to work with the remaining MFH teams.
- Mandatory for the Pharmacy Technician to visit patients with a high number of medications.

**Pharmacy Students**

- Add training to the beginning of the semester and instill in the students that medication reconciliation is important.

**Expected Impact**

The student team has created recommendations to improve the process of gathering medication information from patients and updating the PSL. The team has completed the following:

-Outlined the medication reconciliation process in current state flowchart and value stream map
-Identified steps in the process where providers would like to see improvements
-Gathered quantitative data that supports perceptions of inefficiency of the medication reconciliation process
-Identified key areas in which difficulty arises in the data collection process in order to improve effectiveness of further study
Introduction

Medication reconciliation is the process of ensuring that the medication list is current and accurate between different providers including modifying patient medication history. In the University of Michigan hospital, the final medication list for the patient is printed from the problem summary list (PSL), a computer document that includes lists of the patient’s medication. Currently, the PSL for patient medication is updated once during the patient stay; usually during discharge. There is not currently a standard process for medication reconciliation, or for the updating of the PSL. Nurses and doctors take the patient’s medical history during their admission to the hospital, however, depending on to what department they are being admitted (inpatient, ED, CVC, etc.), they may record their findings in one of many computer systems utilized by the hospital, or even just on paper, and not necessarily update the PSL. If the PSL is not updated before the end of the patient’s stay, it must be updated during discharge. This non-standard process can lead to confusion between departments, rework if a medication is missed and increased difficulty and confusion during patient discharge. Inaccuracies can also occur if the patient does not provide the correct medication information to the nurses and doctors.

The medication reconciliation committee was created to improve medication reconciliation throughout the hospital. The medication reconciliation committee would like to improve the accuracy, workload, and flow problems created by the current process. The committee asked the student team from the Industrial and Operations Engineering Department to collect data through observations of the admissions and discharges within the Emergency Department and Unit 5B, supplemented with data from chart audits and a Pharmacy Pilot program involving Pharmacy technicians. In doing so, the student team has built an understanding of the process and laid groundwork for improvements and further analysis. The purpose of this document is to report the IOE team’s findings and provide recommendations to forthcoming teams that will continue this project.

Background

The Pharmacy Department, in conjunction with the Nursing and Medicine departments, at the University of Michigan Hospital has created a committee to improve the effectiveness and clarity of the medication reconciliation process. Medication reconciliation plays a significant role in patient health outcomes from hospitalization throughout the patient stay, since it is important to maintain an updated medication list. At present, the process of recording patient medication information is not completely defined, which leads to inconsistency in the collection of medication data, and confusion when care providers need to access the information.

A pilot was initiated in summer 2011 to improve the medication reconciliation process by having Pharmacy Technicians talk directly to the patients to reconcile their medicine and collect insurance related information. Two pharmacy technicians work with the Medicine Faculty Hospitalists (MFH) teams 1, 2, 5, and 6. The technicians reconcile the Admission Health & Physical, PSL, and Inpatient Medical Records with the patient. They visit the patient and go through the list of medications that the patient takes at home. Any changes or inconsistencies they find will be updated in the PSL. The visit usually only lasts a few minutes and rarely exceeds 10 minutes.
A key issue in the medication reconciliation process is the updating of the problem summary list (PSL). When patients are admitted to the hospital, the patients are asked what medication they are currently taking, and the nurse or doctor will record the patient’s medication history but often will not update the PSL. The nurse or doctor might update another system, write it down, or commit it to memory, creating more work when transferring the information to the PSL at discharge. This adds more confusion to the discharge process, which is already a time consuming process. Creating a standard process for recording and updating the medical history will improve the flow of the discharge process, provide more accurate medication lists to care providers, and allow for fewer delays to update medication information.

**Key Issues**

The following key issues are driving this project.

- There is no standard process for updating medication history of patients in the PSL, which can lead to inaccuracy in the list
- Failure to update the PSL while taking medication history in the beginning of a patient’s stay adds to confusion in the discharge process

**Goals and Objectives**

To gain a thorough understanding of the current state of the process the student team performed the following tasks:

- Observe current admissions and discharge processes to find workload and flow problems related to PSL updating and medication reconciliation
- Perform audits of medical chart to identify common PSL update times and confirm discrepancies in information
- Collect technician data from Pharmacy pilot program
- Map current process of medication reconciliation from ED admission to inpatient discharge

With this information, the team developed recommendations to:

- Provide short-term improvement opportunities in the Medication Reconciliation Process.
- Suggest areas of interest and strategies for future study

**Project Scope**

This project reaches from the patient admission process to the patient discharge process, and the formation and update of the patient medication database throughout the patient hospitalization. The formation and update process is ongoing for the duration of the patient’s hospital stay. This project does not include hands-on patient care, but does include the information systems that aid the hospital staff in streamlining medication records and effectively caring for the patients.
Methods

Initial data collection primarily consisted of observing the current medication reconciliation process. The project team observed and took time studies of the Emergency Department (ED) admission process, the inpatient medication reconciliation process, and patient discharge process. The purpose of the observations was to note how patient medication lists are formed and updated throughout hospitalization as well as where this information is documented and stored. Observing from the patient admissions, most of which come through the ED, to the patient discharge gave the team a general idea of the current state to work forward from. Since the team didn’t specifically study every area of the hospital, the interviews of an ED Physician, and Pre-Op Physician’s Assistant were conducted to understand how the process functions outside of our direct areas of observation. The chart audits gave specific dates and times of when physicians and nurses collected and documented the patient’s medication information that the team can use to supplement the time studies.

Data Collection

The data consisted of time studies conducted by the team during observations. These time studies consist of measuring the time it takes to update medication reconciliation documents such as the Problem Summary List as well as noting the number of medications recorded when medication history is gathered. Data was collected from November 1, 2011 to November 30, 2011. The team collected the following data:

- Collected 15 observations in the Emergency Department of admissions
- Collected 5 observations on 5B of admission and discharge of the unit; including interviewing 7 nurses, physicians, and pharmacy students.
- Collected 6 observations in addition to 9 data sheets with 32 patients seen by pharmacy technicians.
- Interviewed an ED Physician, Pre-Op Physician Assistant, General Medicine Hospitalist, Internal Medicine Physician, and a Pharmacy Student.

Value Stream Map

From the data collected through observations and chart audits, the student team created a value stream map of the current medication reconciliation process to uncover problem areas that can be corrected. The map shows the ED and 5B patient admissions, 5B patient discharges, medication reconciliation by Pharmacy students and technicians, and how these steps relate to each other.

Figure 1: Value stream map of Medication Reconciliation
Statistical Analysis

Using analysis of variance, the team studied the factors that influence the variation of times taken to collect medication history. Variation factors found in the ED patient admissions process include the number of medications a patient is currently taking, priority level, and time of day.

Findings

Emergency Department Observations
- During a patient’s emergency department visit, time spent on medication reconciliation was typically 14% of the total time in the triage.
- For the most part, medication reconciliation time increased with higher number of medications. The only exception was in the 10+ medication group.

Figure 2: Average Medication Reconciliation Time per Patient With Respect to # of Meds
Collected by IOE 481 Team 5, November 1-16, 2011, N = 15

Admission and Discharge Observations on Unit 5B
- Coordinating with Unit 5B was very challenging, and resulted in poor data collection.
- Physicians handle the majority of the Admission and Discharge processes.
- Nurses do not update the PSL, but they can catch discrepancies during the discharge process. Nurses contact physicians about these discrepancies.

Pharmacy Technician Data Collection
Table 1 includes the data collected from the Pharmacy Data Collection Sheet, Appendix C. The data includes the number of changes made to the PSL and the number of patients the Pharmacy Technician was able to speak with per day.
Table 1: Mean & Standard Deviation of Pharmacy Technician Medication Reconciliation
Collected by Pharmacy Technicians Data, November 18-25, 2011, N=32

<table>
<thead>
<tr>
<th></th>
<th># Patients Assigned</th>
<th># Patients Interviewed</th>
<th># Patients Not Seen</th>
<th>Time between admission and interview (days)</th>
<th>Number of PSL Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>5.45</td>
<td>3.56</td>
<td>1.89</td>
<td>1.19</td>
<td>2.97</td>
</tr>
<tr>
<td>Stdev</td>
<td>2.07</td>
<td>2.01</td>
<td>1.54</td>
<td>0.70</td>
<td>3.23</td>
</tr>
</tbody>
</table>

The Pharmacy Technicians generally see the patients the day after they arrive to the unit and meet with 3 to 4 patients per day. The Pharmacy Technicians will go to rounds in the morning to receive information about which patients are being discharged or need insurance information. They create a list of patients to see based off that information and are assigned to see about 5 patients per day.

Also, the data sheet asked to specify why the Pharmacy Technician was unable to complete the medication reconciliation. The most common answers were:

- Patient did not know medication/confused mental state, family not available to talk on phone that day.
- Patient not transferred to floor yet.
- Patient is sleeping.

Another section of the data collection sheet focused on the process with which the Pharmacy Technicians did the medication reconciliation and the work previously done during the patient’s stay. The data is compiled into Table 2 below.

Table 2: Percentage of Data Recorded of Pharmacy Technician Med. Reconciliation
Collected by Pharmacy Technicians Data, November 18-25, 2011, N=32

<table>
<thead>
<tr>
<th>Previous PSL?</th>
<th>If No, did you create a PSL?</th>
<th>Admin H&amp;P referenced?</th>
<th>Discrepancies in H&amp;P?</th>
<th>Did floor physician write Admin H&amp;P?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>81%</td>
<td>83%</td>
<td>100%</td>
<td>28%</td>
</tr>
<tr>
<td>No</td>
<td>19%</td>
<td>17%</td>
<td>0%</td>
<td>72%</td>
</tr>
</tbody>
</table>

Pharmacy Student Observations and Interviews
Students spend one semester assisting the physicians with medication reconciliation. They work once a week for a four-hour shift. In that shift, they can generally see 3 to 4 patients.

From the observations:
- Reconcile Admin H&P, PSL, and Carelink to prepare for meeting with patient.
- Research any unfamiliar medications.
- Plan the way to approach patient and note key information that they want to gather from patient.
- Review any questions with preceptor before and after meeting with patient.
- Create pharmacy note which is ten reviewed by preceptor.
From the interview, Appendix E, several important factors were noted:

- Usually find discrepancies in the PSL and Admin H&P
- Student’s success depends heavily on the preceptor (teacher)
- Student feels unprepared at the beginning of the semester

**Emergency Department Physician Interview**
- List generated by ED triage nurses is not consistently accurate, so there is little trust by the Physicians.
- ED Physicians do not perform comprehensive Medication Reconciliation
  - They only check for medication types that would affect immediate treatment (high blood pressure, blood thinners, insulin, aspirin, etc)
- ED is considering implementing a pilot involving a Pharmacy Technician assisting with triage medication reconciliation.
- The most common range of medications for patients entering the ED is 0-5.

**Pre-Op Physician Assistant Interview**
- Pre-Op process is heavily dependent upon upstream processes since Pre-Op is not the first visit. If PSL and other medication history information are not reconciled during prior visits, surgical procedures can be delayed or cancelled.
- Physician Assistants record and update medication information in CareWeb. PA’s update the Pre-Op H & P (History & Physical) and the PSL. They are able to access ED notes, Surgeon notes and past Pre-Op H & P.
- Inconsistencies in medication information are usually due to the length of time between updates. Most discrepancies are caused by outdated information.

**Conclusions & Recommendations**

The following conclusions and recommendations can either be implemented for short term improvement to the medication reconciliation process or assist in future study of the process.

**Short Term Medication Reconciliation Improvements**

*Expand Pharmacy technician pilot to all MFH Teams*
- The Pharmacy Technicians job is effective and catches both discrepancies within the PSL and the Admin H&P.

*Require Pharmacy Technicians to visit patients with a high number of medications.*
- Pharmacy technicians do not always visit every patient; their priorities are those with insurance issues.

*Add training for Pharmacy Students to increase awareness of the importance of medication reconciliation.*
- Pharmacy Students do not feel like they do not have sufficient training for medication reconciliation.
- Pharmacy Students initially feel unprepared, and are not always completely focused on catching discrepancies within the PSL.
Future Study

Study teams of Physicians instead of focusing on a specific unit (e.g. 5B). For example, have one MFH team to work with the Pharmacy Technician, one MFH team that does not, and a service that works with the Pharmacy Students.
- Nurses do not update the PSL.
- Doctors perform the medication reconciliation portion of the discharge process.

Study the effect of dedicated medication reconciliation staff in ED Triage
- ED Triage Medication Reconciliation Process for patients with 5+ medications is non-value added and should be modified.
- A dedicated Medication Reconciliation staff in triage would improve the updating process and increase Physician trust in the list generated at during Triage.

Examine error rates in Triage and ED medication histories
- We are unable to conclude whether the error rates in the Triage and ED medication Histories are correlated to the number of medications a patient has, because we weren’t able to collect enough data. Further study would be beneficial.

Expected Impact

The student team has created recommendations to improve the process of gathering medication information from patients and updating the PSL. The team has completed the following:
- Outlined the medication reconciliation process in current state flowchart and value stream map
- Identified steps in the process where providers would like to see improvements
- Gathered quantitative data that supports perceptions of inefficiency of the medication reconciliation process
- Identified key areas in which difficulty arises in the data collection process in order to improve effectiveness of further study
# Appendices

## Appendix A

Emergency Department Observation Sheet

<table>
<thead>
<tr>
<th>Date:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td>ED</td>
</tr>
<tr>
<td>TimeFrame:</td>
<td></td>
</tr>
<tr>
<td>Observer:</td>
<td>Patient</td>
</tr>
<tr>
<td>Priority (1-5):</td>
<td>Patient</td>
</tr>
<tr>
<td>New or Update:</td>
<td></td>
</tr>
<tr>
<td>How does patient know their meds?</td>
<td></td>
</tr>
<tr>
<td>Memory, brought meds, PSL?</td>
<td></td>
</tr>
<tr>
<td># of Meds: Beginning</td>
<td></td>
</tr>
<tr>
<td># of Meds: Ending</td>
<td></td>
</tr>
<tr>
<td>Additions/Deletions (+/-)</td>
<td></td>
</tr>
<tr>
<td>Paper/Centricity:</td>
<td></td>
</tr>
<tr>
<td>Med Rec Time:</td>
<td></td>
</tr>
<tr>
<td>Total Time:</td>
<td></td>
</tr>
<tr>
<td>Notes (Variation, Flow, etc):</td>
<td></td>
</tr>
<tr>
<td>Did any help take vitals, notes, etc.</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix B
Emergency Department Observation Descriptive Statistics
Collected by IOE 481 Team 5, October-November 2011, N = 15

<table>
<thead>
<tr>
<th></th>
<th>Beginning # of Meds (returning patients)</th>
<th>Meds Added to list</th>
<th># of Meds deleted (returning patients)</th>
<th>Ending # of Meds</th>
<th>Average Med Rec Time</th>
<th>Total Time</th>
<th>% of Total Time for Med Rec</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>4.88</td>
<td>1.73</td>
<td>0.40</td>
<td>4.07</td>
<td>1:16</td>
<td>9:06</td>
<td>14%</td>
</tr>
<tr>
<td><strong>Standard Deviation</strong></td>
<td>4.19</td>
<td>2.15</td>
<td>0.69</td>
<td>3.69</td>
<td>1:12</td>
<td>4:36</td>
<td>12%</td>
</tr>
</tbody>
</table>
# Appendix C

Pharmacy Technician Data Collection Sheet

| Name: | | | | | | |
| Date: | | | | | | |

## How Many Patients were you assigned to see today?

## How many did you see?

## If you didn't see some patients, what were the reasons for not seeing them?

## PSL Changes

<table>
<thead>
<tr>
<th>Patient#</th>
<th>Date Patient Admitted to Floor</th>
<th>Date of Pharm Tech Interview</th>
<th>Previous PSL? Y/N</th>
<th>If No PSL, did you create PSL? Y/N</th>
<th># PSL Changes</th>
<th>Did you reference an H&amp;P? Y/N</th>
<th>Discrepancies in the H&amp;P? Y/N</th>
<th>Who wrote H&amp;P?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Appendix D**

Interview with Hospitalist in General Medicine

*Describe the physician’s process for collecting patient history.*

The physicians will evaluate the patient as soon as possible upon arrival to the Unit or when the patient is transferred from the ED physician. The physician will usually ask the referring physician or ED physician if they brought medications or a medication list with them to the hospital.

When a patient transfers from the ED, the ED physician decides the patient needs to be admitted. Once the patient is approved, the ED physician will contact the admitting physician and gives a verbal handoff.

The Admin H&P accuracy depends on the patient recollection which varies from knowledge of every medication and dose to not knowing any of their medications. Depending on the accuracy of the patient’s medication knowledge, other steps for verifying the information are to: contact family or caregiver over phone, ask family to bring in medication bottles later that day or tomorrow, call patient’s pharmacy, or call patient’s insurance company. These steps will be taken if there is time.

Many times, the patient will remember a medication at a later date in their stay. Few physicians will update with this new data. Options for incorporating this information include adding an addendum to the original Admin H&P or putting the information in a progress note. Often times, the physician will make a mental note.

On patient discharge, the tricky part is working with an outdated PSL and many physicians do not have time to go through and analyze the PSL.

*Do you work with either the Pharmacy Students or Technicians?*

The interviewed physician works in MFH with the Pharmacy Technicians who do medication reconciliation. He believes that it instills confidence in the PSL by knowing that they are working with the most up-to-date version of medication history. The Pharmacy Technicians do not remove the responsibility of the physician but helps to clarify ambiguity and changes within the PSL and medication history.
Appendix E
Pharmacy Student Interview

The main problems are the hospital does not have the resources (money, manpower) to properly do medication reconciliations. UMHS’ solution is using Pharmacy Students and this has worked out very well. The students have been able to catch a lot of discrepancies but, since this is a teaching hospital, it is not a viable solution for other institutions.

Describe the Pharmacy Student medication reconciliation process.
The students first look at the PSL to see what the patients are taking. The PSL is usually very inaccurate. Since UMHS is a tertiary care hospital, they often do not have the full patient history. For example, the patient’s primary care physician may not be in the UMHS system.

They also look at the Admin H&P Note. Usually the doctor is busy with the physicals and exams. The Admin H&P is usually not accurate.

The students look at what the patients are on in the EMAR (Carelink). They compare this to the PSL and the Admin H&P to make sure they are given all the medications during their stay. The most common prescriptions medications that are usually left off of the Admin H&P are antidepressants. Many over-the-counter medications such as Tylenol, Ibuprofen, and herbal medications are not in the H&P.

The student will go to the floor and ask the nurse if the patient is sleeping or if they can see the patient. If the patient is away from the room, they will either make a decision to leave the patient for the next day or finish the medication reconciliation without clarifying with the patient. If there are no big problems regarding medication discrepancies, they will generally choose the latter option.

Pharmacy students also check with the patient to see if they are self-medicating in the hospital. They will also notice problems, such as, if the patient is misusing their inhaler. They answer questions that patients do not want to ask physicians like questions regarding allergy medications or antidepressants. The students can answer basic questions and will refer to their preceptor for more complex questions.

If patient cannot recall medication, options for securing information:
1. Patient may call family member (adult children)
2. Review Admin H&P with patient
3. Consult the spouse, if present
4. Call pharmacy, family member, or home clinic

The fourth option is very time intensive.

After talking to the patients, the students use a template to write up the discrepancies and notes. Their preceptor will review the note before adding to CareWeb. If the discrepancies are important, the preceptor will page the attending physician or bring it up during rounds.
Pharmacy Students will generally work on reconciling the medications for 3 to 4 patients per 4 hour shift. Those on units whose patients generally have fewer medications can work on 5 to 6 patients. They usually spend the first 1 to 1.5 hours writing outpatient medication information on charts. The last ½ hour of the shift is spent talking to the preceptor.

*What type of training did the students have to prepare them for medication reconciliation?*

The interviewed student stated that she did not fully understand her role until two months into the semester. The students were given a brief presentation with PowerPoint walkthrough and computer module training. The students training and success depends heavily on the preceptors who teach them how to write the Pharmacy Notes.

*How often do you find discrepancies in the Admin H&P?*

The student said she finds discrepancies every single time. She works with a unit where patients are generally on 15 to 20 medications. Usually, the medication will be correct but sometimes doses may not be or some prescription or over-the-counter medications will be left out.

*Do you see and problems with the current Pharmacy Student medication reconciliation process?*

She would like to see the efficiency of the process improve. On average, it takes 4 hours to reconcile 3 patients.
Appendix F

Average Medication Reconciliation Time per Patient Based on the Quantity of Medications listed in Centricity upon leaving the triage

Collected by IOE 481 Team 5, October-November 2011, N = 15
Appendix G
Priority Frequency of Patients entering the Emergency Department
Collected by IOE 481 Team 5, October-November 2011, N = 15

![Bar Chart]

- Priority Level 3 has the highest frequency with 8 occurrences.
- Priority Level 2 follows with 3 occurrences.
- Priority Level 1 has 2 occurrences.
- Priority Levels 4 and 5 each have 1 occurrence.
- No patients were assigned a priority level of 0.
Appendix H
Medication Reconciliation Flowchart
Appendix I
Medication Reconciliation Value Stream Map
Appendix J
ED Triage Medication Reconciliation Process

Through observations, the student teams found the ED Triage medication reconciliation process to be:

On admittance to the ED, a patient is brought to one of six triage areas. A triage nurse will go over home medications with the patient.

1. Returning patient with a established patient history in Centricity. Nurse goes through the list one-by-one to double check items.
   c. Patient does not know what medications they are currently taking: nurse reviews medications with patient and tries to prompt patient with questions to help patient remember if they are taking the medications listed.

2. New patient (no Centricity patient record): ask patient what medications they take at home including dose and frequency. Ask if patient brought a home medication list.
   a. Patient brought medication list or medication bottles: a nurse review list with patient and enters all medications into Centricity.
      a. Patient knows medications by memory: nurse enters patient medications into Centricity, including dose and frequency if the patient knows these.
      b. Patient does not know what medications they are taking: nurse will prompt the patient with more specific questions. Will generally not prompt on dose.

Exceptions:
1. Patient high priority skips triage and sees physician immediately.
2. Patient may have family member with them who can answer the questions for them.
3. Patient condition will not let them communicate medications. Nurse will refer to family member, medication list brought with patient, or previous Centricity files.
   a. If none of these options are available, nurse will not input or change Centricity.
4. If all triage rooms are full, patient will be put in a bed that is not in a triage room. Write triage information including patient medication history on paper; then write in Centricity after triage visit on an available computer.
Appendix K

Pharmacy Technician Medication Reconciliation Process

Pharmacy Technicians work to reconcile the patient’s home medications and deal with specific insurance questions. The Pharmacy Technicians generally see the patients the day after they arrive to the unit and meet with 3 to 4 patients per day.

The Pharmacy Technicians will go to rounds in the morning to receive information about which patients are being discharged or need insurance information. They create a list of patients to see based off that information and are assigned to see about 5 patients per day. Technicians see as many of the patients that they can before the patient is discharged from the hospital.

Pharmacy Technicians reconcile the PSL, Admin H&P, and Inpatient Medication List to find possible discrepancies. Around 10:30 AM, the technician will begin visiting patients and will review the medications with the patients. They go through the medications one-by-one and check to see if the patient is taking medication with the same dose.

1. If the patient is a good historian, technician will update the PSL.
2. If patient cannot verify doses or names of medications not listed on PSL, technicians will cross reference the information with the patient’s pharmacy or primary care.
3. If patient cannot speak or is in an altered mental state, the technician will follow step 2, or call family members to find a complete medication history.

After updating the PSL, the Pharmacy Technician will write a Pharmacy Note and include the resources they used to reconcile the medications (including patient), what additions, changes, or deletions they made in the PSL.

Over the course of the pilot, some changes and ways the pilot has grown:
1. Currently follow MFH teams. Previously, only worked with patients in certain units.
2. Found specific times of day that are best to talk to patients: around 10:30 to 11:00AM and during lunch times.
Appendix L
Pharmacy Students Medication Reconciliation Process

Third year Pharmacy Students take a pass-fail course on hand-on medication reconciliation. The students will work once a week for four hours. The students work with the following services: MC, HFT, MGI, SBO, SCO, SFO, SMO, and UFM. They reconcile the PSL, Admin H&P, and Carelink EMAR to find possible discrepancies. After finding discrepancies they will write a Pharmacy Note that will be posted onto CareWeb. Preceptors will check the student’s work and post the note themselves.

The students are given tables on which they can write all of the patient’s medications and doses from the Admin H&P, PSL, and inpatient/ Carelink lists to see if the medications are the same.

The students will review any medications that they are not familiar with so they can help prompt patient’s memory. Depending on the number of medications and student’s time and interest, they will look up drug interactions to see if the medications have adverse interactions. After finding possible problem areas in the medication history, they will use this information to plan a way to approach the patient and gather the needed information.

If the students have any questions regarding medications that need to be addressed before talking to the patient, they will contact their preceptor.

When talking to the patient, they go through the medications one-by-one and doses to see if the patient is taking that specific medication. If patients do not know what they are on, the pharmacy student can:
   1. Call family members
   2. Call patient’s primary physician

If the patient is away from the room or asleep, they will try again later in their shift. There is a choice in the Pharmacy Note to say why the patient was unavailable to talk.

Once the student has reconciled the medications, they will write the discrepancies they find in a Pharmacy Note. They detail the medication name, dose, frequency that the patient takes it, and reasons why there is a discrepancy. The preceptor will check the note and then post it to CareWeb.