University of Michigan Health Systems
Program & Operations Analysis
IOE 481

Analysis of Nursing Workload after Discharge Navigator Implementation

Final Project Report

To: Jennifer Dammeyer, Clinical Nurse Specialist, UH-6C
    Jacquelynn Lapinski, Management Engineer – Program & Operations Analysis
    Richard Coffey, Director, Program & Operations Analysis

From: IOE 481 Project Team, Program & Operations Analysis
    Keith Grenham
    Thaddeus Hart
    Christine Laccay
    Jacob Milliken

Date: April 26, 2004
# Table of Contents

**Executive Summary**  
1

**Introduction**  
2
- Goals and Objectives  
- Background  

**Approach & Methodology**  
4
- Project Preparation  
- Data Collection  
- Data Analysis & Formulation of Recommendations  

**Current Situation**  
8
- Nursing Discharge Process  
- Implementation of Discharge Navigator  

**Data Analysis**  
10
- Discharge Navigator Discharges  
- Summary Statistics  
- Confidence Intervals and Statistical Analysis  

**Recommendations**  
16
- Training  
- Implementation  
- Creating Templates  
- Observations  

**Appendix A: Interview Questions**  
A-1

**Appendix B: Time Study Data Sheet**  
B-1
Executive Summary

Background
UH-6B and UH-6C are Internal Medicine Units within the University of Michigan Hospital. Our project focused on the effects of implementing the Discharge Navigator, a computer application, on nursing workload; specifically paperwork related to the discharge process. We focused on the differences between the traditional discharge process and the Discharge Navigator process. By measuring the time required for nurses to complete key discharge tasks, reduction in workload associated with the implementation of the Discharge Navigator was identified. Discharge data was collected during from February 16, 2004 through April 2, 2004.

Methodology
The project was executed in three main phases:
1. Project preparation
2. Data collection
3. Data analysis & formulation of recommendations.

Findings
Thirty-two partial discharges were collected during the data collection period. Twelve of the discharges were from medical services using Discharge Navigator and the remaining 20 discharges were from other medical services, which were still using the handwritten discharge process. The amount of data collected from the Discharge Navigator and handwritten discharges processes was not sufficient to conclude any statistically significant findings. The data did show the following tendencies in time to complete a nursing task:

<table>
<thead>
<tr>
<th>Average Task Time (minutes)</th>
<th>Discharge Navigator</th>
<th>Handwritten</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Complete Discharge Summary</td>
<td>13.57</td>
<td>15.01</td>
</tr>
<tr>
<td>2. Clarification from Physician</td>
<td>3.75</td>
<td>5.84</td>
</tr>
<tr>
<td>3. Patient Education</td>
<td>12.97</td>
<td>8.33</td>
</tr>
</tbody>
</table>

This difference in patient education time may be attributed to a more thorough patient education when using the Discharge Navigator. Discharge Navigator has templates that remind nurses on possible patient education topics.

Recommendations
From the data collected, the time it takes to complete a discharge summary using the Discharge Navigator is 1.44 minutes less than handwriting the discharge summary. The
client perceived at least a five-minute reduction when using the Discharge Navigator. After observing while on the unit, some recommendations regarding training and implementation of the Discharge Navigator could further decrease the time spent on filling out a discharge summary.

The student group noted that while using the Discharge Navigator, more than 50% of the discharges required a nurse to look for someone to help troubleshoot technical issues with the Discharge Navigator. By improving training procedures, fewer nurses will need to ask for technical assistance. Increasing the number of super-users from 15 to 20 can decrease the time it takes to find help when using the Discharge Navigator. Another option is increasing the training for the floor nurses from 20 minutes to at least 30 minutes. During this time, common questions can be addressed and sample discharge orders can be processed.

From taking a poll, the nurses have indicated that they have only used the Discharge Navigator on average nine times since August. Increasing the frequency of nursing usage of the Discharge Navigator will also decrease the time spent in completing a discharge summary. Postponing the roll out into the nurse units until more medical services are on the Discharge Navigator will increase the exposure nurses have during the initial roll out. This will expedite the learning curve, which will allow the nurses to more quickly take advantage of the benefits of using the Discharge Navigator.

The data also showed an increase of 4.64 minutes on patient education when using the Discharge Navigator. This is a desired result because patient education is considered a value-added task that enhances patient care. The creation of more templates can further improve the quality of patient education. The student group recommends that nurses and/or graduate nursing students take on the responsibility of writing these templates to decrease the time it takes to create templates.
Introduction

Currently, the standard method for patient discharge requires redundant handwritten paperwork for the nurses. This time spent completing discharge forms takes nurses away from the bedside. An alternative documentation method called the Discharge Navigator is being piloted, which computerizes the paperwork. The purpose of this project is to measure nursing workload associated with the discharge process with and without using Discharge Navigator; specifically, measuring the time reduction associated with the paperwork documentation process after implementation of the Discharge Navigator. This report presents the findings from the student team as well as conclusions and recommendations for the ongoing implementation of the Discharge Navigator.

Goals and Objectives

Three main goals were associated with this project. First, analyze the total discharge process. Second, compare the time associated with nurses’ paperwork workload of a discharge using the handwritten method to using the Discharge Navigator. Third, compare the nursing discharge tasks with and without the use of the Discharge Navigator.

Background

Nursing shortage throughout the hospital is the main driver for this project. Because nurses are a scarce resource, it is important to increase their productivity by eliminating non-value added tasks, so that more time can be spent in value added tasks. It is perceived by our client, Jennifer Dammeyer, that the use of the Discharge Navigator will increase nurses’ productivity.

According to Jennifer Dammeyer, a Clinical Nurse Specialist in UH-6C, one-half of the medical services in the nursing units 6B and 6C in the University of Michigan Hospital are currently using the Discharge Navigator as part of a pilot. The discharge process begins when the clerk acknowledges the discharge order written by the physician. It ends after the patient leaves the unit and the nurse removes the equipment from the patient’s room. According to our client and the results of a previous study, mentioned later, the time for a full discharge ranges from half an hour to two hours depending on several factors including the complexity of the discharge and the workload of the nurse.

A previous IOE 481 student group in the fall semester of 2001, for which Diana Cprek, nurse manager, was the client, analyzed the discharge process. There were several main differences on how this project and the 2001 project were conducted. The main difference was that the 2001 project focused on analyzing the discharge process as a whole while this project focused on the effects of implementing the Discharge Navigator on nursing workload. Since we measured discharges that were completed by hand as well as on the Discharge Navigator, we were able to focus on the differences between those two processes. The findings from this project can be used for better understanding of the effects of Discharge Navigator and to improve the future implementation of the Discharge Navigator across the hospital.
Approach & Methodology

This project was conducted in three main stages: Project preparation, Data collection, and Data analysis and recommendations.

The following are the elements involved in each stage of the project.

1. Project Preparation
   - Expectation Setting
   - Flow Chart
   - Literature Search
   - Staff Interviews
   - Data Collection Normalization and Standardization
   - Finalization of Data Collection Plan

2. Data Collection
   - Time Study
   - Report of Initial Findings
   - Client Meetings

3. Data Analysis & Recommendations
   - Data Entering
   - Discharge Process Comparison
   - Strategy Meetings
   - Recommendation Meetings

Project Preparation

Project preparation stage of the project began the second week of January 2004 and lasted 7 weeks, until the end of February. This stage began with initial proposal and ended with a well-formulated data collection strategy and plan.

One of the requirements of the project was to develop a flow chart of the discharge process. This involved spending one week on the unit to observe the nursing discharge process and taking notes on what was done in each step. The flow charts developed from the project team 2001 were also studied. After examining all these information, the student team found that the flowcharts established in 2001 were sufficient in describing the current discharge process.

The student team conducted a literature search, but found no relevant information on the internet. The previous IOE 481 project, however, was used as reference for this project.

An important part of the preparation for the data collection was the interview process. Interview questions were formulated by incorporating several of the questions used by the 2001 student team, as well as adding several questions that pertained to the Discharge Navigator. The student group interviewed five nurses, one clerk, one nurse manager, and
one technician. Interviews lasted 15 minutes each. After interviews were conducted, the student team spent a week on the unit collecting test data in order to standardize the data collection methodology. After collecting this test data, the student team standardized the data collection method and created a data collection form (See Appendix B).

**Finalization of Data Collection Plan**

After bringing together all of the preliminary data, interview results, flow chart information, and input from the client and coordinator, the student team formulated a data collection method. The student team considered classifying the discharges according to their complexity, but this idea was discarded due to inconsistency in the classification method. Also, the student team considered using a pace ratings, but this was discarded due to the variability in the nursing tasks involved.

The following lists how the student team collected data.
- Each student spent 6 hours a week recording discharge times.
- The data was collected over a 5 week period.
- Partial discharges were recorded.
- Nursing tasks began when the nurse indicated a change in what they were doing.
- Nursing tasks ended when the nurse said they were finished.
- Tasks were timed to the one second.
- The nurses were asked to clarify any tasks that were confusing.
- Corporate Patient Identifier (CPI) numbers would be recorded for each discharge taken to corroborate times taken by the student team.

**Data Collection**

This stage lasted roughly 6 ½ weeks. This stage ended with 32 partial or full discharges recorded as well as notes on observations that were taken during the data collection process on units 6B & 6C. Discharges were collected on the units using a clipboard, data collection sheet, stopwatch, and pager. Clerks paged members of the student team when they received a discharge order, and then the student would shadow the nurse responsible for the discharge and record times for each nursing task. Student was not silent however. They were in constant communication with the nurse to ensure the accuracy of the classification of the nursing tasks. The data collection form (Appendix B) included 24 possible nursing task that could be recorded by the student. Some tasks such as order prescriptions, and find wheelchair did not always occur. Because of this, we identified seven nursing tasks to focus on that would always occur during a discharge. They are read discharge order, fill out discharge paperwork, educate patient, remove IV, write SOAP notes, remove flowboard, and remove equipment from room. These steps were not always carried out in this order. Also, because partial discharges were recorded these seven nursing tasks were not always captured.

**Data Analysis & Formulation of Recommendations**

During the first week of March, the student team created a Microsoft Excel spreadsheet to enter and constantly update the data. This spreadsheet consisted of all the times
recorded during the time study as well as information on where the discharge happened, the date it happened, and the time the discharge took place.

The data collected was compared in two ways. It was first separated into discharges that were done with the Discharge Navigator and those without. Those two data sets were then compared. The second way the data was compared was against the student project 2001 data. This was to see if there were any notable differences in the discharge process and to better validate the data collected. This comparison process mainly focused on paperwork times.

**Current Situation**

**Nursing Discharge Process**

Regardless of whether the Discharge Navigator is used for a discharge, the nurses perform certain tasks when discharging a patient. The main tasks are illustrated below:

Figure 1: Flow Chart of Nursing Discharge Process

These tasks range in complexity depending on the needs of the patient. For example, a nurse might need to speak to a social worker and arrange transportation needs for the patient or a nurse might need to contact the physician to get clarification on the discharge order. Also, there are times when a nurse technician is able to perform some of these tasks like removing an IV or equipment from the room. These tasks do not necessarily go in this order and a nurse is often not able to perform these tasks without disruptions.

The discharge process generally begins when a nurse is notified by the clerk that a discharge order has been given by a doctor. The order in which the nurse performs the rest of the tasks often overlaps and varies from nurse to nurse and patient to patient. It is also important to note that patients are often waiting for rides whether it be an ambulance or a family member coming to pick them up. Because there are certain tasks that are not performed until the patient leaves the unit, like removing equipment, the total time it takes for a nurse to complete a discharge varies.

**Implementation of Discharge Navigator**

Currently the Discharge Navigator is being used in a very small fraction of the hospital units and medical services. The plan is to have the Discharge Navigator be implemented across all medical services and throughout all hospital units. The planned approach is to have all the internal medicine medical services use Discharge Navigator by June 2004 and to gradually roll out to all of the hospital units.
In the beginning of this project, only units 6B & 6C nurses were using the Discharge Navigator. Also, only three out of ten medical services in these units were using the Discharge Navigator. As of April 1st, five out of ten medical services in these units were on the Discharge Navigator.

In the implementation within these two units, the “super-user” model was used. In this model, a small fraction of the nurses within the unit, around 10-15 nurses, were given extensive training on how to use the Discharge Navigator. These nurses were called super-users. The super-users were given training not only on the portion of the discharge navigator that the nurses had to use for discharging a patient, which is step 11 on the Discharge Navigator, but also on some of the general functionality of the Discharge Navigator. After these nurses are trained, their main responsibility is to go out on the unit and train the rest of the nurses on how to use the Discharge Navigator whenever the nurses have about twenty minutes available for training. Also, these super-users are responsible for addressing any questions that the nurses have when using the Discharge Navigator. For the first week after implementation, there is a technical person on the floor to answer any questions. This super-user model is what will be used in the future implementations of the Discharge Navigator in the hospital units.

Data Analysis

To verify that the sample of data collected was representative of the of the actual occurrences of discharges throughout the day on units 6B & 6C, the times for the sample data set were compared to the average occurrence for a discharge at a particular time on units 6B & 6C.

This comparison was done by standardizing the average hourly discharges on units 6B & 6C as a percent of all discharges during the period of August 2003 through December 2003. The sample data set was standardized by plotting the percent of discharges collected during each 1-hour period during the course of the day over the period of the data collection. Both of the standardized data sets were plotted side-by-side as a histogram to compare the sampled data to the historical data (Figure 2). The resulting graph shows that the sampled data is a fair estimate of actual discharges in the two units.

The peak of the sampled data at 16:00 could be attributed to the relatively small sample size on the collected data (32 samples). The comparison also shows a few areas that are under represented compared to the historical data; this can also be attributed to the relatively small sample of data collected. Sampling more frequently, or over a longer period, should show that the sampled data tends toward the historical data (Assuming no changes in the discharge volumes of units 6B & 6C.).

Based on the comparison of the data collected and the actual discharge data from May-December 2003, the collected data is a good representation of the actual discharge patterns on units 6B and 6C.
Figure 1. Sampled Data Times Compared to Historical Discharge Times

**Discharge Navigator Discharges**
One of the desired outcomes of this project was to evaluate the benefits of the Discharge Navigator when used by nursing staff during the discharge process. The program is still being phased in throughout the various medical services used in the hospital as well as throughout the different units in the hospital. As of the date of this report the Discharge Navigator program has been implemented in the following medical services:

- Medicine Francis  8/25/2003
- Medicine Hewlett  8/25/2003
- Medicine Sturgis  1/26/2004
- Medicine Newburgh  2/9/2004
- Medicine Dock  3/24/2004
This list represents only a fraction of the total discharges in each of the units. The fraction of discharges using the Discharge Navigator was compared to the total number of discharges to estimate the total exposure that a nurse on each of the units has had to the Discharge Navigator. Figure 2 plots the percent of total discharges from the first implementation date through the end of March. The graph is consistent with the dates that new medical services were added. Since a medical service is assigned based on patient’s particular conditions, the volume of discharges during any given period can fluctuate between medical services. Based on the results of the graph, it is reasonable to assume that a nurse currently does not use the Discharge Navigator for more than approximately 20% of his/her discharges. However, due to the recent addition of more medical services the percent of use has begun to rise.

![Graph showing percent of Discharge Navigator discharges compared to total discharges from August 2003 to March 2004.](image)

**Figure 2. Percent of Discharge Navigator Discharges Compared to Total Discharges**

Table 1 further breaks down the implementation of the Discharge Navigator by medical service explaining how each service contributes to the total number of discharges over the period since the Discharge Navigator was first used by the nurses on units 6B & 6C.
### Table 1. Number of Discharge Navigator (DN) Discharges by Medical Service

<table>
<thead>
<tr>
<th>Medical Service</th>
<th>(Implementation Date)</th>
<th>Aug-03</th>
<th>Sep-03</th>
<th>Oct-03</th>
<th>Nov-03</th>
<th>Dec-03</th>
<th>Jan-04</th>
<th>Feb-04</th>
<th>Mar-04</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine Dock</td>
<td>3/24/2004</td>
<td>DN Discharges</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Discharges</td>
<td>24</td>
<td>23</td>
<td>18</td>
<td>18</td>
<td>27</td>
<td>28</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Medicine Francis</td>
<td>8/25/2003</td>
<td>DN Discharges</td>
<td>7</td>
<td>36</td>
<td>29</td>
<td>29</td>
<td>40</td>
<td>26</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Discharges</td>
<td>32</td>
<td>36</td>
<td>27</td>
<td>29</td>
<td>40</td>
<td>26</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Medicine Hewlett</td>
<td>8/25/2003</td>
<td>DN Discharges</td>
<td>7</td>
<td>43</td>
<td>32</td>
<td>40</td>
<td>38</td>
<td>23</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Discharges</td>
<td>31</td>
<td>43</td>
<td>32</td>
<td>40</td>
<td>38</td>
<td>23</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td>Medicine Newburgh</td>
<td>2/9/2004</td>
<td>DN Discharges</td>
<td>35</td>
<td>52</td>
<td>38</td>
<td>87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Discharges</td>
<td>46</td>
<td>40</td>
<td>45</td>
<td>42</td>
<td>42</td>
<td>29</td>
<td>46</td>
<td>52</td>
</tr>
<tr>
<td>Medicine Sturgis</td>
<td>1/26/2004</td>
<td>DN Discharges</td>
<td>3</td>
<td>15</td>
<td>20</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Discharges</td>
<td>20</td>
<td>33</td>
<td>20</td>
<td>18</td>
<td>17</td>
<td>18</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>All other services</td>
<td>N/A</td>
<td>DN Discharges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Discharges</td>
<td>219</td>
<td>198</td>
<td>213</td>
<td>200</td>
<td>211</td>
<td>212</td>
<td>189</td>
<td>259</td>
</tr>
<tr>
<td>Total Sum of DN Discharges</td>
<td></td>
<td>15</td>
<td>79</td>
<td>59</td>
<td>69</td>
<td>78</td>
<td>52</td>
<td>113</td>
<td>169</td>
<td>633</td>
</tr>
<tr>
<td>Total Sum of All Discharges</td>
<td></td>
<td>372</td>
<td>373</td>
<td>355</td>
<td>347</td>
<td>375</td>
<td>336</td>
<td>336</td>
<td>451</td>
<td>2945</td>
</tr>
</tbody>
</table>

To account for implementing the medical services in the middle of a month it was assumed that discharges only occurred Monday through Saturday (No discharges occurred on Sundays.), and that the total number of discharges in that month occurred evenly over everyday. For example, if a month has 30 days, (Assume the 1st is a Thursday and the 30\textsuperscript{th} is a Friday.) there would be 26 days on which a discharge would occur. Furthermore, if some medical service had 30 discharges that month and began using the Discharge Navigator on the 26\textsuperscript{th} day of that month (a Monday) the number of discharges credited as Discharge Navigator discharges would be:

\[
30 \times \left( \frac{5}{26} \right) = 5.77 \text{ Discharge Navigator Discharges}
\]

### Summary Statistics

Data was collected in two sample groups, either a Discharge Navigator discharge or a “traditional” discharge. The total number of discharges observed during the data collection period was 32, 20 traditional and 12 Discharge Navigator discharges. The data was collected using a data collection table (Appendix B) originally developed by an IOE 481 student team from the fall of 2001. Table 2 lists the summary statistics for particular tasks that potentially could have the largest impact when the Discharge Navigator is used. Both traditional and Discharge Navigator statistics are listed.
Table 2. Summary Statistics for Discharge Tasks

<table>
<thead>
<tr>
<th></th>
<th>Average Time (min)</th>
<th>Standard Deviation (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Read Discharge Order</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Navigator</td>
<td>0.71</td>
<td>0.41</td>
</tr>
<tr>
<td>Traditional</td>
<td>2.95</td>
<td>2.77</td>
</tr>
<tr>
<td><strong>Clarification from Physician</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Navigator</td>
<td>3.75</td>
<td>2.47</td>
</tr>
<tr>
<td>Traditional</td>
<td>5.84</td>
<td>7.23</td>
</tr>
<tr>
<td><strong>Fill Out Discharge Summary</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Navigator</td>
<td>13.57</td>
<td>8.35</td>
</tr>
<tr>
<td>Traditional</td>
<td>15.01</td>
<td>9.17</td>
</tr>
<tr>
<td><strong>Educate Patient</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Navigator</td>
<td>12.97</td>
<td>6.34</td>
</tr>
<tr>
<td>Traditional</td>
<td>8.33</td>
<td>4.15</td>
</tr>
</tbody>
</table>

Confidence Intervals and Statistical Analysis

In order to better estimate the times associated with an individual task a 95% confidence interval was constructed around the average times for the collected data. Since both Discharge Navigator and traditional, handwritten, discharges were analyzed separately, the sample size used to calculate each interval was small, resulting in a relatively large confidence interval. In order to better determine a standard time to carryout a particular task, more samples would have to be taken to increase the sample size, reducing the width of the confidence interval.

The average time for a given task using the traditional discharge process was statistically tested against the time to complete a task using the Discharge Navigator; due to the small sample size of each data set, the test failed to conclude a difference between the two methods in all but one task. The task (Notify Patient of Discharge) that showed a statistical difference between the methods involved a very small period of time and could have been caused by errors introduced in the data collection process. A statistical t-test was used to compare the two samples.

To compare the possible differences between traditional and Discharge Navigator discharges four of the steps involved in the discharge process were graphed against each other for comparison. The four tasks were: Read the discharge order, Clarification from the physician, Fill out discharge summary, and educate the patient. Figure 3 shows the side-by-side comparison of the average times and the 95% confidence intervals for each of the four tasks.

Not surprisingly, the average time required for clarification from a physician tends to decrease when the Discharge Navigator is used. This would likely be due to the text on
the discharge paperwork and/or screen being more legible than the traditional handwritten process.

Figure 3. Task Time and 95% Confidence Intervals Discharge Task Times

The time required to fill out the discharge summary has remained approximately constant between the methods. This could be due to the small sample size, or more likely, the fact that the nurses are not yet comfortable using the Discharge Navigator. The familiarity of the nurses with the program could be further evaluated to determine that their computer skills may be the root cause of the problem, rather than the Discharge Navigator itself.

Patient education was the only one of the four tasks that showed a considerable increase between the two sample data sets. The time devoted to patient education has increased by about 55% using the Discharge Navigator when compared to the handwritten process. This might be explained by two factors:

1. The patient gets a printed copy of the discharge documents when discharged using the Discharge Navigator. This allows the patient to better understand his/her condition, giving them the ability to get more clarification during the patient education process.
2. Since the nursing staff is using templates that are built into the Discharge Navigator software there may be items listed in the templates that are important concerns for the particular patient that the nurse may forget, if not reminded.

Recommendations

Training
From the data collected, the average time it takes to complete the discharge paperwork is not significantly different when using the Discharge Navigator and using the handwritten method. From observation, the nurses seemed to have technical issues using the Discharge Navigator, which accounts for a delay in completing the discharge summary. Nurses are often looking for someone who is more familiar with the Discharge Navigator for help. The tasks that the nurses need assistance vary from knowing how to print to more complicated problems. A few recommendations regarding the training process could help alleviate the delay in completing the discharge summary when using the Discharge Navigator.

First, the units should have more nurses on the floor that can help troubleshoot technical issues. This can be very costly and hard to implement because of the scarce resource of having enough nurses on the floor. This means having to train more super-users so that more nurses are available to train/help nurses on the floor. This would mean more technical trainers and more nurses off the floor for training. One advantage of this method, however, is that more nurses are trained in using the Discharge Navigator. The nurses on the floor would have a better support during the initial implementation of the Discharge Navigator. The time it takes for all the nurses on the floor to become familiar with the software could potentially be less.

Another recommendation is to improve the initial training for those who are not super-users so that the nurses will have less technical issues. Improvements in the training should include better familiarity with the software as well as the computer. Because the super-users are in charge of training the nurses on the floor, the cost of having a more extensive training would include not only time of the untrained nurse, but also time away from the floor of the super-user. The time it takes for the super-user to train another nurse should increase from 20 minutes to one hour. It might be useful for the nurses to get a sheet of paper on how to use Discharge Navigator to access the discharge summary. This sheet should include a step-by-step instruction from opening CareWeb, to printing the document and closing the application. In the initial roll out of the Discharge Navigator, this instruction sheet could be included in the discharge order for all patients who use the Discharge Navigator. Also in the initial training of a nurse on the floor, it might be helpful to have the nurse go through at least five sample discharges, from receiving the discharge order to printing out the discharge summary, under the super-user’s supervision. With such an intense training, the nurse may be able to have less technical problems and learn to use the software at a faster pace while on the floor.

Implementation
For the month of February, 34% of the discharges used Discharge Navigator and 37% for the month of March. Also from interviewing the nurses, 11 nurses indicated that on average they had used the discharge navigator 9 times since August 2003, clearly showing the lack of exposure with the Discharge Navigator. This lack of exposure can also account for the delay of filling out the discharge summary during the initial roll out. Our recommendation is to modify the implementation of rolling out to the units so that nurses would have more exposure to the Discharge Navigator. One possibility is to delay the roll out for the units until after June 2004. In this way, the Internal Medicine services will all be using the Discharge Navigator. Once a unit decides to roll out the Discharge Navigator, a majority of the medical services will be using it, and the nurses would have to use the Discharge Navigator more frequently. The cost of this type of implementation is the delay of the roll out of the Discharge Navigator hospital wide. The limited number of technical trainers available for support during the initial roll out for each unit could also lengthen this delay. An advantage of delaying the roll out to the units is that nurses will not only have more exposure to the Discharge Navigator right away, but also they would be able to retain more from their training given that they use it on a more regular basis. Another advantage is a higher utilization of the technical service available during the first week of the roll out. The main reason for this type of implementation is to help the nurses learn how to use the software more effectively and more quickly.

Creating Templates
Nurses on the floor have expressed their concerns about having more templates available when using the Discharge Navigator. Our client has also mentioned that creating templates takes approximately two to three hours. One possible solution to making it easier to create a template is to delegate this duty to more people. Nurses on the floor maybe able to indicate which templates are used most frequently and can give better feedback on what templates are necessary for each unit. Nurses or graduate nursing students may also be able to write templates given a specific format, which a committee can further develop and edit to fit a specific format. Having more people involved in the creation of templates could possibly make the creation of templates less difficult and less time consuming. A cost associated with having nurses create templates would be time away from the floor.

Another option would be to hire a few nurses to create templates for each unit. By delegating this task to a set of people, templates could be completed more efficiently. The cost of this would be the salaries of the people hired to do this job.
Observations
These are general issues regarding the discharge process observed while the student team was in the unit. Some of these may be further analyzed if deemed necessary.

Some nurses have had trouble with comparing data from the Problem Summary List and the Discharge Navigator, specifically when reviewing medications. The nurses spent time comparing these data. This might be an issue of training and having the nurses be more knowledgeable of the functionalities of the Discharge Navigator.

Nurses often delete information on the Discharge Navigator that they do not need for a specific patient. It may be possible to give nurses only the information that they need for a specific discharge.

There are issues with the discharge process that slowed down the time it takes to discharge a patient. The main issue is the communication between nurses and discharge planners. An example is having the correct timing of arranging transportation before the discharge; sometimes ambulances arrive too early and have to be sent away until the discharge can be completed. The student team has been informed that a program called Core Transition Improvement has been created and will be piloted in order to address this issue.
Discharge Process:

1. Could you go through the steps involved in discharging a patient?
2. Do you follow this process for all patients as they are discharged?
3. What are the major problems that you run into during a discharge?
4. What are some delays that you encounter during a discharge?
5. How often do the delays occur?
6. Is there a difference in the discharge if the patient is new, rather than a regular?
7. What is your interpretation of a simple, intermediate, and complex discharge?
8. Is there a standard discharge procedure that all RNs follow when discharging a patient?
9. How long is the average discharge?
   a. Simple discharge -
   b. Intermediate discharge -
   c. Complex discharge -
10. In your opinion, what percent of the discharges that you perform are simple?
11. What is the longest part of the discharge process?

Discharge Navigator:

1. How long have been using the Discharge Navigator?
2. How were you trained to use the Discharge Navigator?
3. How comfortable do you feel using the Discharge Navigator?
4. What kind of background do you have in using computers?
5. Has the Discharge Navigator changed the procedure you use to conduct a discharge? If yes, how?
6. Do you have any other comments to add about the discharge process using the Discharge Navigator?

Appendix A
### Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Start</th>
<th>Stop</th>
<th>Start</th>
<th>Stop</th>
<th>Start</th>
<th>Stop</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notify the Patient of discharge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notify the Tech or Host of activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Read the D/C order</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Find physician for clarification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Receive clarification from physician</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain prescription options to patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Send prescriptions to in-house pharmacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fill out Discharge Summary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start SOAP notes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order homecare supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Try to find a ride home for patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact social services for a ride for patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Get filled prescriptions from pharmacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait for the family/primary caregiver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educate patient/patient's family/caregiver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Remove IV from patient</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait and/or look for wheelchair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait and/or look for tech or host for transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Patient or Family/Caregiver sign the paperwork</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finish SOAP notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Take down Flow Board</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Give Flow Board to Clerk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Remove equipment that was in patient's room</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>