Nursing Workload Analysis for the
Pulmonary and Nephrology Clinics
at the University of Michigan Taubman Center

University of Michigan Health System
Program and Operations Analysis

Project Final Report

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The Nursing Workload Analysis report is composed of three main sections. The first section contains the Executive Summary, Introduction, Methods, and Summary pertinent to both the Pulmonary and Nephrology Clinics. The second section includes the Findings and Recommendations separated for each clinic. The third section includes the Appendices, both common and separated for each clinic.

The Table of Contents below highlights the information related to both clinics and shows the location of the Pulmonary and Nephrology Clinics’ Table of Contents, where more detail about each section will be given.

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Executive Summary

Current Situation

The nurses of the Pulmonary and Nephrology Clinics at the University of Michigan Hospital Taubman Center have worked a total of 71.1 and 63.7 hours of overtime respectively from June through October, 2009, according to the Internal Medicine Nurse Supervisor. The Internal Medicine Nurse Supervisor wants to understand why the nurses are working overtime and how it can be reduced. The Pulmonary and Nephrology Clinics have been analyzed by an Industrial and Operations Engineering (IOE) 481 team to determine the contributing factors to nurse overtime and ways to reduce the amount of nurse overtime worked in both clinics. The nurses perform a variety of tasks including calls regarding prescription refills, referrals, orders, filling out prior authorization forms, performing lab monitoring, and checking on test results. The team analyzed tasks performed by the nurses and the processes used to complete tasks, the technology utilized by the nurses, and the structure of the clinic to determine reasons for the nurse overtime.

Data Collection Methods

To determine current issues of both clinics, historical data was obtained and current data was collected using interviews, observations, a randomized work sampling study, and a volume study. The team observed and interviewed the nurses and medical assistants (MAs) within the Pulmonary and Nephrology Clinics for a total of 16 hours (roughly 2 hours per nurse and MA). The purpose of observations and interviews was to familiarize the team with the nurses, the MAs, and the clinics as well as gather information to perform the randomized work sampling study and the volume study. The second form of data collection, the randomized work sampling study, was a week long study performed in both clinics. The nurses and MAs were asked to carry a data collection sheet and a randomized work sampling tool for all hours worked within the business week. The randomized work sampling sounded randomly four times an hour. When the randomized work sampling sounded, the nurses were asked to mark down the task that they were performing. This data collection technique allowed the team to determine an approximate amount of time spent by the nurses and MAs on each task listed on the data collection sheet. After the randomized work sampling study was completed, the team performed a volume study. The purpose of the volume study was to determine the number of phone calls received by the nurses and MAs and the volume of calls placed by the nurses and MAs to a variety of sources. Like the randomized work sampling study, the nurses were asked to use a data collection sheet for a full business week. Lastly, the team analyzed historical data provided by the Medical Center Information Technology (MCIT) and the Nurse Supervisor. This data included the amount of nurse overtime as well as detailed accounts of outgoing nurse CareWeb notifications, outgoing provider CareWeb notifications, outgoing Call Center CareWeb notifications, and outgoing nurse phone calls. The purpose of this data was to determine trends in workload required of nurses on a given day or at a given time.
Data Collection Findings

The data collection illustrated the nurse and MA workload volume, peak calling and CareWeb times, and inefficiencies in communication flows with providers and nurses. The observations and interviews illustrated the large variety in tasks performed by the staff in each clinic. These results were used in the creation of the randomized work sampling and volume studies.

The randomized work sampling study illustrated how the nurses and MAs spend their time. Roughly 32.8% of the Pulmonary nurses’ time and 28.4% of the Nephrology nurses’ time was spent on symptom-related activities. The data from the randomized work sampling study was the first piece of data to illustrate the Nephrology MA’s allocation of time; the MAs in the Nephrology Clinic spend time in two roles: nurse-assist and clinic-assist. The Nephrology MA that participated in the randomized work sampling study spent 37.4% of time in the clinic-assist role. The amount of time the Nephrology MA spends in the clinic-assist and the nurse-assist roles varies each week and is not defined by the clinic, according to the Nurse Supervisor.

The volume study performed in both clinics illustrated the processes performed in regards to live and outgoing phone calls. According to the volume study, the Pulmonary and Nephrology MAs receive only 25.4% and 29.8% of their calls live, respectively. The vast majority of phone calls received by the clinic go to voicemail. The volume study also demonstrated that the nurses of the Pulmonary and Nephrology Clinics place 2.4 and 2.1 times more calls than the MAs to pharmacies in regards to prescriptions that do not require an R.N. Also illustrated was that the Pulmonary nurses receive 5.9% of their live phone calls after clinic hours. Receiving calls after clinic hours is strongly discouraged by the Nurse Supervisor because it reportedly leads to nurses performing work near the end of the day which leads to nurse overtime.

The last form of data collection utilized by the team was historical data provided by the Nurse Supervisor and MCIT. The data provided by MCIT verified a fairly consistent number of clinic visits received by both clinics over the January through August, 2009 time period. The historical data was also used in the Nephrology Clinic for different analyses due to the systems in which the nurses are assigned to providers; in the Pulmonary Clinic, the nurses’ work as a team to assist all providers whereas the Nephrology nurses are assigned to specific providers. The Nephrology Clinic assigns each provider to a nurse; the nurses support the provider with their new and revisit patients. Because of this structural difference, the team investigated the workload of both nurses in the Nephrology Clinic. The historical data illustrated that one of the two nurses receives more patients and CareWeb notes from providers than the second nurse; Nephrology Nurse 1 had 1.6 times as many clinic visits (new and revisit patients) per scheduled work hour than Nurse 2. The providers assigned to Nurse 1 created 2.4 times as many CareWeb notifications per scheduled nurse work hour than the providers assigned to Nurse 2.

Conclusions and Recommendations

The data collection techniques illustrated factors in both clinics which contribute to nurse overtime; some of the factors are similar between clinics while others are unique to one of the clinics. The team analyzed all issues to determine recommendations for each clinic.
The team recommends that the Pulmonary and Nephrology Clinics shift all incoming phone calls to the Call Center and no longer give out nurse, MA, and provider phone numbers to patients. One of the reasons the team recommends this process change is that 74.6% and 70.2% of the incoming phone calls to the Pulmonary and Nephrology clinics go to the voicemail. This process change would eliminate nurses and MAs scheduling appointments and it would filter patient phone calls; the process change could reduce nurse workload by 1.5 hours per week and MA workload by 4.5 hours per week in the Pulmonary Clinic and 1.9 hours of nurse workload and 4.9 hours of MA workload in the Nephrology Clinic.

Currently, both the Pulmonary and Nephrology Clinic nurses have expressed difficulty communicating with providers; the nurses frequently page and call providers after sending a CareWeb notification and not receiving a response. The team recommends that the providers check their CareWeb notifications every 4 hours and that the nurses only page and/or call a provider in case of an emergency.

Nurses in the Pulmonary and Nephrology Clinic are spending 10.0% and 22.4% of their time on patient-follow up, however, the system utilized by the nurses is inefficient and unorganized. Currently, the nurses print CareWeb notifications which require a staff member to call the patient at a later date, which has led to piles of paper stacked by each nurse’s desk. The team recommends that the clinics either utilize the future follow up tool provided on CareWeb or use agenda books to record when a staff member must call a patient. This will allow MAs and float nurses to help or take over tasks with little confusion.

Both the Pulmonary and Nephrology Clinic nurses perform tasks that could be delegated to an MA. Some of the tasks that could be shifted from a nurse to a MA are patient appointment scheduling, future follow up, and prescription refill calls that do not require an R.N. If all tasks currently being performed by a nurse were reallocated, roughly 15.3 and 16.0 hours per week of nurse work time could be reduced in the Pulmonary and Nephrology Clinics respectively.

Specifically for the Pulmonary Clinic, the teams recommends the implementation of the recommendations above, as well as employ a process change in their patient education. Currently, nurses spend 7.9% of their time on patient education. To reduce this, the team suggests that the clinic purchase DVDs of patient educations and create competency sheets.

The Nephrology clinic has three unique recommendations: CareWeb refresher course, nurse schedules, and definition of the MA role. A CareWeb refresher course is suggested to increase the effectiveness of the communication between the nurses and providers. CareWeb is new to the clinic and used inconsistently. The team also recommends that the two nurses are reassigned to providers, based on the number of clinic visits each provider received, the amount of CareWeb notes the providers generate, and the schedules of the providers and nurses. Lastly, the team recommends that the clinic create a clear definition for the amount of time each MA is to spend in the nurse-assist and clinic-assist roles because there is currently a great deal of variability.

The detailed information on the introduction to the project, a background of the problems in each clinic, the methods, findings, and conclusions of the data collection, and the recommendations for both clinics can be found in the report following.
1 Introduction

The Pulmonary Clinic at the University of Michigan Hospital Taubman Center treats patients with lung problems including emphysema and cystic fibrosis, and the Nephrology Clinic cares for patients with kidney illnesses. As reported by the Nurse Supervisor of the Department of Internal Medicine, the nurses in the Pulmonary and Nephrology Clinics manage activities such as prescription refills, referrals, orders, prior authorizations, lab monitoring, and test results. The Nurse Supervisor has also reported that between September 1st, 2008 and August 31st, 2009, the nurses in the Pulmonary and Nephrology Clinics worked 78.3 and 74.8 hours of overtime respectively per clinic. The amount of overtime seems to be increasing; roughly 41.4% of the Pulmonary and 60.9% of the Nephrology Clinic overtime was from the three-month period of June to August 2009 as shown in detail in Appendices D and L, respectively. The nurses in both clinics have reported that they are working overtime to finish some of the activities listed above. Therefore, the Nurse Supervisor has asked an Industrial and Operations Engineering (IOE) 481 team to identify the tasks the nurses and medical assistants (MAs) perform in a day, to determine the amount of time spent on each activity, to analyze the volume of each activity, to isolate the jobs that could be given to other employees, and to provide recommendations to reduce nurse overtime. This report presents the methods, findings, and recommendations of the team throughout the project. The methods are similar between the two clinics while the findings, recommendations, and appendices are divided by those that are similar and those that are dissimilar between the Pulmonary and Nephrology Clinics.

1.1 Background

The Pulmonary and Nephrology Clinics at the University of Michigan Hospital Taubman Center each have a team of nurses and MAs who support the providers. The nurses and MAs perform a variety of tasks. Some of these activities are limited to either the nurses or MAs while other activities overlap between the positions, meaning that both nurses and MAs perform the given task. Since September 1st, 2008, the Nurse Supervisor has noticed that the nurses have been working overtime. Table 1 summarizes the amount of overtime that each clinics’ nurses had over a 12-month period.

<table>
<thead>
<tr>
<th>Clinic at the Taubman Center</th>
<th>Nurses FTE (Full Time Equivalent)</th>
<th>Amount of Nurse Overtime (hours) 09/01/08-08/31/09</th>
<th>Amount of Nurse Overtime (hours) 06/01/09-08/31/2009</th>
<th>Percent of Nurse Overtime Occurring within 06/01/09-08/31/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary</td>
<td>2.3</td>
<td>78.3</td>
<td>32.4</td>
<td>41.5</td>
</tr>
<tr>
<td>Nephrology</td>
<td>1.6</td>
<td>74.8</td>
<td>45.5</td>
<td>60.8</td>
</tr>
</tbody>
</table>

Table 1 illustrates the amount of overtime the nurses worked within the September 2008 and August 2009 time period. The numbers of nurses in both clinics, shown in the second column, are determined by the amount of hours they are scheduled a week within a clinic. If a nurse is full time, which is defined by the Nurse Supervisor as a nurse who works 40 hours per week,
then the nurse is counted as 1 nurse. If the nurse works 20 hours a week, the nurse is counted as half a nurse.

The number of overtime nurse hours has been documented in previous IOE 481 projects in other University of Michigan Hospital clinics, specifically the Rheumatology Clinic. A fall 2008 IOE 481 team performed a similar project titled “Analysis of Nursing Workload at the Division of Rheumatology.” The project on the workload on the Division of Rheumatology as well as the nurse workload analysis of the Pulmonary and Nephrology Clinics are similar because they have parallel methodology, such as observing the nurses and collecting data regarding daily tasks. Another similarity is a final goal to reduce the amount of nurse overtime.

The Pulmonary and Nephrology Clinics investigation was inspired by the Rheumatology nurse workload project, which discovered that nurses were working overtime to complete a variety of tasks and provided recommendations to standardize nurses’ and MAs’ work. The current Nurse Supervisor noticed trends similar to those reported in the Rheumatology Clinic project and aimed to determine the cause for the overtime in the Pulmonary and Nephrology Clinics and to develop ways to eliminate the need for it.

1.2 Goals and Objectives

The primary goals of this project were to determine the reasons nurses are working overtime and develop methods to reduce or eliminate overtime. To achieve these goals, the team performed the following tasks:

- Identified the most time consuming tasks
- Eliminated waste in tasks
- Determined which daily tasks should be performed only by a nurse or only by a MA
- Developed recommendations

The team’s methodology consisted of observations, interviews, a randomized work sampling study, a volume study, a process flow chart, and historical data analysis to determine how much time a nurse and MA spend on each task and how the nurses and MAs perform each of these tasks.

1.3 Key Issues

The following key issues contributed to the problem under investigation.

- Nurses and MAs perform certain tasks with large variability.
  - Example: Some nurses keep track of patient follow up calls by stacking printed CareWeb notifications, while other nurses file printed CareWeb notifications into an accordion folder.
- The Nurse Supervisor has reported that nurses and MAs perform work that should be performed by other people.
  - Example: MAs have the authority to call in the majority of prescriptions but some nurses still perform this task.
• The Nurse Supervisor has reported that nurses and MAs perform work that should be performed at a different time.
  o Example: Nurses may page providers at the end of the work day regarding a prescription refill that should wait and be handled the following work day.

1.4 Project Scope

This project included only the nurses of the Pulmonary and Nephrology Clinics of the University of Michigan Taubman Center and the MAs who assist these nurses. This project analyzed all activities that the nurses and MAs perform during the day shift Monday through Friday.

Any MA who only assists the clinic (versus an MA who assists the clinic’s nurses) was not included in the scope of this project. Programs that are specialties under the Pulmonary and Nephrology Clinics, such as the Dyspnea Clinic, were not included in this project. Finally, the feasibility and implementation of recommendations was not included in the scope of this project.

2 Methods

The team performed this project in three phases: data collection, data analysis, and recommendations. Based on our literature search, the data collection phase included: observations, interviews, a randomized work sampling study, a volume study, a process flow chart, and historical data.

2.1 Observations

The team observed the nurses and MAs for 2 hours each as they performed daily tasks (phone calls, patient work, etc.) in the Pulmonary and Nephrology Clinics, with a total of six nurses and two MAs; resulting in, a total of 16 hours of observation between the three-member team. The purpose of this method was to familiarize the team with the nurses, MA, and clinic, as well as gather information to perform the randomized work sampling study and the volume study.

In these observations, the team recorded general observations of nurses’ and MAs’ tasks. All three team members observed six nurses or two MAs for one hour per person observed. With this method of observation, the team had two sets of observations, recorded by different team members, for each nurse and MA that occurred at different times to allow the team to get an accurate depiction of the nurses’ and MAs’ tasks throughout the day. This method also allowed the team to compare observations for each nurse or MA to validate what each nurse or MA had communicated to the team member. All of the nurses and MAs in the Pulmonary and Nephrology Clinics were observed with the exception of a float nurse who could not be observed as scheduled because the nurse was not working in either the Pulmonary or Nephrology Clinics during the observations.

2.2 Interviews

Each team member also interviewed the same nurse or MA who was observed. The purpose of the interviews were to familiarize the team with the nurses, MAs, and clinic, as well as gather
information to perform the randomized work sampling study and the volume study, particularly a list of tasks performed by the nurses and MAs in the Pulmonary and Nephrology Clinics. The interview questions are shown in Appendix A.

2.3 Randomized Work Sampling Study

In the randomized work sampling study, the nurses and MA collected data while they were working on their daily tasks. Each nurse and MA carried a beeper, which sounded randomly approximately 4 times an hour. When the beeper sounded, the nurse or MA recorded on a card, which the team provided, the task they were performing at the time. This study was designed to provide information regarding how time is allocated to various activities the nurses and MAs perform.

The team used the observations and interviews to create the randomized work sampling study data collection sheet. This sheet was then presented to the Nurse Supervisor and project coordinator for discussion. Upon completing minor changes to make the sheet easier to understand, the team began the randomized work sampling study with the help of the nurses and MAs. Figure 1 shows the data collection sheet for the randomized work sampling study.

![Figure 1: Randomized Work Sampling Study Data Collection Sheet](image)

The randomized work sampling study consisted of one trial day and a week of data collection. The purpose of the trial day was for the team to receive feedback from the nurses and MAs on the study, to clarify any concerns, and to prevent problems from occurring during the actual study. Two nurses and one MA from the Pulmonary and Nephrology Clinics participated in the trial. As a result of the trial, no changes were made to the data collection sheet, but additional instructions were given to the nurses and MAs, including a task definitions sheet that was developed after the trial day. The purpose of the task definitions sheet was to apply consistent interpretations and responses based on the definition of each task, between all participants during the study. The randomized work sampling study task definitions sheet is included in Appendix B.
2.4 Volume Study

The volume study was similar to the randomized work sampling study; both were self data collection studies used to determine aspects of the work performed in the clinic that may be leading to nurse overtime. Each nurse and MA carried a card that listed types of phone calls they placed and the number phone calls they received, which the team provided. Once a phone call on the card was completed, the nurse or MA made a tick on the card. The nurses and MAs performed this study for one week. The team analyzed the data provided by the study to understand which phone calls are being made by the nurses that can be delegated to the MAs, and which calls are occurring most frequently.

The version of the data collection sheet, shown in Figure 2, was the first of four versions used in the Pulmonary and Nephrology Clinics.

![Figure 2: First Volume Study Data Collection Sheet](image-url)

The nurses and MAs provided a great deal of feedback on the first, second, and third revisions of the volume study. The issues of the data collections sheets included:

- Nurses and MAs reported difficulty determining when one task ended and another began.
- Nurses and MAs reported difficulty determining how to categorize certain activities.
- Nurses and MAs said that this study would be time consuming and would require additional time, possibly overtime, to their day.
- Multiple nurses and MAs had scheduled time off during the week identified for the volume study and others were ill.
- Nurses described difficulty in determining when to record tasks and when not to record tasks; some of the tasks from the randomized work sampling study were not included in some versions of the data collection sheet.

The issues described by the nurses and MAs were used to create each version of the volume study data collection sheet. The final revision of the data collection sheet is shown in Figure 3.
Figure 3: Final Volume Study Data Collection Sheet

<table>
<thead>
<tr>
<th>PHONE CALLS TO:</th>
<th>7:00 - 9:59 AM</th>
<th>10:00 - 12:59 PM</th>
<th>1:00 - 3:59 PM</th>
<th>4:00 - 6:59 PM</th>
<th>After 7:00 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient (purpose in placing call= SYMPTOM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= SCHEDULE APPT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= DISCUSS LAB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= SCHEDULE A LAB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacy- Call in immunosuppressant, narcotic, or non-oral antibiotics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacy- Other prescriptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group voicemail box (check for each voicemail)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (record on back)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| PHONE CALLS FROM:                        |                 |                  |               |               |              |
| Live Phone calls (record all live calls) |                 |                  |               |               |              |
|                                          | Date:           | Overtime (Y/N):  |               |               |              |
|                                          | Start Time:     | End Time:         |               |               |              |

Figure 3 illustrates the data collection sheet used in the Pulmonary and Nephrology Clinics. The data collection sheet is a detailed phone study, which indicated the type of phone calls that was most frequent, the number of calls being answered live or by voicemail, the number of calls that were performed by nurses but could be delegated to an MA, and the number of phone calls answered after clinic hours. See Appendix C for a detailed account of each version of the volume study data collection sheet.

2.5 Process Flow Chart

The team analyzed the nurses’ and MAs’ distribution of work and time on various activities by diagramming the process flow. This started by creating a process flow of all incoming patient phone calls and branched out to the different entities receiving the call, the different purposes of the call, and the action taken by the nurses, MAs, providers, and Call Center staff.

Team members asked a nurse from the Pulmonary Clinic and an MA from the Nephrology Clinic about the activities and process that occur when a patient calls each of their clinics. Based on the nurse’s and MA’s descriptions, the team mapped the process flow, showing the reasons for incoming calls, the various stakeholders involved for each call, and the actions performed by each stakeholder. Appendix G and Q illustrates the process flow chart for incoming calls into the Pulmonary and Nephrology Clinics, respectively.

2.6 Historical Data

The team examined the trends of clinic workload as well as nurse and MA workload by analyzing historical data provided by the Medical Center Information Technology (MCIT). Data provided by MCIT included nurses’ overtime data, number of new and revisit patients seen at the clinic, outgoing phone calls placed by nurses and nurses’ incoming CareWeb notifications from the providers of the clinic and the Call Center. The majority of the data was used to determine if current scheduling practices within the Pulmonary and Nephrology Clinics are the most efficient.
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3 Pulmonary Findings and Conclusions

The second phase of the project was the data analysis phase. Based on the data collected, the team developed findings and conclusions based on: observations, interviews, a randomized work sampling study, a volume study, a process flow chart, and historical data.

3.1 Observations: Variety in Tasks Performed by Nurses and MAs

For one hour, each team member observed the tasks performed by the nurse or MA and asked questions to clarify the tasks performed. After compiling all the observation notes, the team’s findings indicate that the nurses and MA perform a large variety of tasks, such as updating CareWeb notes, calling patients, paging providers, and faxing. Most of the time, the nurses performed computer tasks, either writing or reading CareWeb notes, or phone tasks, ranging from calling patients to calling pharmacies. The MA tasks included taking live phone calls and listening to recorded voicemail messages from patients.

3.2 Interviews: Variation in CareWeb Notification Response Time

Based on interviews, the team generated a list of tasks performed by the nurses and MA. Additionally, the team compiled a list of current problems reported by the nurses and MA. The main problems included obtaining CareWeb notification responses from the providers and the variability of tasks and workload throughout each day. A summary of the notes the responses to the questions can be found in Appendix F.

3.3 Randomized Work Sampling Study: Nurses Spend 32.8% of Time on Symptom Related Activities

The nurses and MA in the Pulmonary Clinic were asked to participate in the randomized work sampling study for one week. A summary of the findings appears in Figure 4.
The randomized work sampling study result in Figure 4 reinforced the information gathered from the observations and interviews, as it shows the nurses spend 32.8% of time on “Symptoms” (performing activities regarding symptoms). It also shows that most tasks are performed by both nurses and MA, implying a lack of allocation of who can perform tasks in the clinic.

### 3.4 Volume Study: Nurses Could Reallocate 130.9 Minutes per Week on Outgoing Calls

The nurses and MA in the Pulmonary Clinic were asked to participate in the volume study for one week. A summary of the findings appears in Figure 5.
Figure 5: Pulmonary Clinic – Volume Study Results Data
Sample size of 4, Data Collected by Pulmonary Nurses and MA for 10/26/09-10/30/09 Time Period

In Figure 5, nurses made the largest percentage of calls to a patient in regards to symptoms while the MA made the most calls to download each individual voicemail. The volume study results in Figure 5 show activities that nurses spend time on that can be allocated to an MA, such as scheduling appointments and calling the pharmacy for prescriptions. The MAs can perform these tasks as they have the necessary training and sufficient medical expertise but currently had been assisting the nurses in other administrative tasks such as faxing and downloading voicemail. Calls regarding prescriptions and appointments add up to 19.8% of all phone calls currently placed by nurses that could be allocated to an MA. Reallocation of calls regarding prescriptions and appointments would reduce nurse workload by approximately 130.9 minutes per week.

The volume study results also showed if incoming phone calls were answered live or if a patient left a voicemail. Figure 6 shows the comparison of live calls versus voicemails to the MA.
The volume study incoming calls data in Figure 6 shows 75% of calls to Pulmonary MA go to voicemail. This causes an inefficient process which entails the MA to call the voicemail box, download voicemails, listen to them, and then either create CareWeb notes or call the patient back for more information.

3.5 **Process Flow Chart: Nonstandard Assignment of Tasks to Nurses and MAs**

The team mapped the process flow, showing the reasons for incoming calls, the various clinic staff involved for each call, and the actions performed by each clinic staff. Appendix H illustrates the complete process flow chart for incoming calls into the Pulmonary Clinic and Call Center. It indicates problems with task assignment by role, nonstandard procedure for handling calls, and communication between the nurses and providers. Currently, both the nurses and MA are performing tasks related to prescription calls, lab scheduling, and patient follow ups calls, making the assignment and procedure of tasks nonstandard.

With regards to the problems in communication between the nurses and providers, Figure 7 shows a branch of the process flow titled Provider Reroute.
In the Provider Reroute, when providers do not reply to a CareWeb note, nurses use multiple other modes of communication to get a response from a provider, including a page, phone call, and/or visit in clinic. During the communication, the nurse will receive a verbal response from the provider regarding patient information, which the nurse must then type into a CareWeb note to ensure that there is a record of the communication. This method is inefficient and causes nurses to do extra work as they need to communicate with the provider both in a written and oral form, and then type the information into CareWeb.

3.6 Historical Data: Average Outgoing Nurse and MA Phone Call Length

The historical data collected consisted of outgoing calls and CareWeb notes generated by nurses, MAs, providers, and the Call Center. Figure 8 shows the percentage of calls made each hour by the nurses in the Pulmonary Clinic.
The peak time nurses make calls occurs between 3:00 pm and 5:00 pm. These hours fall within the nurses’ current schedules.

The historical data of nurse outgoing phone calls was also used to calculate the average outgoing phone call length. The data provided by MCIT illustrated an average call length of 2.42 minutes for the nurses and an average call length of 2.20 minutes for the MA. Details of the nurses’ outgoing phone calls by time of day can be seen in Appendix G.

Data regarding the nurses’ overtime hours and number of clinic visits (new and revisit patients) at the clinic was also collected. The data gave the team information about the nurses’ overall increased workload in the clinic and the change in overtime hours needed across a three month period. The nurse’s overtime data can be seen in more detail in Appendix D and the nurses’ clinic workload data can be seen in Appendix E.

4 Pulmonary Recommendations

The third and final phase of this project was developing recommendations. The team has five distinct recommendations for the Pulmonary Clinic regarding the Call Center, Provider Reroute, Patient Education, Future Follow Up, and Reallocation of Tasks.

4.1 Call Center: Shift Incoming Phone Calls to the Call Center

The process in which a clinic receives information from patients varies from one clinic to another: some clinics have patients call their MA line, some clinics have patients call their nurses directly, some clinics have patients call the Call Center, and other clinics use a combination of all possibilities. The observations and mapping the current process flow show that the majority of Pulmonary patients call either a nurse line or the MA line. Although, the Pulmonary nurses only give out their personal numbers for emergencies, as reported by the nurses. The team observed inefficiencies with this process and quantified some of these issues using the volume study. One
of the main problems pertaining to the incoming call process is that many of the incoming calls go to voicemail. The volume study showed that the MA answered 25.4% of calls, while the other 74.6% calls went to voicemail. However, this data could be skewed because the MA was new and in training for 1-2 weeks while the volume study was conducted. For this period, the MA may not have been at the clinic throughout the day and perform activities regularly.

Voicemails require additional nurse or MA time because they need to be downloaded and then responded to, which may entail the generation of a CareWeb note, another phone call, etc. Another issue in the Pulmonary Clinic is that the nurses answer incoming phone calls after the clinic hours (4:30 pm). Roughly 5.9% of calls placed by the nurses during a weeklong volume study were placed after 4:30 pm. The Nurse Supervisor has informed the team that the nurses should not be receiving phone calls after hours because the nurses will have additional tasks near their scheduled departure time, which frequently leads to the necessity of overtime.

To reduce the amount of calls that go to voicemail and calls answered after clinic hours, the team recommends that the Pulmonary Clinic shift all incoming phone calls to the Call Center. The calls that will be shifted to the Call Center are summarized in Table 2.

<table>
<thead>
<tr>
<th>Pulmonary Clinic</th>
<th>7:00-AM</th>
<th>9:00-AM</th>
<th>12:00-PM</th>
<th>2:00-PM</th>
<th>After 4:30 PM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Voicemails Received</td>
<td>Nurse</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Incoming Live Calls</td>
<td>2</td>
<td>7</td>
<td>13</td>
<td>10</td>
<td>2</td>
<td>34</td>
</tr>
<tr>
<td>Total Voicemails Received</td>
<td>MA</td>
<td>4</td>
<td>40</td>
<td>15</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Incoming Live Calls</td>
<td>0</td>
<td>14</td>
<td>6</td>
<td>9</td>
<td>0</td>
<td>29</td>
</tr>
</tbody>
</table>

According to volume study results illustrated in Table 2, 122 phone calls per week will be shifted from the clinic to the Call Center. Shifting the calls will reduce nurse workload by 90 minutes per week and MA workload by 251 minutes per week.

The team also recommends that the Pulmonary Clinic (nurses, medical assistants, and providers) only give patients the Call Center phone number. The benefits of this process change include eliminating the need for nurses to receive phone calls after hours and download voicemails left outside of clinic hours. The Call Center would filter the calls according to the person required to respond to the call (provider, nurse, medical assistant, clerk, etc.). The shift will also allow patients to speak to a live person when the calls are placed during Call Center hours.

4.2 Provider Reroute: Standardize Provider Check of CareWeb Every 4 Hours

The method of contacting and communicating with providers called the Provider Reroute has resulted in a cycle where providers do not check their CareWeb notes regularly because they are
used to being paged and nurses are not waiting for providers to reply through CareWeb, as they can obtain a faster response by paging the provider. This method is inefficient and causes nurses to do extra work as they need to communicate with the provider both in a written and oral form, and then type the information into CareWeb.

To eliminate the Provider Reroute, providers should check CareWeb notes every 4 hours. Nurses will not page the provider when a response is needed and wait until the provider replies to the CareWeb note, unless there is an emergency. Nurses and MAs should also inform patients that there is a 24-hour turnaround provider response time for non-emergency inquiries. Finally, the clinic should clearly define which patient situations constitute an emergency, thus requiring a page.

By implementing this CareWeb check, nurses will know when to expect a response from the providers and will not resort to paging them immediately unless it is an emergency. If providers respond to CareWeb notes, the nurses’ workload will be reduced as they will no longer have to spend time talking to the provider and then writing up their response in the CareWeb system. This system will allow nurses to spend time on other tasks and ensure an easier communication flow between providers and nurses.

4.3 Patient Education: Purchase DVDs and Create Competency Sheets

During interviews, the nurses reported feeling interrupted in their daily tasks when providers ask for the nurse to provide patient education for a medication, tool, or procedure pertaining to the patient’s health. The nurse who is at a convenient break point usually takes on this task. There are several types of patient education, which vary significantly in time depending on the type of education and patient. A list of patient educations can be found in Appendix J. The most frequent patient educations include the bronchoscopy, immunosuppressant, and inhalers educations.

The clinic is unaware that a patient will require an education until the appointment takes place. The team recommends the clinic to purchase DVDs of current patient educations and create competency sheets which will ensure that the patient has understood the key teachings presented in the DVD. Rather than the nurses being taken away from their work to perform a teaching, the patient watches the DVD (on a computer that is already available in the clinic rooms) and when the DVD is finished, the patient and nurse check through a competency sheet, to ensure the patient understands the information, and the patient can ask the nurse any questions pertaining to the education.

4.4 Future Follow Up: Implement Standardized Future Follow Up System

Currently, Pulmonary nurses are printing CareWeb notifications and writing down the dates for future patient follow up calls on the sheet. The printed notes are then organized chronologically with labels and placed into various piles based on the day of the week the call is due. After the patient has been called, each nurse must then go on to CareWeb and update a note that the patient was called. The current system is inefficient for the nurses because it requires them to keep track of several piles of paper, which could easily be lost. Moreover, this system is not very intuitive, making it hard for incoming float nurses to understand the system and implement it on
a given day. Finally, redundant work is being performed in utilizing both a printed and electronic copy of the CareWeb note, as nurses will still have to go into CareWeb to ensure that a record of the call has been made.

To streamline the patient future follow up process, two alternative recommendations are presented. The first is to train nurses and MAs to utilize the CareWeb’s “Future Follow Up” call status and the second is to utilize an agenda book to record all future follow up calls to be made.

The “Future Follow Up” call status has been part of the CareWeb system since the software was launched. However, the Pulmonary Clinic has never used the “Future Follow Up” call status. Figures I-1 and I-2 in Appendix I show how the “Future Follow Up” call status appears in CareWeb. When creating a note in CareWeb, a nurse can change the current status to “Future Follow Up” and select a due date. Once the note is saved, it will show with a “F/U” status in a selected CareWeb inbox. Nurses can then sort all CareWeb notes on the inbox by their due date, finding the follow ups that need to be done each day. Since this system is in CareWeb, nurses can then change the call status once the call has been made, and make a record that the follow up call has been made. The team recommends that nurses and MA take a CareWeb training course, focusing on shortcuts, so they can learn about the benefits of this feature and other features in CareWeb.

An alternative solution is an agenda book in which nurses write the patient follow up call that is needed on the due date. This way, the nurse can open the agenda book on a given date and go through the list of follow up calls for that day. Float nurses or MAs can take over the agenda book for any nurse who is out of the office. If patient follow up calls are assigned only to MAs, each nurse can give the MA a page with the day’s list of calls to be made and the MA can store all the past follow up pages in a binder/folder.

The benefits of implementing either of these solutions are having a more organized and efficient system of tracking future follow up calls, allowing for float and MAs to help nurses in this task (if needed), and the system will create a record of the calls made. Nurses will no longer have to print and stack piles of CareWeb notes, and will have a list of all patient follow up calls in one consolidated system (either online or in the agenda book). Also, a float nurse that comes to the clinic will be able to quickly understand how each system works and help respond to follow up calls for that day. Finally, using either system will create a record of calls, as nurses will have either a binder containing all the previous follow up calls made, or a note of the call placed in the CareWeb system.

4.5 Reallocation of Tasks: Shift Portion of Tasks from Nurses to MA

The randomized work sampling and volume studies have illustrated that nurses perform tasks that could be reallocated to the MAs. Specifically, the randomized work sampling study showed that nurses spend roughly 13.4 hours per week on work that could be delegated to an MA, including 9 hours per week on patient follow up and 4.4 hours per week on prescription refills that do not require an R.N. In October 2009, there was a shift from a clerk to a nurse-assist MA. This led nurses to perform tasks that would usually be done by a fully trained MA.
To reduce the nurses’ current workload, MAs should perform the following nurse tasks: all calls pertaining to prescriptions (with the exception of immunosuppressant, narcotics, non-oral antibiotics), all patient follow up calls, appointment and lab scheduling and patient education. Some of the patient education needs to be delivered specifically by a nurse while others can be done by an MA. Appointment and lab scheduling does not require a nurse and can be done by an MA. Finally, MAs can perform all follow up patient calls and send a CareWeb note to the nurse if the patient has questions outside the MA’s range of expertise. Having the MAs be responsible for all future follow up calls will allow the MA to filter all calls to the nurse, allowing the nurse to only speak to patients when it is necessary.

The main benefits of the reallocation of tasks from a nurse to an MA are the reduction of the overall workload of the nurses and overtime on a particular day. Based on the randomized work sampling study results, it is estimated that the nurse’s workload would be decreased by approximately 13.4 hours per week, which accounts for 17% of their time. Moreover, since nurses are currently working an average of 14.2 hours of overtime in the Pulmonary Clinic (data collected from Nurse Supervisor for June 2009 to October 2009 time period), this reallocation of work could eliminate the regular need for overtime. However, the clinic MA does not have an additional 13.4 hours a week to perform tasks allocated by the nurses. The team recommends that the nurses reallocate 3.5 hours of work to the MAs per week, which would eliminate the need for overtime. This recommendation accompanied with the Call Center recommendation, would give nurses and MAs workload equivalent or less to the number of hours they are scheduled a week.
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5 Nephrology Findings and Conclusions

The second phase of this project was the data analysis phase. Based on the data collected, the team developed findings and conclusions based on: observations, interviews, a randomized work sampling study, a volume study, a process flow chart, and historical data.

5.1 Observations: Variety in Tasks Performed by Nurses and MAs

For one hour, each team member observed the tasks performed by the nurse or MA and asked questions to clarify the tasks performed. After compiling all the observation notes, the team’s findings indicated that the nurses and MA perform a large variety of tasks, such as updating CareWeb notes, calling patients, paging providers, and faxing. Most of the time, the nurses performed computer tasks, either writing or reading CareWeb notes, or phone tasks, ranging from calling patients to pharmacies. The MA tasks included listening to recorded voicemail messages from patients and verifying if faxed lab tests were already in the CareWeb system.

5.2 Interviews: Variation in CareWeb Notification Response Time

Based on interviews, the team generated a list of tasks performed by the nurses and MA. Additionally, the team compiled a list of current problems reported by the nurses and MA. The main problems included obtaining CareWeb notification responses from the providers and the variability of tasks and workload throughout each day. A summary of the notes the responses to the questions can be found in Appendix M.

5.3 Randomized Work Sampling Study: Time Spent by MA in Clinic-Assist and Nurse-Assist Roles Varies

The nurses and MA in the Nephrology Clinic were asked to participate in the randomized work sampling study for one week. A summary of the findings appears in Figure 9.
The randomized work sampling study result in Figure 9 reinforced the information gathered from the observations and interviews, as it shows the nurses spend 28.4% of time on “Symptoms” (performing activities regarding symptoms). It also shows that most tasks are performed by both nurses and MA, implying a lack of allocation of who can perform tasks in the clinic.

One unexpected finding was the variation in the amount of time spent by the MA in the clinic-assist position versus the nurse-assist position. The data collected from the randomized work sampling for the MA is illustrated in Figure 10.
The randomized work sampling study results in Figure 10 reinforced how time is spent by the MA in the nurse-assist and clinic-assist roles vary by day. As reported by the MA, the clinic has first priority, therefore the MA is required to perform tasks in the clinic prior to in the nurse-assist position. However, the amount of clinic work varies by the day; the amount of clinic work is dependent upon the number of patient clinic visits and the providers in clinic.

5.4 Volume Study: Nurses Could Reallocate 195.4 Minutes per Week on Outgoing Calls

The nurses and MA in the Nephrology Clinic were asked to participate in the volume study for one week. A summary of the findings appears in Figure 11.
In Figure 11, nurses made the largest percentage of calls to a patient in regards to symptoms while the MA made the most calls to download each individual voicemail. The volume study results in Figure 11 also show activities that nurses spend time on that can be allocated to an MA, such as scheduling appointments and calling the pharmacy for prescriptions. The MAs can perform these tasks as they have the necessary training and sufficient medical expertise but currently had been assisting the nurses in other administrative tasks such as faxing and downloading voicemail. Calls regarding prescriptions and appointment scheduling add up to 24.0% of all phone calls currently placed by nurses. Shifting all phone calls that do not require an R.N. to a MA would reduce nurse workload by 195.4 minutes per week.

The volume study results also showed if incoming phone calls were answered live or if a patient left a voicemail. Figure 12 shows the comparison of live calls versus voicemails to the MA.
The volume study incoming calls data in Figure 12 shows 70% of calls to Nephrology MA go to voicemail. This causes an inefficient process which entails the MA to call the voicemail box, download voicemails, listen to them, and then either create CareWeb notes or call the patient back for more information.

5.5 Process Flow Chart: Nonstandard Assignment of Tasks to Nurses and MAs

The team mapped the process flow, showing the reasons for incoming calls, the various clinic staff involved for each call, and the actions performed by each clinic staff. Appendix Q illustrates the complete process flow chart for incoming calls into the Nephrology Clinic and Call Center. It indicates problems with task assignment by role, nonstandard procedure for handling calls, and communication between the nurses and providers. Currently, both the nurses and MA are performing tasks related to prescription calls, lab scheduling, and patient follow ups calls, making the assignment and procedure of tasks nonstandard.

With regards to the problems in communication between the nurses and providers, Figure 13 shows a branch of the process flow titled Provider Reroute.
In the Provider Reroute, when providers do not reply to a CareWeb note, nurses use multiple other modes of communication to get a response from a provider, including a page, phone call, and/or visit in clinic. During the communication, the nurse will receive a verbal response from the provider regarding patient information, which the nurse must then type into a CareWeb note to ensure that there is a record of the communication. This method is inefficient and causes nurses to do extra work as they need to communicate with the provider both in a written and oral form, and then type the information into CareWeb.

### 5.6 Historical Data: Unequal Workload Between Nurses

The historical data collected consisted included information on the number of clinic visits (new patients and revisit patients) received by providers. From there, the team determined the number of clinic visits each nurse attended to by quantifying the number of clinic visits the providers assigned to the nurses received from January to August, 2009. Figure 14 shows the number of clinic visits per nurse scheduled work hour that the nurses received.
Table 3: Nephrology Clinic – Provider CareWeb Notification Generation
Sample Size of 37, Generated by MCIT over 07/2009- 10/2009 Time Period

<table>
<thead>
<tr>
<th></th>
<th>Percent of Received CareWeb Notes on Week Days not Scheduled</th>
<th>Percent of Received CareWeb Notes on Weekend Days</th>
<th>Percent of Received CareWeb Notes after/before hour s on Scheduled Days</th>
<th>Percent CareWeb Notes Received when NOT scheduled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse 1</td>
<td>-</td>
<td>17.0%</td>
<td>33.8%</td>
<td>50.8%</td>
</tr>
<tr>
<td>Nurse 2</td>
<td>32.3%</td>
<td>19.8%</td>
<td>22.1%</td>
<td>74.2%</td>
</tr>
</tbody>
</table>

One key finding from Table 3 is that Nurse 2 receives almost a third of CareWeb notifications on unscheduled week days. On the days when only one nurse is scheduled, the nurse receives CareWeb notifications in a first-in, first-out method. Therefore, the full time nurse attends to notifications from the providers they are assigned to and the providers assigned to the other nurse. This increases the amount of workload for the full time nurse. More detail on the amount of CareWeb notes generated by providers is provided in Appendix N.
6 Nephrology Recommendations

The third and final phase of this project was developing conclusions and recommendations. The team has seven distinct recommendations for the Nephrology Clinic incoming the Call Center, Provider Reroute, CareWeb Refresher, Nurse Schedules, MA Definition of Tasks, Future Follow Up, and Reallocation of Tasks.

6.1 Call Center: Shift Clinic Incoming Phone Calls to the Call Center

The process in which a clinic receives information from patients varies from one clinic to another: some clinics have patients call their MA line, some clinics have patients call their nurses directly, some clinics have patients call the Call Center, and other clinics use a combination of all possibilities. The observations and mapping the current process flow show that the majority of Nephrology patients call the nurses directly. The Nephrology nurses have been instructed by the providers to keep close, personal contact with their patients through phone calls and e-mail, as reported by the nurses. The team observed issues with the incoming call process and quantified some of these issues using the volume study.

Incoming calls going straight to voicemail is a major concern for the clinic. The MA analyzed during the volume study answered 29.8% of calls, while the other 70.2% calls went to the voicemail. Voicemails require additional nurse or MA time because they first need to be downloaded and then listened to, which may entail the generation of a CareWeb note, another phone call, etc.

The team recommends that the Nephrology Clinic shift all incoming phone calls to the Call Center. Table 4 summarizes the number of calls per week that will be shifted from the Nephrology Clinic to the Call Center.

| Table 4: Nephrology Clinic – Incoming Calls Shifted to the Call Center |
| Sample Size of 2, Data Collected by Nephrology Nurse and MA for 10/26/09-10/30/09 Time Period |
| Nephrology | 7:30-8:00 | 8:00-10:59 | 11:00-1:59 PM | 2:00-3:59 PM | 4:00-5:59 PM | Total |
| Nurse | AM | AM | 1:59 PM | PM | PM | Total |
| Total Voicemails Received | 0 | 2 | 0 | 0 | 0 | 2 |
| Incoming Live Calls | 5 | 32 | 26 | 10 | 0 | 73 |
| MA | AM | AM | 1:59 PM | PM | PM | Total |
| Total Voicemails Received | 0 | 32 | 31 | 22 | 0 | 85 |
| Incoming Live Calls | 0 | 9 | 15 | 12 | 0 | 36 |

According to the volume study data summarized in Table 4, 131 phone calls per week will be shifted from the Clinic to the Call Center. Shifting the calls will reduce nurse workload by 183 minutes per week and MA workload by 254 minutes per week.

The team also recommends that the Nephrology Clinic (nurses, medical assistants, and providers) only give patients the Call Center phone number. The benefits of this process change...
include eliminating the need for nurses to receive phone calls after hours and download voicemails left outside of clinic hours. The Call Center will also filter the calls according to the person required to respond to the call (provider, nurse, medical assistant, clerk, etc.). Routing calls to the Call Center will also allow patients to speak to a live person when the calls are placed during Call Center hours.

### 6.2 Provider Reroute: Standardize Provider Check of CareWeb Every 4 Hours

The method of contacting and communicating with providers called the Provider Reroute has resulted in a cycle where providers do not check their CareWeb notes regularly because they are used to being paged and nurses are not waiting for providers to reply through CareWeb, as they can obtain a faster response by paging the provider. This method is inefficient and causes nurses to do extra work as they need to communicate with the provider both in a written and oral form, and then type the information into CareWeb.

To eliminate the Provider Reroute, providers should check CareWeb notes every 4 hours. Nurses will not page the provider when a response is needed and wait until the provider replies to the CareWeb note, unless there is an emergency. Nurses and MAs should also inform patients that there is a 24-hour turnaround provider response time for non-emergency inquiries. Finally, the clinic should clearly define which patient situations constitute an emergency, thus requiring a page.

By implementing this CareWeb check, nurses will know when to expect a response from the providers and will not resort to paging them immediately unless it is an emergency. If providers respond to CareWeb notes, the nurses’ workload will be reduced as they will no longer have to spend time talking to the provider and then writing up their response in the CareWeb system. This system will allow nurses to spend time on other tasks and ensure an easier communication flow between providers and nurses.

### 6.3 CareWeb Refresher: Provide CareWeb Training to Providers

Another component contributing to the Nephrology nurses’ workload is the time spent on creating new CareWeb notifications for the providers they support. Providers communicate with the nurses through GroupWise email and CareWeb. The usage of two system results in the nurses’ performing redundant work by copying and pasting information back and forth between GroupWise and CareWeb to ensure that a record of the nurse-provider communication occurred. The utilization of two systems leads to nurses doing redundant work by transferring information twice (between the two systems) and results in an overall inefficiency in the communication flow between nurses and providers.

To fully transition from GroupWise communication to CareWeb-only communication, the team recommends that all providers take CareWeb “refresher” training class. This will allow those providers who did not take the first training class to be fully exposed to what the CareWeb system is and its benefits. The training class will also help those providers who already took the
training class to be reminded on some of the features that could aid them in being more efficient and effective in creating, updating and sending notes through CareWeb.

This recommendation will help the nurses and providers communicate more effectively because both entities will be using only one system and will hence be able to respond quicker. Its implementation will also significantly decrease the Nephrology nurses’ workload in eliminating redundant work by using both GroupWise and CareWeb. Utilizing only CareWeb will allow the nurses more time to focus on doing symptom-related work, checking on patient information and blood tests and problem solving case-by-case patient issues. Finally, patient information will be kept only in one system, decreasing security risks usually present in email systems.

6.4 Nurse Schedules: Reassign Providers to Nurses

Clinics within the Taubman Center use one of two methods in which nurses and providers work together to service the patients: 1) a teamwork approach, where all nurses assist each provider or 2) an assignment approach, where each nurse is assigned to assist specific providers. The Nephrology Clinic utilizes the second approach. While in theory, both approaches work equally well, the team has determined that the workload created by the division of providers is imbalanced between the two nurses.

An imbalance of workload between the two Nephrology nurses had been reported by the Nurse Supervisor and the nurses themselves. To investigate this issue, the team analyzed data provided by the Nurse Supervisor and MCIT. According to data provided by the Nurse Supervisor, Nurse 1 has 1.6 times as many clinic visits (new and revisit patients) per scheduled hour as Nurse 2. According to data provided by MCIT, the providers assigned to Nurse 1 generate 2.4 times as many CareWeb notes per scheduled hour. It was also determined that 32.3% of the provider generated CareWeb notes assigned to the part time nurse are created on the week days in which the part time nurse is not scheduled. Both data provided by MCIT and the Nurse Supervisor is shown in Appendix O. As reported by the nursing staff, the vast majority of these notes are sent to the general Nephrology nurse mailbox. On the days that only the full time nurse is working, the full time nurse answers CareWeb notes from all providers in a first-in, first-out approach.

A solution to the imbalanced workload between the nurses is a reallocation of providers to the two nurses. This reallocation should be based on:

- The average number of clinic visits (new and revisit patients) each provider receives
- The average number of CareWeb notes generated by each provider
- The peak times in which each provider sends the majority of their CareWeb notes
- The schedules of the nurses and providers

The analysis required to reallocate the nurses schedules should be performed consistently to ensure that the workload between both nurses is balanced. The team suggests that evaluation of the nurses assigned of providers to be done yearly. The above criteria should all be considered when a new provider is assigned to a nurse.
6.5  MA Definition of Tasks: Define Time Allocation for MA in Clinic-assist and Nurse-assist Positions

The Internal Medicine department within the Taubman Center has clearly defined the duties for the MAs in both the nurse-assist and clinic-assist positions; however, the Nephrology Clinic has not clearly defined how much time each MA is expected to work in the two positions. According to the Internal Medicine Administrative Manager, the MA hours are charged 100% to Nephrology but they are not broken down by nurse and clinic-assist. This lack of time allocation has led to variability in the amount of time the MA spends in the clinic-assist and nurse-assist position. This variation can be difficult for all staff members of the clinic who depend on the MA support. For instance, the nurses may believe that an MA will work 10 hours in the nurse-assist position because that is the amount they worked in the position the week before. If this does not happen, the nurse may need to finish tasks that do not require an R.N. (scheduling appointments, faxing, etc.).

To reduce the variability of an MA’s involvement in the nurse-assist role, the Nephrology Clinic should clearly define the amount of time that each MA is expected to work in the clinic-assist and nurse-assist roles. This information will increase the consistency in the amount of time spent in both roles. The clinic should also consider creating job titles for the MAs that limits their job scope to the nurse-assist or clinic-assist position. For example, the nurse can have a part time MA consistently work all scheduled hours in the nurse-assist position and a full time nurse consistently work all scheduled hours in the clinic-assist position. This recommendation is different than current practice, in which each role is consistently filled by 2 to 3 MAs. Changing the MA’s work hours in each role could increase the quality and efficiency of work because MAs could be experts in their position.

6.6  Future Follow Up: Implement Standardized Future Follow Up Status

Currently, Nephrology nurses are printing CareWeb notifications and writing down the dates for future patient follow up calls on the sheet. The printed notes are then organized chronologically with labels and either placed into an accordion folder with a slot for each day of the month or added to a pile of other printed notes. Each nurse then looks at the slot for today’s date and separates the notes with future follow up dates to call each patient. After the patient has been called, each nurse must then go on to the CareWeb system and update a note that the patient was called. The problem with this current system is that it is difficult for the nurses to continuously update their files. Moreover, this system is not very intuitive, making it hard for incoming float nurses to understand the system and implement it on a given day if one of the nurses is out of the office. Finally, redundant work is being performed in utilizing both a printed and online copy of the CareWeb note, as nurses will still have to go into CareWeb to ensure that a record of the call has been made.

To streamline the patient future follow up process, two alternative recommendations are presented. The first is to train nurses and MAs to utilize the CareWeb’s “Future Follow Up” call status and the second is to utilize an agenda book to record all future follow up calls to be made.
The “Future Follow Up” call status has been part of the CareWeb system since the software was launched. However, the Nephrology Clinic has never used the ‘Future Follow Up” call status. Figures R-1 and R-2 in Appendix R shows the appearance of the “Future Follow Up” call status looks like in CareWeb. When creating or updating a note on CareWeb, the nurse can change the current status to “Future Follow Up” and select a due date. Once the note is saved, it will show with a “F/U” status in a selected CareWeb inbox. Nurses can then sort all CareWeb notes on the inbox by their due date, finding the follow ups that need to be done each day. Since this system is in CareWeb, nurses can then change the call status once the call has been made, and make a record that the follow up call has been made. The team recommends that nurses and MAs take a CareWeb training course, focusing on shortcuts, so they can learn about the benefits of this feature and other features on CareWeb.

An alternative solution is for each nurse to have an agenda book in which to write the follow up call that is needed on the due date. Float nurses and MA’s can also perform this task if a nurse is out of the office. If patient follow up calls are assigned only to MAs, each nurse can give the MA a page with day’s list of calls to be made and the MA can store all the past follow up pages in a binder/folder.

The benefits of implementing either of these solutions are having a more organized and efficient system of tracking future follow up calls, allowing for float and MAs to help nurses in this task (if needed) and the creation of a record system of the calls made. Nurses will no longer have to print and stack piles of CareWeb notes, and will have a list of all patient follow calls in one consolidated system (either online or in the agenda book). Also, a float nurse that comes to the clinic will be able to quickly understand how each system works and help respond to follow up calls for that day. Finally, using either system will create a record, as nurses will have either a binder containing all the previous follow up calls made, or a note of the call placed in the CareWeb system.

6.7 Reallocation of Tasks: Shift Portion of Tasks from Nurses to MAs

The randomized work sampling and volume studies have shown that nurses perform tasks that could be reallocated to the MAs. Specifically, the randomized work sampling study showed that nurses spend roughly 16.0 hours per week of work that could be delegated to an MA, including 14.3 hours per week on patient follow up and 1.7 hours per week on prescription refills that do not require an R.N.

In the Nephrology Clinic, the nurse-assist MAs have been asked to help in the clinic due to understaffing issues. This has lead to the nurses having to take on a larger portion of the tasks that they would usually delegate to the MA. As this student team will recommend having a full-time MA in the Nephrology Clinic, there will be the opportunity to re-allocate some of the tasks performed by the nurse to the MA in aim to reduce the nurses’ workload and need for overtime.

In order to reduce the nurse’s current workload, MAs should perform the following nurse tasks: all calls pertaining to prescriptions, all patient follow up calls, lab scheduling and patient education. Most of the prescriptions, with the exception of immunosuppressant, narcotics, and non-oral antibiotics, do not require a nurse to call the pharmacy and order prescription
medication for the patient. The same is also the case for patient education, where some of the education needs to be delivered specifically by a nurse while others can be done by an MA. Lab scheduling does not require the expertise of a nurse and can be done by an MA with no special training. Finally, MAs can perform all follow up patient calls and send a CareWeb note to the nurse if the patient has questions outside the MA’s range of expertise. Having MA’s perform all future follow up calls will allow the MA to filter the calls to the nurse, allowing the nurse to only speak to patients when it is necessary.

The main benefits of the reallocation of tasks from a nurse to an MA are the reduction of the overall workload of the nurses and overtime on a particular day. Based on the randomized work sampling study results, it is estimated that nurses will decrease their workload by approximately 16.0hrs/week, which accounts for 25.0% of their time (not including overtime). Moreover, since nurses are currently working an average of 12.7 hours of overtime per month in the Nephrology Clinic (data collected from Nurse Supervisor for June 2009 to October 2009 time period), this re-allocation of work could eliminate the regular need for overtime. However, the clinic MA does not have an additional 13.4 hours a week to perform tasks allocated by the nurses. The team recommends that the nurses reallocate 3.5 hours of work to the MAs per week, which would eliminate the need for overtime. This recommendation accompanied with the Call Center recommendation, would give nurses and MAs workload equivalent or less to the number of hours they are scheduled a week.

7 Summary

The Pulmonary and Nephrology Clinics are two separate entities within the Internal Medicine Department within the University of Michigan Taubman Center. This report outlines the processes in both clinics that can be eliminated or altered in order to reduce the amount of nurse overtime. The team created recommendations, some of which were unique to one of the clinics and others which the clinics had in common. The recommendations are summarized in Table 5.
### Table 5: Pulmonary and Nephrology Recommendations Summary

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Expected Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pulmonary Clinic</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Quantitative Recommendations** | Call Center | • 1.5 hours per week of nurse work eliminated  
• 4.2 hours per week of MA work eliminated |
|                  | Reallocation of tasks | • 3.5 hours per week of nurse work reallocated to the MA |
| **Qualitative Recommendations** | Provider reroute | Reduce nurse time spent on paging providers and typing oral responses |
|                  | Patient education | Create standardized system for how patient educations will be performed and whether the will be completed by nurses or MAs |
|                  | Future follow up | Increase organization of the patient future follow up system which will enable floats and MAs to help complete tasks, if needed |
| **Nephrology Clinic** |
| **Quantitative Recommendations** | Call Center | • 3.1 hours per week of nurse work eliminated  
• 4.2 hours per week of MA work eliminated |
|                  | Reallocation of tasks | • 3.5 hours per week of nurse work reallocated to the MA |
| **Qualitative Recommendations** | Provider reroute | Reduce nurse time spent on paging providers and typing oral responses |
|                  | CareWeb refresher | Enable one form of effective communication between nurses and providers |
|                  | Nurse schedules | Ensure equivalent workload between the two nurses |
|                  | MA definition of tasks | Reduce variability in the amount of time spent by the MAs in the nurse-assist and clinic-assist roles |
|                  | Future follow up | Increase organization of the patient future follow up system which will enable floats and MAs to help complete tasks, if needed |
Table 5 summarizes the recommendations made by the team for both the Pulmonary and Nephrology Clinics. These recommendations target specific issues that contribute to the amount of nurse overtime.

The team also mapped a future state process flow for all incoming patient calls into both the Pulmonary and Nephrology Clinics. These flow charts, shown in Appendices K and S respectively, show how all incoming calls would be routed and handled if the following recommendations were to be implemented: route all calls to the call center, re-allocation of tasks from a nurse to an MA and the elimination of a provider reroute. Overall, the future state flow charts show improved communication between nurses, providers and MAs, the elimination of nurse’s work in appointment or prescription call reasons and the elimination of any need for the MA to download voicemail or handle live calls unless there is an emergency. Although each clinic behaves independently and carries different processes and procedures for patient care, the change in the size of the process flow is dramatic, showing an overall elimination of bottlenecks and redundant work in each of the clinic’s processes and procedures, promising a faster flow of communication and a reduction in the nurse’s overall overtime.
Common Appendices
Appendix A: Interview Questions

1) Could you please list activities and tasks you perform regularly?
2) Do you think the tasks fluctuate by the day of the week?
3) Is there a time of day in which you feel you are particularly busy?
4) Are there any activities that you listed which you feel are not in your job description?
5) Is there any special software in your department?
6) What, if any, changes do you think would improve your ability to do your job?
7) Are you going on vacation or does your schedule deviate from normal from now until mid-December?
8) When do you take lunch, typically?
## Appendix B: Randomized Work Sampling Study Task Definitions

**Figure B-1: Randomized Work Sampling Study Definition Sheet**

<table>
<thead>
<tr>
<th>Task</th>
<th>Definition/Examples</th>
</tr>
</thead>
</table>
| Administrative work (training, meetings, etc.) | *Examples:*  
Train MA on task, train fellow or physician on task, attend a meeting, attend a training session |
| General patient care/coordination         | *Examples:*  
Referring different or cheaper medication, preparing forms regarding handicap stickers, referring patients to clinics or doctors |
| Symptoms                                  | *Examples:*  
Receiving a notification/call/etc. about a patient symptom, contacting the patient, contacting a physician or MA about the way to treat the symptom |
| Patient follow-up                         | *Examples:*  
Contacting a patient to check reactions to an adjustment in medications |
| Labs (orders, review, monitoring, etc.)   | *Examples:*  
Receive a request for a lab (via call, notification, etc.), review a lab, monitor a lab, order a lab |
| Patient appointment scheduling            | *Examples:*  
Receive a request to schedule a patient, giving scheduling information to a MA, call the patient to schedule the appointment, discuss scheduling with physician or MA |
| Prescription refills                      | *Examples:*  
Receive a request to refill a prescription, giving prescription information to MA, verifying prescription on PSL, requesting quantify/dose/etc. with physician |
| Patient prep and patient education        | *Examples:*  
Prepping patient for MRI, teaching patient how to use an inhaler |
| Starting patients on IV-antibiotics       | *Examples:*  
Looking at PSL, filling out visiting nurse form |
| Clinic work                               | *Examples:*  
Check urine slides, see patients |
| Prior authorization                       | *Examples:*  
Filling out paper work, contacting insurance companies, contacting patients |
| CF Registry                               | Only applicable to one nurse in Pulmonary who is a part of the CF grant |
| Personal time (lunch, break, bathroom, etc.) | *Examples:*  
Lunch, coffee break, bathroom, phone call with family member, etc. |
| Other                                     | Any other task that does not appear above. |
Appendix C: Volume Study

The team decided to conduct a volume study which would by conducted in each clinic for five days. The team’s initial goal was to conduct the volume and randomized work sampling studies concurrently. The plan was to have half of the Pulmonary Clinic staff (nurses and MAs) and half of the Nephrology Clinic staff perform the randomized work sampling study and the other half of each clinic staff perform the volume study. Figure C-1 shows the first version of the volume study data collection sheet used during the trial volume study.

Figure C-1: Volume Study 1 Data Collection Sheet

<table>
<thead>
<tr>
<th>Task</th>
<th>Checks/Ticks</th>
<th>Instructions for Volume Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative work (training, meetings, etc.)</td>
<td></td>
<td>Please check/tick every time you are working on a specific task. If the task you are working on is not listed, please tick “Other” and write down the activity on the back of the card.</td>
</tr>
<tr>
<td>General patient care/coordination</td>
<td></td>
<td>You will notice that methods of communication (email, Careweb, fax) are not listed here. We would like you to think about the goals/purpose of each method of communication and to find this on the task list. For example, if you are using Careweb notifications for the purpose of a prescription refill, you would tick next to the task listed &quot;Prescription refill&quot;.</td>
</tr>
<tr>
<td>Symptoms</td>
<td></td>
<td>Every time you perform a task you will need to check this sheet. If you perform different tasks for the same lab at 3 separate occasions, it is 3 checks for &quot;Labs&quot;. If you are working on the same lab continuously for 10 minutes, it is 1 check for &quot;Lab&quot;. If you have questions please contact Jessica Avery: (517) 646-9197, <a href="mailto:jessavery@umich.edu">jessavery@umich.edu</a> Emily Garcia - (858) 819-0630, <a href="mailto:egt@umich.edu">egt@umich.edu</a> Wenting Guo - (734) 355-7212, <a href="mailto:gewenting@umich.edu">gewenting@umich.edu</a></td>
</tr>
<tr>
<td>Patient follow-up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labs orders, review, monitoring, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient appointment scheduling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescription refills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-prep patient education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting patients on IV-antibiotics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior authorization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF Registry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal time (lunch, break, bathroom, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prior to generating the data collection sheet shown in Figure C-1, the team discussed the goals of the volume study. The team hoped to use the volume study to determine the amount of time per task. Because the tasks were the same for both studies, the team could determine the total time per day spent on each task, the volume of each task per day, and the average time per task. This would be useful in identifying the most time consuming tasks, which might lead to additional studies or process flows. The findings of the trial volume study are shown in Table C-1.
Table C-1 summarizes the trial volume study, which shows that three staff members (one in the Pulmonary Clinic and two in the Nephrology Clinic) were given the study to determine any issues. The issues described from staff members and determined from the trial study included:

- Staff members had difficulty determining when one task ends and another begins. This could lead to inconsistency in the number of tasks performed per hour, which would not accurately reflect the work reported by each staff member per day.
- Many staff members described difficulty in determining how to categorize certain activities. This would lead to discrepancy in the reported amount of time spent and the volume of the tasks.
- Staff members said that this study was time consuming and would require additional time, possibly even overtime, to their day. This could skew results because the team is analyzing the amount of nurse overtime.

These issues led the team to reconstruct the volume study and to alter the timeline. The team decided to perform the randomized work sampling study with all staff members and to do a different volume study the following week. The team used the suggestions from the staff members along with their opinions to create the second version of the volume study.

The second version of the volume study was created to determine the amount of time spent per task, the amount of determine the number of activities necessary to complete each task (for instance, an average prescription refill requires 2 phone calls and 1 fax), and determine the tasks that are being performed by nurses but can be delegated to the MAs. See Figure C-2 for the second version of the volume study data collection sheet.
The team created the volume study to be used for the duration of the week. However, after giving the data collection sheet to the staff members, the team was informed of the following issues:

- Multiple staff members had scheduled time off during the week identified for the volume study and others were ill. This would have resulted in very limited data.
- These issues also led to busier conditions. Nurses were not willing to perform the data collection under the busier conditions.
- Staff members said that certain tasks were missing from the data collection tool. For example, the Pulmonary Nurses did not understand why “symptoms” was not a task as it is one of their most time consuming tasks. However, this type of phone call cannot be routed to an MA and thus was not an issue in the study.
- Nurses described difficulty in determining when to record tasks and when to not record tasks; some of the tasks from the randomized work sampling study were not included in the data collection sheet. The nurses were required to remember to record only those activities listed in the sheet and not those that weren’t.
- Trouble with defining tasks persisted. The nurses continued to struggle with defining when tasks ended and others began.

The issues outlined above led the team to postpone the volume study and to once again redesign the data collection sheet. The team compiled the information from nurses on the previous revisions and compiled a list of tasks that they had been told should be performed by the MA but may currently be performed by the nurses. The tasks that could be performed by MAs included calling patients to schedule appointments, calling patients to schedule labs, calling pharmacies to call in prescriptions that did not require a registered nurse, and calling the group voicemail box. Because all of the tasks listed were conducted by the nurse or MA by a telephone call, the team created the third version of the volume study as an in-depth phone study. The goals of this study were to:
• Eliminate the discrepancy in categorizing nurse and MA tasks by creating narrow and well defined tasks.
• Identify tasks that are being performed by nurses that should be performed by MAs.
• Determine the time of day that have the highest volume of incoming and outgoing calls.

The team created the following data collection sheets using the goals outlined above, the nurse’s suggestions, and the feedback from previous versions of the study (Figure C-3).

**Figure C-3: Volume Study 3 Data Collection Sheet**

<table>
<thead>
<tr>
<th>PHONE CALLS TO:</th>
<th>7:00 - 10:00 AM</th>
<th>10:00 - 1:00 PM</th>
<th>1:00 - 4:00 PM</th>
<th>4:00 - 7:00 PM</th>
<th>After 7:00 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social work employee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group voicemail box (check for each voicemail)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacy: Nurse position required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacy: Nurse position NOT required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= SYMPTOM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= SCHEDULE A LAB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= SCHEDULE APPT.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= DISCUSS LAB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHONE CALLS FROM:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live Phone calls (record all live calls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Name: ___________________________ Date: _______ Overtime (Y/N): _______
Start Time: ___________________________ End Time: __________

The team gave the volume study data collection sheet in Figure C-3 to a one of the Pulmonary and Nephrology nurses. The nurses looked over and used the data collection sheet and provided useful feedback on the data collection sheet. With these suggestions and additional information, the team created the fourth version of the volume study, as seen in Figure C-4.

**Figure C-4: Volume Study 4 Data Collection Sheet**

<table>
<thead>
<tr>
<th>PHONE CALLS TO:</th>
<th>7:00 - 9:59 AM</th>
<th>10:00 - 12:59 PM</th>
<th>1:00 - 3:59 PM</th>
<th>4:00 - 6:59 PM</th>
<th>After 7:00 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient (purpose in placing call= SYMPTOM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= SCHEDULE APPT.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient (purpose in placing call= DISCUSS LAB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician: Call in immunosuppressant, narcotic, or non-oral antibiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacy: Other prescriptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group voicemail box (check for each voicemail)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (record on back)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHONE CALLS FROM:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live Phone calls (record all live calls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Name: ___________________________ Date: _______ Overtime (Y/N): _______
Start Time: ___________________________ End Time: __________

The data collection sheet shown in Figure C-4 is being used by all Pulmonary and Nephrology nurses and MAs who support the nurses.
Appendix D: Pulmonary Nurse Overtime

Figure D-1 demonstrates the amount of overtime worked by the Pulmonary Clinic nursing staff.

**Figure D-1: Pulmonary Nurse Overtime Data**
Sample Size of 3, Data collected from Nurse Supervisor from 06/2009-10/2009 Time Period
Appendix E: Clinic Patient Data

Figure E-1 demonstrates the clinic workload in regards to the number of patients received (new patients and revisit patients).

**Figure E-1: Pulmonary Clinic Patient Data**
Sample Size of 43, Data collected from MCIT for 01/2009-08/2009 Time Period
Appendix F: Interviews Notes

**General Issues**

1. **Incoming patients Statistics**
   a. 40 new CF patients acquired when nearby MI facilities closed
   b. More new patients than returning patients in regular clinic:
      i. Old patients: 60-80
      ii. New patients: 100-120
      iii. Patients cannot be released because they treat mostly chronic patients that can never leave/stop treatments
   c. Same nurse capacity
2. **History with MAs**
   a. Used to have 1 well trained MA that had a lot of responsibility, he left.
   b. When he left, nurses work increased drastically
   c. Takes 3 months to fully trained MA
   d. Cannot give current MA as much responsibility because s/he might not be trained enough
3. **Variability**
   a. In incoming calls from patients
   b. In requests from providers
   c. Unpredictability of workload leads to stress and lack of planning of daily activities
4. **Delayed/no response from providers through CareWeb notes**
   a. If question is urgent, must page provider to get a response
   b. Statistics (total of 30 providers):
      i. 16% providers need to be paged all the time to get answers
      ii. 16% providers answer quickly though CareWeb, and are reliable
      iii. 66% are unpredictable and fluctuate a lot
   c. Nurses usually wait for doctor’s response through CareWeb until it becomes urgent and must page the provider to obtain a response.
   d. Proposed Solutions by nurses:
      i. Have providers type in prescriptions directly into CareWeb (instead of asking nurses to fill it out or leaving information empty)
      ii. Have providers ask patients DURING clinic visit if they need a prescription refill
      iii. Have providers could keep the patient’s medication list updated on CareWeb
5. **Setting patients on IV-antibiotics**
   a. Same prescription form details are filled out 3 times: in a special writer, a Visiting nurse’s note and through CareWeb notifications
b. Must coordinate to get patients to come to the hospital to start their IV line, or schedule for a Visiting Nurse to go to their home to start the line

c. Average time for each form: 2 hours

6. Human Error/Inconsistencies
   a. Double documentation on CareWeb (regarding prescription orders)
   b. Person who creates notification does not update it, and will create another one (without deleting the previous one)
   c. Hard to keep track, finding the most updated note, making 1 person responsible for the note

**CareWeb related issues**

7. Notifications
   a. Quality of notifications:
      i. Lengthy, unorganized, written in long paragraphs requiring nurses to spend time scanning text to find relevant information
   b. Input of notifications:
      i. Some nurses type directly from phone call, other nurses take notes, then type up notes into CareWeb system.

8. Software
   a. Some times takes 1min to load
   b. Will log off user randomly
   c. Fluctuates between functioning/slow or not functioning
   d. Has not indication for notes with “urgent flag”, only “time sensitive flag” exists.

**Avitracks related issues**

9. Uses
   a. Patients often mention things regarding their prescription that is NOT on CareWeb
   b. Patients’ prescription list is not updated
   c. Can’t update the list until the prescriptions match (some prescriptions have multiple names)

10. Combination of CareWeb and Avitracks
    a. Double charting between info on these 2 databases
    b. Need to replicate notes on both systems because:
       i. Some providers might not use that system
       ii. Some nurses don’t have access to that system (because most of their patients don’t need to be in there, but sometimes they get assigned a patient that does)
Appendix G: Historical Data- Outgoing Phone Calls Placed By Nurses

While the data collected by the nurses and MA using the randomized work sampling and volume studies is useful in determining the current situation and problems, the data is subject to a variety of human errors. The nurses and MA performing the studies can forget to make a check mark for an activity they perform, they can categorize tasks differently, or they can alter data according to what they want people to see. These factors and the quick deadline have led the team to pursue other ways of analyzing the current situation and problems. This included an analysis of the Pulmonary nurses outgoing phone calls, as seen in Table G-1.

Table G-1: Outgoing Phone Calls by Nurses by Day of Week
Sample Size of 6, Generated by MCIT over 05/2008-08/2009 Time Period

<table>
<thead>
<tr>
<th>Pulmonary Clinic</th>
<th>Volume of Outgoing Calls</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>2858</td>
<td>22.73%</td>
</tr>
<tr>
<td>Tuesday</td>
<td>2022</td>
<td>16.08%</td>
</tr>
<tr>
<td>Wednesday</td>
<td>2269</td>
<td>18.05%</td>
</tr>
<tr>
<td>Thursday</td>
<td>2257</td>
<td>17.95%</td>
</tr>
<tr>
<td>Friday</td>
<td>3167</td>
<td>25.19%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12573</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Figure G-1: Outgoing Phone Calls by Nurse by Time of Day
Sample Size of 6, Generated by MCIT over 05/2008-08/2009 Time Period
Appendix H: Current State Process Flow

Figure H-1 is the complete Current State Flow for the Pulmonary Clinic. This flow shows the process when a patient calls the Call Center or the clinic, depending on the reason of call (Symptom, Appointment, Lab Tests, etc). Due to its size, the following pages will show each part of the process flow in detail.

Figure H-1: Entire Current State Process Flow for the Pulmonary Clinic
Figure H-2 shows the process flow for calls received at the call center. For calls pertaining to appointments, the Call Center can schedule new, edit current or cancel appointments. For any other reasons, the Call Center transfers the call to the Pulmonary Clinic, where the MA receives the call.

**Figure H-2: Section of Current State Process Flow for incoming calls to the Call Center**

Figure H-3 shows when calls are received at the Pulmonary Clinic or transferred from the Call Center, pertaining to either a symptom or prescription (question or refill). In the ‘Symptom’ branch, the Provider Reroute can be seen. This reroute is shown throughout the current state process flow (as shown also in the ‘Prescription’ branch) but it is only shown in detail once, to simplify the process flow.
For calls pertaining to labs and tests, the process will differ depending on the type of labs or tests required such as blood tests, CT, Bronchoscope, Sleep Study and others. Figure H-4 shows incoming patient calls to the clinic (or transferred from the Call Center) pertaining only to labs and tests.
Finally, Figure H-5 shows all incoming patient calls to the clinic pertaining to Appointment scheduling. In this case, calls would not be transferred from the Call Center as the Call Center is authorized to take appointment-related calls. For these types of calls, the MA can schedule the appointment in the clinic.

**Figure H-5: Section of Current State Process Flow for incoming calls to the Pulmonary Clinic (Appointment-related calls)**
Appendix I: Future Follow Up Screen Shots

Figure I-1: Screen capture of “Call Status” options in a CareWeb Note

<table>
<thead>
<tr>
<th>Medical Docs</th>
<th>Legal &amp; Consents</th>
<th>Imaged Docs</th>
<th>Create Docs</th>
<th>Discharge Navigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reg: 12</td>
<td>Name: BIRD, BIG</td>
<td>DOB: 01/17/2004</td>
<td>Sex: M</td>
<td>Age: 5 Years</td>
</tr>
<tr>
<td>Department:</td>
<td>Service:</td>
<td>Doc Type:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MED</td>
<td>MART</td>
<td>Select Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signer ID:</td>
<td>Find</td>
<td>Reviewer ID:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case Date:</td>
<td>Priority:</td>
<td>Indicate Call Status:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Today</td>
<td>Future Follow Up</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please enter new or altered Diagnosis, Medication or Allergy information directly into the Problem Summary List or Discharge Navigator.

<table>
<thead>
<tr>
<th>Document Text: Append text from My templates</th>
<th>Refresh Data Tag</th>
</tr>
</thead>
</table>

Note: Selecting Control-Z will undo sequential text editing changes since last save.

Reason for Call Vr. 4.0

Figure I-2: Screen capture of CareWeb showing how “Future Follow Up” appointments look in inbox

<table>
<thead>
<tr>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner: ZAMBOROWSKI, CHERYL A</td>
</tr>
</tbody>
</table>

Refresh List | Click the Refresh List button to update the list

Move to My notifications

<table>
<thead>
<tr>
<th>Document Type</th>
<th>Provider#</th>
<th>Priority</th>
<th>Status/Subject</th>
<th>Due Date</th>
<th>Doc Create Date (D)</th>
<th>Req#</th>
<th>Name</th>
<th>Birthdate</th>
<th>Last Edit Date/Time</th>
<th>Last Editor</th>
</tr>
</thead>
</table>
Appendix J: Patient Education

Below is the list of all the patient educations the Pulmonary Clinic currently supports.

- Breathing devices
  - Acapella flutter
  - C-PAP
  - BiPAP
- Bronchoscopy
- Home equipment
- Immunosuppressant
- Infusion
- Inhalers
- Lovenox
- Medication
  - Doses
  - Drug interactions
  - Proper Use
  - Side effects
  - Adverse reactions
- Methacholine (test for asthma)
- Nebulizer
- Peak flow meter
- Port
- Pulmonary rehab
- Respiratory specialist set-up/prep
- Scoop catheter
- Sleep Studies
  - What to expect
  - Plan for follow up (dependent on results)
- Supplemental oxygen
  - Home use
  - Portable systems
  - Airline travel
- TB Skin tests
  - Proper time frame for follow up
  - Positive result issues
- Tobacco/Smoking
- Xolair

The most frequent patient educations include bronchoscopy, immunosuppressant, and inhalers educations. Additional frequent educations include methacholine and supplemental oxygen.

The clinic currently has owns two VHS’s, one for breathing device: acapella flutter and another for supplemental oxygen. The problem with using the VHS is that it is difficult to get the T.V. and VCR to set up in the patient rooms. Nurses must go to a locked room to retrieve these items and cart and move it to the patient’s room.
Appendix K: Future State Process Flow

Figure K-1 shows the complete process flow for the Future State in the Pulmonary Clinic. The Future state shows the ideal state that the Pulmonary Clinic should be in, taking into account several of the recommendations mentioned in this report: elimination of the Provider Reroute, reallocation of tasks to the MA and transferring all incoming calls to the call center. Due to its size, each part of the process flow will be shown in detail in the following pages.

Figure K-1: Entire Future State Process Flow for all incoming calls
In the Future State scenario, all calls will be received at the Call Center. For calls pertaining to appointments, shown in Figure K-2, the Call Center operators will schedule a new, edit or cancel an existing appointment.

**Figure K-2: Section of Future State Process Flow for incoming calls to the Call Center (Appointment-related calls)**

For any calls pertaining to reasons other than appointment scheduling, in Figure K-3, the Call Center operator will make a CareWeb note and send it to the correct entity (MA, nurse, or provider) at the Pulmonary Clinic.

**Figure K-3: Section of Future State Process Flow for incoming calls to the Call Center (all other calls)**
The branch for ‘Symptom Call’ is shown in Figure K-4. Here the nurse is in charge of checking the patients’ medical information and contacting the provider if there are additional questions.

**Figure K-4: Section of Future State Process Flow for incoming calls to the Pulmonary Clinic (Symptom-related calls)**

Calls pertaining to prescriptions, shown in Figure K-5, have two sub-nodes: prescription refill calls and prescription question calls. For prescription questions, the nurse will be doing most of the work, as her expert knowledge is required. For prescription refills, some of the tasks can be performed by the MA with the required nurse approval.

**Figure K-5: Section of Future State Process Flow for incoming calls to the Pulmonary Clinic (Prescription-related calls)**
Finally, shown in Figure K-6, all lab and test results are sent directly either to the nurse or the doctor (depending on the type of labs or tests examined). For any abnormal results, nurses page doctors for a consultation via a CareWeb note.

**Figure K-6: Section of Future State Process Flow for incoming calls to the Pulmonary Clinic (Lab and Test-related calls)**
Nephrology Clinic Appendices
Appendix L: Nurse Overtime

Figure L-1 demonstrates the amount of overtime worked by the Nephrology Clinic nursing staff.

**Figure L-1: Nephrology Nurse Overtime Data**
Sample Size of 2, Data collected from Nurse Supervisor from 06/2009- 10/2009 Time Period
Appendix M: Observations and Interviews Notes

General Issues
1. Incoming patients Statistics
   a. 40 new CF patients acquired when nearby MI facilities closed
   b. More new patients than returning patients in regular clinic:
      i. Old patients: 60-80
      ii. New patients: 100-120
      iii. Patients cannot be released because they treat mostly chronic patients that can never leave/stop treatment.
   c. Same nurse capacity
2. Variability
   a. In incoming calls from patients
   b. In requests from providers
   c. Unpredictability of workload leads to stress and lack of planning of daily activities
3. Transition from Emails to CareWeb
   a. Some of the providers are resistant to change from emailing the nurses to using the notifications.
   b. Nurses must read the email and copy the information, create a new notification and paste the information.
4. Setting patients on IV-antibiotics
   a. Same prescription form details are filled out 3 times: in a special writer, a Visiting nurse’s note and through CareWeb notifications
   b. Must coordinate to get patients to come to the hospital to start their IV line, or schedule for a Visiting Nurse to go to their home to start the line
   c. Average time for each form: 2 hours
5. Human Error/Inconsistencies
   a. Double documentation on CareWeb (regarding prescription orders)
   b. Person who creates notification does not update it, and will create another one (without deleting the previous one)
   c. Hard to keep track, finding the most updated note, making 1 person responsible for the note

CareWeb related issues
6. Notifications
   a. Quality of notifications:
      i. Lengthy, unorganized, written in long paragraphs requiring nurses to spend time scanning text to find relevant information
   b. Input of notifications:
i. Some nurses type directly from phone call, other nurses take notes, then type up notes into CareWeb system.

7. Software
   a. Some times takes 1min to load
   b. Will log off user randomly
   c. Fluctuates between functioning/slow or not functioning
   d. Has not indication for notes with “urgent flag”, only “time sensitive flag” exists.

**Avitracks related issues**

8. Uses
   a. Patients often mention things regarding their prescription that is NOT on CareWeb
   b. Patients’ prescription list is not updated
   c. Can’t update the list until the prescriptions match (some prescriptions have multiple names)

9. Combination of CareWeb and Avitracks
   a. Double charting between info on these 2 databases
   b. Need to replicate notes on both systems because:
      i. Some providers might not use that system
      ii. Some nurses don’t have access to that system (because most of their patients don’t need to be in there, but sometimes they get assigned a patient that does)
Figure N-1 constitutes two graphs, since the Nephrology Clinic has two nurses, both of whom are assigned to specific providers in the clinic. The team used this data to determine the percent of total CareWeb notes being generated by Nephrology Nurse 1 and 2’s assigned providers.
Appendix O: Historical Data- Clinic Visits New and Revisit Patients Data

Table T-1 illustrates the number of clinic visits, new patients (NP) and revisit patients (RV), each nurse of the Nephrology Clinic has had. This number is determined by calculating the number of NP and RV patients each provider has had in the past that is assigned to each nurse.

Table O-1: Nurse NP and RV per Scheduled Hour
Sample Size of 43, Information Collected from MCIT for 01/2009-08/2009 Time Period

<table>
<thead>
<tr>
<th>Nurse</th>
<th>NP (monthly average)</th>
<th>RV (monthly average)</th>
<th>Total</th>
<th>NP per scheduled hour</th>
<th>RV per scheduled hour</th>
<th>Total per scheduled hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse 1</td>
<td>38.0</td>
<td>416.8</td>
<td>454.8</td>
<td>0.2</td>
<td>2.6</td>
<td>2.8</td>
</tr>
<tr>
<td>Nurse 2</td>
<td>31.4</td>
<td>135.8</td>
<td>167.1</td>
<td>0.3</td>
<td>1.4</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Table O-1 illustrates an imbalance of patients received per scheduled work hour between the two Nephrology nurses. Nurse 1 has 1.6 times as many patients per scheduled hour as Nurse 2.

Table O-2 shows the number of CareWeb notes that are generated by the providers assigned to both Nephrology nurses.

Table O-2. Average Provider CareWeb Notes Generation per Nurse Scheduled Hour
Sample Size of 37, Information Collected from MCIT from 07/01/2009-10/15/2009

<table>
<thead>
<tr>
<th>Nurse</th>
<th>July 2009 total</th>
<th>August 2009 total</th>
<th>September 2009 total</th>
<th>Average per month</th>
<th>Average per nurse work hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse 1</td>
<td>1169</td>
<td>1096</td>
<td>1175</td>
<td>1146.67</td>
<td>440.23</td>
</tr>
<tr>
<td>Nurse 2</td>
<td>304</td>
<td>244</td>
<td>306</td>
<td>284.67</td>
<td>201.31</td>
</tr>
</tbody>
</table>

Table O-2, like Table S-1, demonstrates an imbalance of workload between Nurse 1 and Nurse 2. Nurse 1 received 2.4 times as many CareWeb notes per scheduled hour from providers as Nurse 2.

Table O-3 illustrates when the providers within the Nephrology Clinic are generating CareWeb notifications. The table breaks this information down by day of the week, and then goes on to demonstrate how this is in alignment with the nurses’ schedules.
Table O-3: Provider Note Generation During and After Nurse Schedule Hours  
Sample Size of 37, Information Collected from MCIT from 07/01/2009-10/15/2009

<table>
<thead>
<tr>
<th>Provider Generated CareWeb Notes</th>
<th>Monday total</th>
<th>Tuesday total</th>
<th>Wednesday total</th>
<th>Thursday total</th>
<th>Friday total</th>
<th>Saturday total</th>
<th>Sunday total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse 1</td>
<td>642</td>
<td>1037</td>
<td>784</td>
<td>477</td>
<td>450</td>
<td>381</td>
<td>315</td>
<td>4086</td>
</tr>
<tr>
<td>Nurse 2</td>
<td>132</td>
<td>127</td>
<td>141</td>
<td>135</td>
<td>150</td>
<td>80</td>
<td>89</td>
<td>854</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>CareWeb notes received on week days not scheduled</th>
<th>CareWeb notes received on Saturday or Sunday</th>
<th>CareWeb notes received on scheduled days after/before hours</th>
<th>CareWeb Notes Received when not scheduled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse 1</td>
<td>-</td>
<td>17.0%</td>
<td>40.7%</td>
<td>50.8%</td>
</tr>
<tr>
<td>Nurse 2</td>
<td>32.3%</td>
<td>19.8%</td>
<td>46.2%</td>
<td>74.2%</td>
</tr>
</tbody>
</table>

The data in Table O-3 allows for a couple of conclusions. First observation is that the providers are sending 17% of all CareWeb notifications on Saturdays and Sundays (days in which there are no nurses scheduled). This means that on any given Monday, the nurses have to complete the notifications sent over the weekend and throughout the day. Another observation from the data is that the majority (roughly 74%) of the notifications that the part time nurse receives are when they are not scheduled. Specifically, 32.3% of the notifications sent by the providers assigned to the part time nurse are sent on the days the nurse is not scheduled. On these days, the full time nurse must complete the notifications from all providers; the nurse attends to the notifications in a first in, first out approach.
Appendix P: Clinic Patient Data

Figure P-1 demonstrates the clinic workload in regards to the number of patients received (new patients and revisit patients).

**Figure P-1: Pulmonary Patient Clinic Visit Data**
Sample Size of 43, Data collected from MCIT for 01/2009- 08/2009 Time Period

![Graph illustrating clinic visit data](image-url)
Appendix Q: Current State Process Flow

Figure Q-1 is the complete Current State Flow for the Nephrology Clinic. This flow shows the process when a patient calls the Call Center or the clinic, depending on the reason of call (Symptom, Appointment, Lab Tests, etc). Due to its size, the following pages will show each part of the process flow in detail.

Figure Q-1: Entire Current State Process Flow for all incoming patient calls
Patients can call either the Call Center or the Nephrology clinic direct line for any issues pertaining to appointments, symptoms, prescriptions and so on. Patients also have the nurses’ direct line, so calls in the Nephrology clinic can be answered by either the MA or a nurse. The branch in Figure Q-2 shows the process for all calls received only at the Call Center.

**Figure Q-2: Section of Current State Process Flow for calls received at the Call Center**

For calls answered at the Nephrology clinic, the branch in Figure Q-3 shows calls answered only by an MA for calls pertaining to prescription, lab requests and lab results.

**Figure Q-3: Section of Current State Process Flow for calls received at the Nephrology Clinic (Prescription, Lab Request and Lab Result-related calls only) answered by the MA**
Figure Q-4 shows calls received by an MA at the Nephrology clinic for calls pertaining to symptoms. The node marked by green dotted lines shows the Provider Reroute. This reroute is present throughout the current process flow, but only mapped in detail in the branch showed below (to keep the process flow as simple as possible).

**Figure Q-4: Section of Current State Process Flow for calls received at the Nephrology Clinic (Symptom-related calls only) answered by the MA**

Finally, for calls received by an MA, the branch for calls pertaining to appointments is shown in Figure Q-5. Here, appointment calls for the Kidney Stone clinic are managed by the MA, while calls pertaining to appointments for the renal clinic are transferred to the Call Center to be scheduled.
Figure Q-5: Section of Current State Process Flow for calls received at the Nephrology Clinic (Appointment-related calls only) answered by the MA

Figure Q-6 shows process flow pertaining to calls received at the Nephrology Clinic and answered by the nurse. The branches shown below are for calls pertaining to prescriptions and lab requests. For lab requests, nurses can perform the tasks themselves or route the call to the MA.

Nurses can also receive calls pertaining to lab results, symptoms and appointment scheduling, as shown below. As both MAs and the Call Center are fully trained to schedule appointments for patients, the nurse will transfer the call to the MA for Kidney Stone clinic appointments, and to the Call Center for renal clinic appointment scheduling.
Finally, all incoming patient calls made to the Nephrology Clinic will be stored in the clinic’s voicemail if no nurses or MAs are available to answer the call. In this case, shown in Figure Q-7, the MA will listen to each voicemail and create a CareWeb note to the nurse if the call reason requires the nurse’s expertise knowledge.

**Figure Q-7: Section of Current State Process Flow for calls received at the Nephrology Clinic not answered (stored in Voicemail)**
Appendix R: Future Follow Up

Figure R-1: Screen capture of “Call Status” options in a CareWeb Note

Figure R-2: Screen capture of CareWeb showing how “Future Follow Up” appointments look in inbox
Appendix S: Future State Process Flow

Figure S-1 shows the complete process flow for the Future State in the Nephrology Clinic. The future state shows the ideal state that the Nephrology Clinic should be in, taking into account several of the recommendations mentioned in this report: elimination of the provider reroute, reallocation of tasks to the MA and transferring all incoming calls to the call center. Due to its size, each part of the process flow will be shown in detail in the following pages.

Figure S-1: Future State Process Flow for all incoming patient calls

One of the recommendations suggests that all incoming patient calls should be received at the Call Center. Figure S-2 shows the action performed by the Call Center operator depending on the reason of the incoming patient call. For all calls that are not urgent or related to appointment scheduling, the Call Center operator will write a CareWeb note to the nurses and MAs of the Nephrology clinic.
The Nephrology MA will then look at all the CareWeb notes. The branches in Figure S-3 show CareWeb notes from incoming patient calls pertaining to prescription and lab requests. In an ideal (future state), the MA will manage most of the tasks pertaining to prescription and lab requests, unless nurse expertise knowledge is require for specific tasks.

Continued from Figure S-3, Figure S-4 shows the CareWeb notes received by the MA for incoming patient calls pertaining to lab results and symptoms. For these two branches, the nurses’ expertise knowledge will be more required, but the MA will still assist the nurse in any tasks that will not require specific nurse knowledge.
Figure S-4: Section of Future State Process Flow for calls received at the Call Center (Lab Results and Symptom-related calls only)