

Workload Analysis of the Department of Michigan Visiting Nurses Staff

Final Report

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Executive Summary

Introduction

The department of Michigan Visiting Nurses (MVN) is interested in improving efficiency in the current work system and allocation of human resources in the administrative department of MVN. The three main areas of concern are Data Entry, Utilization Review, and Billing. These three areas are in charge of all administrative tasks from the time a patient is admitted to MNV's service until a final claim is submitted to the insurance company for a payment. The workload in these three areas is unknown and standardized work practices are currently not in place. Therefore, the director of MVN asked Team Infinity, a group of Industrial and Operations Engineering (IOE) 481 students, to quantify the staff workload in the three areas of concern and provide recommendations about plans for improvement in the current work system. Team Infinity has performed various studies to measure the workload of each area and developed plans for improvement by focusing on the following key issues.

- The amount of time each staff member spends on daily activities is unknown
- Time wasted due to inefficient work methods and non-standardized work procedures is evident
- Some tasks are redundant due to errors
- Communication methods between the three areas are not standardized

The team analyzed the data from the studies and developed recommendations for the primary goal of this project, which was to identify ways to improve the current work system by developing standardized work practices, determining efficient work methods and schedules, and improving allocation of human resources for the staff in the three areas at MVN.

Methodology

Team Infinity has completed the following tasks to develop recommendations for the three areas.

- Observed and interviewed key staff to develop flow charts and task lists for each area
- Conducted three workload studies for the three areas to collect time spent in each task per staff member: Random Sampling Beeper Study, Ladder Log Study, and Task Volume Study
- Analyzed the collected data and developed recommendation to improve overall workflow

Observations, Interviews, and Questionnaires: Each staff member was observed and interviewed to find out all the daily tasks performed. In addition, a questionnaire was distributed to examine any other factors that might affect the staff's work and to obtain any information missed during the observations and interviews. All 13 staff in the three areas were observed, interviewed, and given a questionnaire. This initial stage of the project was performed for about 2 weeks.

Preparation for Data Collection: The team developed several task lists and study sheets for each workload study using information from the team's observations, interviews, and questionnaires. In addition, to better understand the current workflow, the team created flow charts of the three areas. With the prepared study sheets, the team trained the staff to perform each study throughout their work hours.

Random Sampling Beeper Study: Each staff member was given a beeper and a data log sheet that list the staff's daily tasks. Every time the beeper sounded, the staff marked on the sheet the corresponding task they were performing at that time. This study was performed for one week by all the staff in each area.

Ladder Log Study: This study recorded the duration of each task, possible multi-tasking, and possible interruptions during the task. Each staff member recorded all tasks performed throughout the day on the given log sheet based on the task list for this study. This study was done for one week by all the staff in each area.

Task Volume Study: This study focused mainly on work related to errors, corrections, and any other redundant work. All tasks related to errors, corrections, and redundancy was recorded on the given data sheet along with the time that the task was performed. This study was performed for one week by all the staff in each area.

Data Analysis: With the collected times and data from the three studies for each of the three areas, the team performed a statistical analysis to prepare recommendations.

Recommendations: The team developed recommendations for reallocation of human resources, standardized work practices, efficient work methods and schedules, and other plans for improvement in the current work system. Recommendations for each of the three areas and the administrative department as a whole were developed.

Findings and Conclusions

The following are the findings and conclusions identified from the observations, interviews, questionnaires, and the three workload studies. The conclusions made from the findings were used to develop the recommendations.

Initial Findings

By observing, interviewing, and gathering information through questionnaires, the team learned the following:

- The three areas consisted of 13 staff; 5 staff in data entry, 4 staff in utilization review, and 4 staff in billing.
- Work hours varied for each staff member.
- Data entry and utilization review had numerous interactions and connections in the tasks they performed. However, billing had very minimal interaction with any other areas.
- The tasks performed by each staff member varied greatly even for the staff within the same area.
- Most field staff enters patient data and other data through Point of Care (POC), which is electronic.
- Not all field staff is trained to use POC, therefore, paperwork still exists.
- Most work comes in as a batch (i.e. batch of admission folders, batch of approved patient cases, batch of other documentations, batch of POC folders etc.). Workload varies for each staff member due to the size of the batch they receive.
- Medicare and Medicaid patient files have the highest risk factor. Errors on these documentations have more severe consequences compared with other insurance companies.

- McKesson is not as billing-friendly compared to other programs used by other companies.

Findings and Conclusions from Workload Studies for the Three Areas

The following summarizes the key findings for each area after analyzing the data from the three studies performed.

Data Entry:

- The top three tasks performed by the data entry staff are: entering data onto computers (45.39 hours per week), coding (40.38 hours per week), and POC monitoring (39.55 hours per week). These tasks accommodate for 63% of data entry's total workload.
- Category of "other tasks" represents tasks that were not specifically defined in the study. The data entry staff spends about 18.55 hours per week performing "other tasks."
- File room activity, which was part of the category of "other tasks", lasted about 1.72 hours per task, which was the single longest activity performed in the study.
- 94% of interactions occur with the field staff to make changes on the patient files or other documentations, which is equivalent to performing redundant work.

Utilization Review (UR):

- Reviewing Point of Care (POC) accommodates for 60% of utilization review's workload.
- The time spent on review varies depending on the sample size.
- 72% of interaction activity consists of discussing the case with the field staff to make changes on the patient files and other documentations.

Billing:

- Each staff member had their own set of daily tasks with their own assigned insurance companies.
- 40% of patients admitted to MVN's service are under Medicare or Medicaid.
- 59% of claim rejections are caused by errors in dates and insurance companies.

Recommendations

Team Infinity concludes that the overall work system of the three areas in MVN can be greatly improved by correcting the work system of the field staff (nurses, clinicians, etc.). Three recommendations for the overall work system includes:

- All work should be done in a one-piece flow. Most work for all the areas come as a batch. This should be worked on to create one-piece flow.
- Train field staff to maximize use of Point of Care (POC), which will maximize one piece flow instead of batching process.
- Perform additional studies on the field staff to improve their time management to obtain and submit documentation in a more timely fashion, and to improve the first time quality (FTQ) of the documentations to avoid errors.

Team Infinity also recommends the following for the three areas in MVN on ways to improve the current work system by developing standardized work practices, and determining efficient work methods and schedules, and improving allocation of human resources.

Data Entry

- Train all staff to perform all tasks from start to finish.
- Edit Point of Care (POC) monitoring task (All work process related to POC).
- Eliminate non-value added work, which includes all redundant tasks due to errors and other unnecessary tasks found in the “other tasks” category.
- Set up daily meetings in beginning of the day to reduce initial tasks and to distribute tasks evenly among the staff.
- Set Thursday or Friday to work only on filing room activities, which is part of “other tasks.”
- Reduce paper work, which is to reduce tasks related to entering data onto computer.
- Remove coding from their main tasks and train utilization review to code.
- Set staffing level to 3.28 FTE if non-value added work such as initial tasks, interaction activities, entering data onto computer (paperwork), and “other tasks” can be eliminated.
- Set staffing level to 2.27 FTE if all non-value added work and coding can be removed.

Utilization Review

- Perform nurse training evaluation.
- Prioritize tasks: prioritize work related to billing corrections, 485's and MD orders, and reviewing Medicare and Medicaid files before other insurance companies.
- Only review Medicare and Medicaid, because they have the highest risk factor.
- Perform additional studies to measure the number of errors and time spent on work related to reviewing files of specific insurance companies.
- Learn a new task to perform: coding, which is currently performed by data entry.
- Set staffing level to 2.63 FTE if UR works only on Medicare and Medicaid files and learns coding.

Billing

- Assign at least 1 more staff to work with Medicare.
- Create instructional text for each insurance company's main tasks.
- Improve McKesson to make a more billing-friendly interface.

Introduction

The department of Michigan Visiting Nurses (MVN) is a busy, complex home care service that offers healthcare services for various patients who need care in their home. The current work activities in the administrative department of MVN consist of reviewing patient files, receiving and completing patient documentation, updating and verifying insurance records, and performing other administrative activities. For each episode of care, which is from the time a patient is admitted to MVN's service until a final claim is submitted to the insurance company, the administrative staff activities can greatly impact the timely receipt of payment for the services offered by MVN. Because of this impact, the management of MVN is concerned with efficiency in the work system and appropriate resource allocation of the administrative staff. The MVN administrative staff would like to improve their workflow processes, work methods, and allocation of resources within the administrative staff. Therefore, management would like to know the proportion of time each administrative staff spends on each specific daily task.

The director of MVN asked Team Infinity to observe and measure the workload of the MVN administrative staff and to recommend ways to improve the efficiency of the current work system. She asked the team to focus specifically on three areas within the administrative department: data entry, utilization review, and billing. For each area, Team Infinity observed, interviewed, and distributed questionnaires to understand and identify the exact work activities that each staff perform. The team then measured the workload of all staff activities in each area. The team analyzed the collected data and developed recommendations to improve the workflow in each area, improve allocation of human resources, develop standardized work for each administrative task, and determine efficient time schedules and work methods for each staff according to their workload. The purpose of this report is to present the methodology, findings, and recommendations of this study conducted at MVN.

Background

Michigan Visiting Nurses (MVN) is one of the departments in Home Care Services, which is a division of the University of Michigan Health System. The department of MVN manages the central operations for the nurses and other professionals to enable them to offer quality services in Home Nursing, Occupational Therapy (OT), Speech Therapy, Home Health Aide (HHA), Dietician Services, Medical Social Services, and Physical Therapy (PT). When home health care is needed, MVN organizes a team of professionals with highly specialized skills to ensure that the patient is getting the best care available in their homes.

Concerns have been raised in the administrative department of MVN in areas of data entry, utilization review (UR), and billing about efficiency in the current work system because the workload is unknown. Therefore, the proportion of time each staff member spends on each specific task needs to be measured to document and improve the current work system and workflow. Each area has several staff working on numerous tasks for every patient admitted to MVN's service. Some general tasks of these areas include:

- Receiving patient information and files sent from an assigned nurse after admission visit (received by both data entry staff and utilization review staff)

- Transferring, coding, printing, mailing, reviewing, and approving tasks performed by data entry and utilization review staff
- Making claims for approved patient cases (billing staff)
- Sending claims and receiving payments (billing staff)

To completely understand the current workflow process, the workloads of all tasks including the general tasks listed above were studied. The management of MVN asked Team Infinity to thoroughly analyze the workload and recommend ways to improve the overall work system and the allocation of human resources in the three areas.

Key Issues

The key issues that were addressed in this project are:

- Proportion of time spent on daily activities by each staff is unknown
- Time wasted due to inefficient work methods and non-standardized procedures is evident
- Some tasks are redundant due to initial documentation errors and other mistakes
- Communication methods between the three areas are not standardized

Goals and Objectives

The primary goal for this project was to identify ways to improve the overall work system and workflow by improving allocation of human resources, developing standardized work practices, and determining efficient time schedules and work methods for the staff in each of the three areas.

To accomplish this goal, Team Infinity completed the following objectives for this project:

- Observed and interviewed key staff to develop flow charts and task lists for each area
- Conducted a series of workload studies for the three areas to quantify time spent in each task per staff
- Analyzed collected data and develop methods to improve overall workflow
- Developed recommendations for:
 - Improving workflow between each task and each area
 - Developing standardized work practices
 - Developing a more efficient work schedule and work methods for staff
 - Improving allocation of human resources

Project Scope

The scope of this project included studying the workload of the administrative staff in the three areas of MVN: data entry, utilization review and billing. The workload study began when the nurse sent the documentation to the data entry and utilization review after an admission visit

(first visit) to the assigned patient. The study covered all tasks and activities up to the point at which a claim was made and payment was received by the billing area.

This project did not include any interactions with patients and clinicians (nurses, therapists, etc.) on duty.

Methodology

Team Infinity needed to understand exactly how the current work system of the three areas functioned before being able to progress in this project. Once the team was able to identify the workflow and define the tasks performed throughout the work system, the team was able to conduct studies to collect the workload measurements. The team has completed the following methodologies for this project.

Initial Observations, Interviews, and Questionnaires

Team Infinity performed initial observations and interviews, and distributed questionnaires for all the staff in each of the three areas. Staff were observed and interviewed to determine all the tasks performed and to learn about the workflow process between the three areas. The team developed a questionnaire that was distributed to each of the staff in the three areas. The purpose of the questionnaire was to identify specific tasks that might not have been identified in the interviews. The team observed, interviewed, and gathered information through questionnaires from all 13 staff in the three areas and other key staff members such as managers and directors of each area. Observations and interviews were conducted for about two weeks to clarify and completely understand the current work system. Lastly, the questionnaires were distributed at the end of the interviews and collected the next business day.

Preparation of Data Collection

To perform the workload studies, the team analyzed the identified tasks to create a study sheet for each workload study. These study sheets were the team's data collection tools to track the tasks performed and the time that the tasks were performed by each staff. To prepare the study sheets, the team first created flow charts of the key tasks to document the workflow of the three areas. Once the tasks and the workflow of each area were documented, the team attempted to create a single common study sheet for each study for each area. However, the tasks and work hours varied between the staff of each area; therefore, the team developed several study sheets to accommodate this variation among the staff and the tasks they perform. After the study sheets were made, the team trained all the staff to use the sheets to perform each study. This preparation process took about two weeks to complete.

Random Sampling Beeper Study

The purpose of the beeper study was to measure the frequency of the workload of the staff in the three areas. Each staff was assigned a beeper that was set to randomly around at an average of 4 times per hour. Each time the beeper sounded, the staff member marked the tasks in progress on the given log sheet. This study was performed for one week per staff in each area.

Ladder Log Study

The purpose of the ladder log study was to track the duration of each task, possible multi-tasking and possible interruptions to the tasks. Each staff member recorded all tasks performed throughout the day on the given log sheet. This study was performed for about one week per staff in each area.

Task Volume Study

The purpose of the task volume study was to obtain the volume of each task performed each day. Each staff member marked a tally on the given log sheet for each task performed. This study was performed for about one week per staff in each area.

Data Analysis

After the data was collected, the team performed thorough statistical calculations such as determining the percentage of time each staff spends on each type of task. The team also prepared graphs that depict the staff workload stratified by task type, duration of the task, frequency of the task, and more detail about each task performed. The analysis was performed for each staff in the area and correlated with the other staff within the same area.

Recommendations

Based on the observations, interviews, questionnaires, and quantitative studies, Team Infinity developed recommendations for improving the current workflow, improving allocation of human resources, developing standardized work practices, and developing a more efficient work schedule and work methods for the staff.

Findings and Conclusions

The observations, interviews, questionnaires, and the three workload studies have been analyzed. Through the observations, interviews, questionnaires, the team was able to define the background of the three areas such as the exact number of staff, staff member's work hours, specific tasks performed by each staff member, and other information of the current work system. The team also developed flow charts to identify the workflow and interaction activities between the three areas. These initial findings were used to prepare the workload studies to collect measurements of the workload. The following presents the team's findings after the methodologies were conducted.

Initial Findings and Results

Team Infinity first observed, interviewed, and gathered information through questionnaires for each staff in the data entry, utilization review, and data entry areas. By observing and interviewing the staff, the team learned the following:

- Number of staff in each area
- Work hours of each staff
- Overall workflow and key tasks performed in the three areas
- Specific tasks performed by each staff in the three areas
- Ways to distribute the workload studies for each staff member

In addition, questionnaires (Appendix R) were distributed to all staff in the three areas after the interview. Using the information collected from the observations, interviews, and questionnaires, Team Infinity derived the following information.

Staff Working Hours

A total of 13 staff work within the three areas.

- Data Entry – 5 staff
 - 2 staff members work from 7 am to 4 pm, Monday through Friday.
 - 1 staff member works from 7:30 am to 4:30 pm, Monday through Friday.
 - 1 staff member works from 7:30 am to 4:00 pm, Monday through Friday.
 - 1 staff member works from 2 pm to 10 pm, Monday through Friday, excluding Wednesday. On Wednesday, the staff member works from 7 am to 4 pm.
- Utilization Review – 4 staff
 - 1 staff member works from 8 am to 5 pm, Monday through Friday.
 - 1 staff member works from 8 am to 5 pm, Monday through Wednesday.
 - 1 staff member works from 8 am to 5 pm, Thursday and Friday.
 - 1 staff member works from 9 am to 6 pm, Monday through Friday, but does not work on Wednesday.
- Billing – 4 staff
 - 1 staff member works from 8:30 am to 5 pm, Monday through Friday.
 - 1 staff member works from 8:00 am to 4:30 pm, Monday through Friday.
 - 1 staff member works from 7 am to 4 pm, Monday through Friday.
 - 1 staff member works from 7 am to 12 pm, Monday through Thursday.

Issues Concerning the Overall Workflow

After analyzing the observations, interviews, and questionnaires, the team found several key issues concerning the current work system that could affect the workflow. The following presents the issues that can affect the current workflow of the three areas.

- Most field staff enters patient data and other data through Point of Care (POC), which is an electronic program that allows the field staff to access without having to do paperwork.
- Not all field staff is trained to use POC, therefore, paperwork still exists.
- Most work comes in as a batch (i.e. batch of admission folders, batch of approved patient cases, batch of POC folders etc.).
- Workload varies for each staff member due to the size of the batch they receive.
- Medicare and Medicaid patient files have the highest risk factor. Errors on these documentations have more severe consequences compared with other insurance companies.
- McKesson, computer program used by billing, is not as billing-friendly compared to other programs used by other companies.

Flow Charts of the Three Areas

Team Infinity developed flow charts of the workflow in the three areas (Appendix P and Q). Each of the flow charts represents the key tasks that each area performs. The flow charts were separated depending on the volume of interaction between the areas and the work order of the whole work system. The workflow of utilization review and the workflow of data entry were combined onto one flow chart because of the high volume of interaction between the two areas.

The workflow of billing was put in a separate flowchart because of the minimum interaction between other areas.

The flow chart (Appendix P) of the initial process, which starts from the field staff sending the patient files to data entry and utilization review, shows tasks that involve coding, reviewing, and verifying the documentation. Various interactions can be seen between the utilization review and data entry to complete the workflow process, which requires that all the documentation is signed and approved.

The flow chart (Appendix Q) that represents the workflow of the billing area shows that the only interaction occurs between billing and utilization review. The flow chart shows two branches within the billing area based on the type of insurance companies. The first branch represents the workflow for Medicare billing, which is insurance provided by the government. The second branch on the right side of the page displays the billing processes for all other insurance companies. For both branches, after the patient cases and documentation have been approved, billing sends an initial claim for an initial payment, and then sends a final claim for a final payment. In response to these claims, payments are sent directly from the insurance companies to the billing area of MVN.

Task Lists and Study Sheets (Data Collection Sheets)

Using the collected information and flow charts, the team developed a list of all specific tasks that each staff member performs throughout their work hours. The task lists were incorporated into the study sheets to perform the workload studies. The team developed three types of data collection sheets for each area: Random Sampling Beeper Study Sheets, Ladder Log Study Sheets, and Task Volume Study Sheets. The following presents the factors that contributed for setting up different task lists for some staff members for different studies and reasons for different distributions of the study sheets. The following also presents the tasks that were studied and the purpose measuring the task in more detail.

- Random Sampling Beeper Study Sheets: These study sheets consist of a list of specific tasks with a corresponding time frame. The staff members were given a beeper that rings randomly throughout the day at an average of 4 times per hour. Whenever the beeper sounded, the staff placed a check in the box that corresponds to the time and the task the staff member was performing at that moment.
 - Data Entry – The team combined the various tasks and developed a single random sampling beeper study task list for all data entry staff. However, the work hours varied between the staff, so the team rearranged the time frames for each staff. A sample of the Data Entry Beeper Study Sheet can be seen in Appendix A.
 - Utilization Review – The team created a single task list with rearranged time frames for each staff member. A sample of the Utilization Review Beeper Study sheet can be seen in Appendix D.
 - Billing – The team distributed different task lists for each of the four staff members, because of the different insurance companies and different tasks each staff members performed. A sample of the Billing Beeper Study Sheets for each of the four staff members can be seen in Appendices G, I, K, and M.
- Ladder Log Study Sheets: These study sheets consist of a list of specific tasks used in the Beeper Study and a ladder log to record the corresponding task performed. The list of

tasks were organized and placed into a broader category. For example, tasks such as Check E-mail, Reply all Field Staff Comments, and Check Mail would be categorized as a T1 – Initial Tasks Related to Mails. Whenever the staff member performed a task that was included in a category, the staff member marked the start time and end time of that task category, which represented the duration of the tasks. Interruptions and possible multi-tasking that occurred while the staff were working were also incorporated in this study. The instructions on how to perform this study along with the log sheet and a list of the grouped tasks were prepared for each staff.

- Data Entry – The team used the beeper study task list to group the tasks into a broader category for the staff in data entry. The sample of the ladder log task list for data entry can be seen on Appendix B.
 - Utilization Review – The team used the beeper study task list to group the tasks into a broader category for the staff in UR. The sample of the ladder log task list for UR can be seen on Appendix E.
 - Billing – The team used the beeper study task list to group the tasks into a broader category. A customized ladder log task list was developed for each billing staff member. A sample of the ladder log task lists for billing can be seen on Appendix H, J, L, and N.
- Task Volume Study Sheets: Team Infinity focused this study on the tasks related to corrections, redundant work, and other activities that occur due to error, because these are the tasks that need to be eliminated. A separate task list was prepared for each of the staff in the three areas for this study. Each time a staff member performed a task related to an error, they marked a check in the box that corresponds to that task and the time.
 - Data Entry – A common list of tasks for this study was created for each staff in data entry. A sample of the Data Entry Task Volume Study Sheet can be seen in Appendix C.
 - Utilization Review – A common list of tasks for this study was created for each staff in UR. A sample of the Data Entry Task Volume Study Sheet can be seen in Appendix F.
 - Billing – Different from the previous studies, a single common list of tasks related to errors and redundant tasks was created for billing. A sample of the Billing Task Volume Study Sheet can be seen in Appendix O.

All of the prepared data collection sheets (Appendix A through O) for each study included the recordings of start time, break time, lunch time, and end time of each staff member who participated in the study.

Findings and Conclusions from Workload Studies for the Three Areas

The following presents the team's findings for the workload studies performed for each of the three areas: data entry, utilization review, and billing.

Data Entry

The following presents the findings from the workload studies performed on 5 staff member of data entry.

Beeper Study

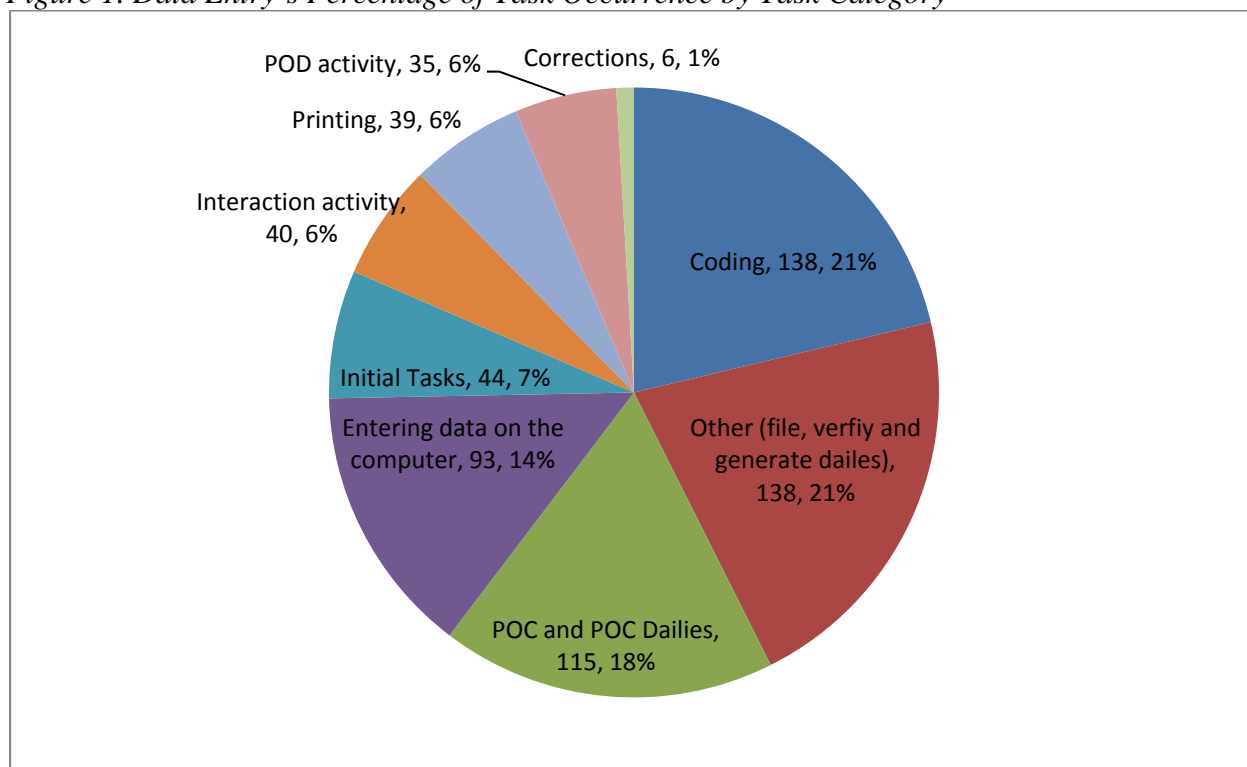
The purpose of this study was to analyze the frequencies of all the tasks that data entry staff perform each day. A full analysis of the Beeper Study data, which is an analysis of each staff in data entry, can be found in Appendix S. Table 1 below displays the sample size, which is the task frequency, and the percentage of times that the task occurred when the beeper sounded for data entry area. This table displays the total combined data of the 5 staff members in data entry for one week. Note the grouping of the individual tasks into a more general task category in Table 1.

Table 1. Data Entry's Task Frequency

Initial Tasks	N	Percentage
Assess and prioritize task list, workload for day	10	2%
Check calendar, e-mails, voice msg, and comm notes	12	2%
Interaction activity		
Confer with field staff and make changes	13	2%
Confer with UR and make changes	27	4%
Coding		
POC ICD9 coding	138	21%
POC and POC Dailies		
Process POC folders	25	4%
Process POC Dailies	81	13%
Review POC	0	0%
Review POC Dailies	9	1%
POD activity		
Telephony	4	1%
Monitor and update POD list	25	4%
POD meeting	6	1%
Printing		
Print orders	10	2%
Print clinical forms	28	4%
Print a verification message	1	0%
Entering data on the computer		
Enter 485	39	6%
Enter orders	10	2%
Enter admit, discharge and personnel for all OB visits	18	3%
Extract OASIS to State / Enter OASIS to computer	22	3%
Enter meds - Paper - enter paper discharge	26	4%
Corrections		
Correct orders/485	0	0%
Other corrections	6	1%
Other	138	21%

Figure 1 displays the percentage of time that the task occurred when the beeper sounded as a pie-graph to show the differences between the tasks that were performed the most and the tasks that were rarely performed. Note that the pie-graph displays the general task category.

Figure 1. Data Entry's Percentage of Task Occurrence by Task Category



Key findings from Table 1 and Figure 1 include:

- The task with highest frequency (110 / week) performed was POC ICD9 coding, which took about 17% of data entry's total working time.
- Other tasks (mostly work related to helping Medical Records) took about 26% of data entry's working time.
- Time spent on entering data onto computer was also significant, which was 14% of the total working time.

Ladder Log Study

The purpose of the ladder log study was to find out the average task duration and the percentage of the each task. The study also looked at each staff's total time spent on multi-tasking in addition to the percentage of multi-tasking out of total time. A detailed analysis of each staff's task can be found in Appendix T.

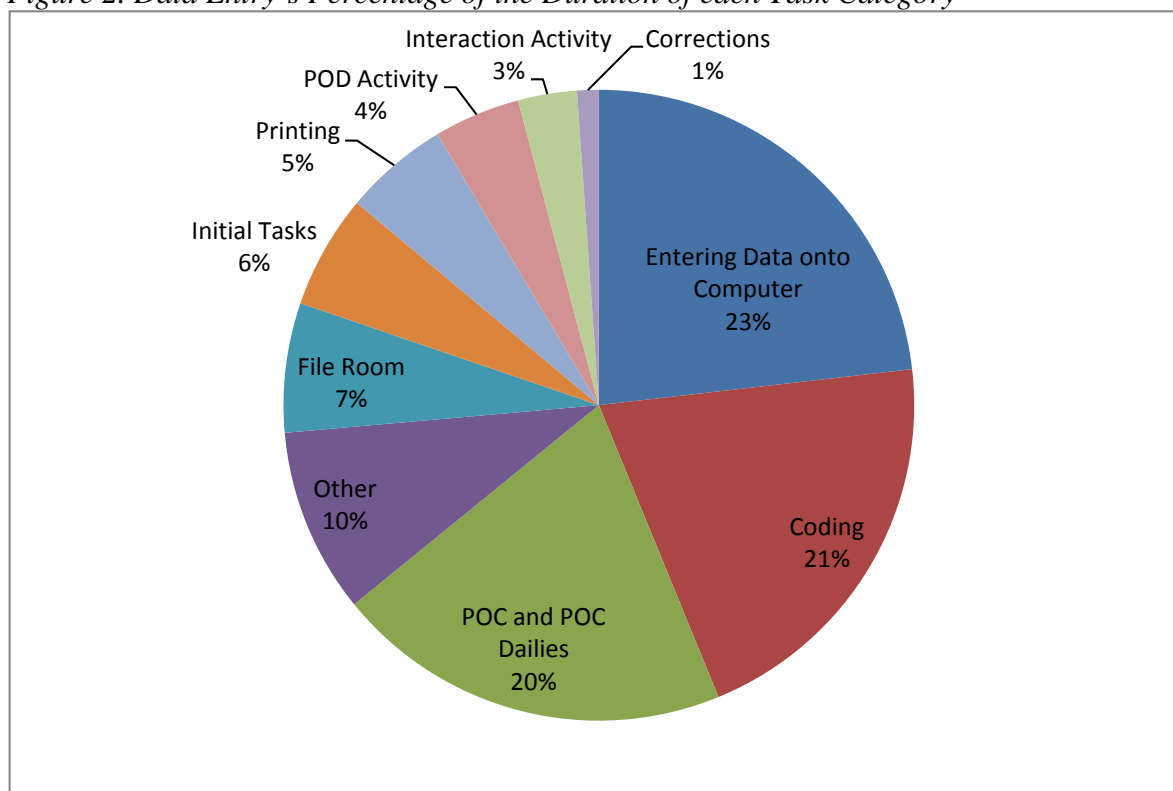
Table 2 below displays the average duration of the tasks performed by the data entry staff for one week. The sample size, standard deviation, sum of total time spent on the task, and the percentage of the tasks done in one week are also shown for each task category. The mean represents the average duration of performing the task.

Table 2. Data Entry's Average Task Duration

Task	Duration (in min)				
	N	Mean	St Dev	Sum	Percentage
Entering Data onto Computer	46	58.76	38.69	2723	23%
Coding	37	65.07	49.54	2423	21%
POC and POC Dailies	58	41.07	35.26	2388	20%
Other	61	18.25	18.71	1113	9%
File Room	7	102.96	43.66	780	7%
Initial Tasks	40	17.03	12.18	686	6%
Printing	33	18.94	13.99	630	5%
POD Activity	22	23.48	19.09	521	4%
Interaction Activity	41	8.55	4.91	354	3%
Corrections	13	9.7	5.77	130	1%

Figure 2 below is a pie-graph of the percentage of the duration of the task categories performed by the data entry staff throughout one week.

Figure 2. Data Entry's Percentage of the Duration of each Task Category



Key findings from the Table 2 and Figure 2 include:

- Files room task lasted 103 minutes on average. Performing this task once was the longest duration compared to any other tasks performed a single time. However, the task

occurred only 7 times in one week. The duration of the file room task might have been the longest, but the frequency (number of times performed throughout one week) was the lowest.

- The three top tasks: entering data onto computers, coding, and working with Point of Care (POC) and POC dailies accounted for 63% of the time throughout one week.

Table 3 below displays the percentage of time of multi-tasking done by each staff member in data entry for one week.

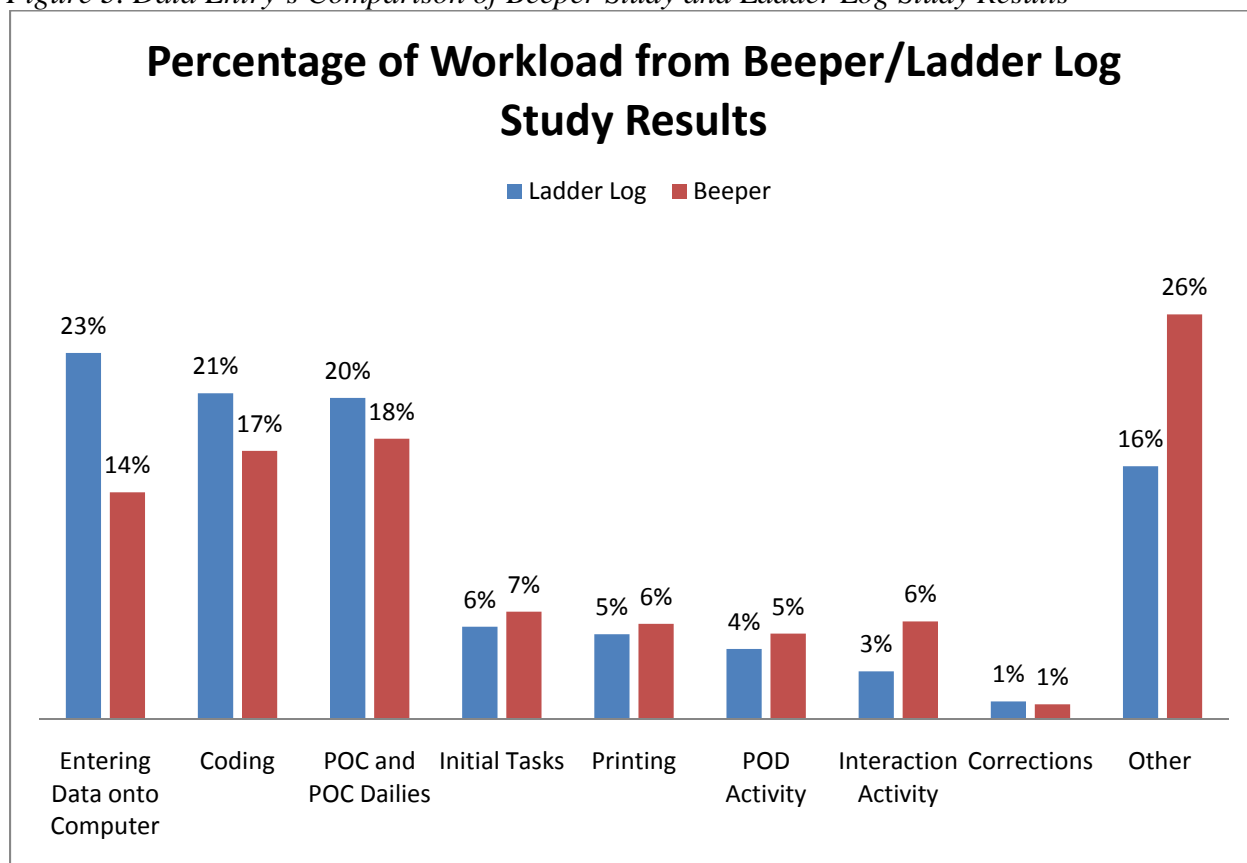
Table 3. Percentage of Time Spent Multi-Tasking by each Staff

Name	Total Time Observed (in min)	Total Time Multi- Tasking (in min)	% of Time Multi- Tasking
Staff 1	2663	80	3%
Staff 2	2136	0	0%
Staff 3	2529	109	4%
Staff 4	2040	160	8%
Staff 5	2380	25	1%
Total	11748	374	3%

Table 3 shows that the staff in data entry spent 374 minutes in one week multi-tasking. Multi-tasking was done about 3% of the staff's total working time in one week.

All the data collected from both beeper study and ladder log study have been compared to verify the variability and usability. Both data points are close to each other, which verify the usability of the collected data. Figure 3 shows the percentages of each task category for both studies.

Figure 3. Data Entry's Comparison of Beeper Study and Ladder Log Study Results



Task Volume Study

The purpose of this study was to analyze the volume of the tasks Data Entry staff performed. For this study, the team mainly focused on the number of interaction activities, number of corrections and number of codings. Table 4 below shows the measurements of task volume study collected throughout one week.

Table 4. Data Entry's Task Volume of Interaction Activities, Corrections, and Codings

Interaction activity	N	Percentage
Confer with field staff and make changes	51	94%
Confer with UR and make changes	3	6%
Corrections		
Correction's on dates	12	39%
Other corrections	10	32%
Correct orders/485	4	13%
Correct visit for discharge folder	3	10%
Correct visit for lois	2	6%
Coding		
POC ICD9 coding	68	70%
Other coding	29	30%

Key findings from Table 4 include:

- 94% of the work related to Interaction Activity was to confer with the field staff to make changes of initial documentation errors, which occurred 51 in one week.
- 39% of the work related to corrections was to make corrections on dates, which occurred 12 times in one week.
- 70% of the work related to coding was POC ICD9 coding, which occurred 68 times in one week.

Data Entry Key Conclusions

Data entry performed three main tasks throughout one week which accommodated for 63% of their total workload.

- Entering Data onto Computers: Total of 45.39 hours per week
- Coding: Total of 40.38 hours per week and Highest frequency of 110 times per week
- Work related to POC Monitoring (POC activities): Total of 39.55 hours per week

Data entry performed “other” tasks that were identified by the team as non-value added work. This activity of “other” tasks accommodated for 18.55 hours of one week. Within this category of “other” tasks, task identified as File Room Activity, was performed for 13 hours in one week.

Data entry provided the team with several historical log sheets that kept track of numbers of tasks completed by each data entry staff member from January 2009 to March 2009. Using this data, the team was able to calculate that Thursdays and Fridays were the least busy day for data entry. The graph that depicts this information can be seen in Appendix U.

Utilization Review

Each utilization review staff member performed the same tasks as one another. This simplified the methods of analyzing UR’s workload studies, because all the data consisted of same tasks. The following presents the findings from the workload studies performed on 4 staff member of utilization review (UR).

Beeper Study

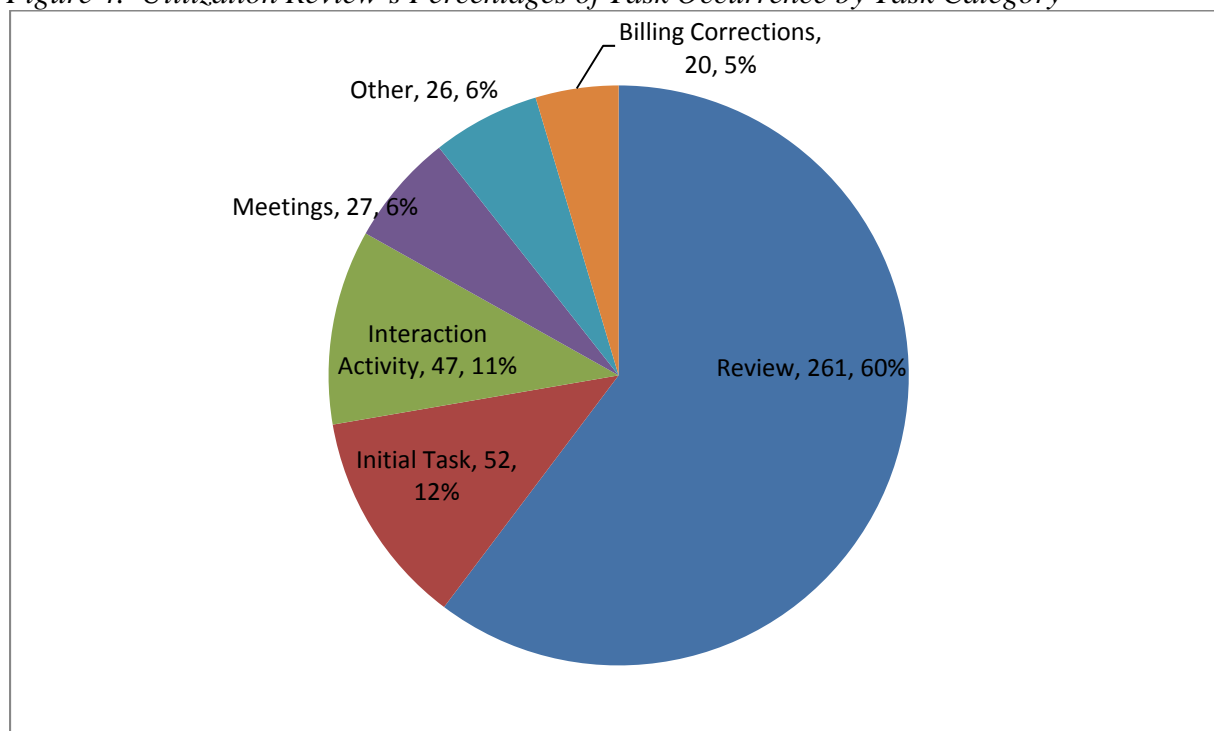
The purpose of this study was to analyze the frequencies of all the tasks UR staff perform each day. Table 5 below displays the sample size, which is the task frequency, and the percentage of task occurrence for UR area. This table displays the total combined data from the 4 staff members in UR for one week. Note the grouping of the individual tasks into a more general task category in Table 5.

Table 5. Utilization Review's Task Frequency

Initial Task	Frequency	Percentage
Check calendar & e-mails	20	5%
Assess and prioritize task list, workload for day	14	3%
Print & highlight - for POD meetings	12	3%
Set-up POC program - clinical explorer etc	6	1%
Review		
Review POC	199	46%
Review POC 485's and sign 485	30	7%
Looking up patient and care information	12	3%
Review Paper documentation (green)	15	3%
Perform clinical and compliance review	5	1%
Interaction Activity	0	
Confer with supervisors (coding, oasis entry, etc)	21	5%
Discuss case with field staff and make changes (coding, oasis entry, etc)	15	3%
Confer with Data Entry staff and make changes (coding, oasis entry, etc)	9	2%
Confer with Billing staff and make changes (coding, oasis entry, etc)	2	0%
Billing Corrections		
Write orders, visit after D/C, insurance change, etc	19	4%
Run & reconcile discharges due and upcoming recerts	1	0%
Meetings		
Committees	13	3%
Staff education	10	2%
POD meetings	4	1%
Other	26	6%

Figure 4 below is a pie-graph showing the percentage of task occurrence stratified by task category.

Figure 4. Utilization Review's Percentages of Task Occurrence by Task Category



Key findings from Table 5 and Figure 4 include:

- The task most often performed (199 / week) performed was Review POC.
- UR staff spent most of their time (60%) on Review.
- Task of billing corrections accommodated for 5% of UR's total working hours in one week, which is redundant work due to errors and claim rejections.

Ladder Log Study

The purpose of this study was to look at not only the percentage of time staff spend on each task, but also the duration of the tasks. The full analysis of ladder log study for UR of total time spent on each task category through one week can be seen on Appendix V.

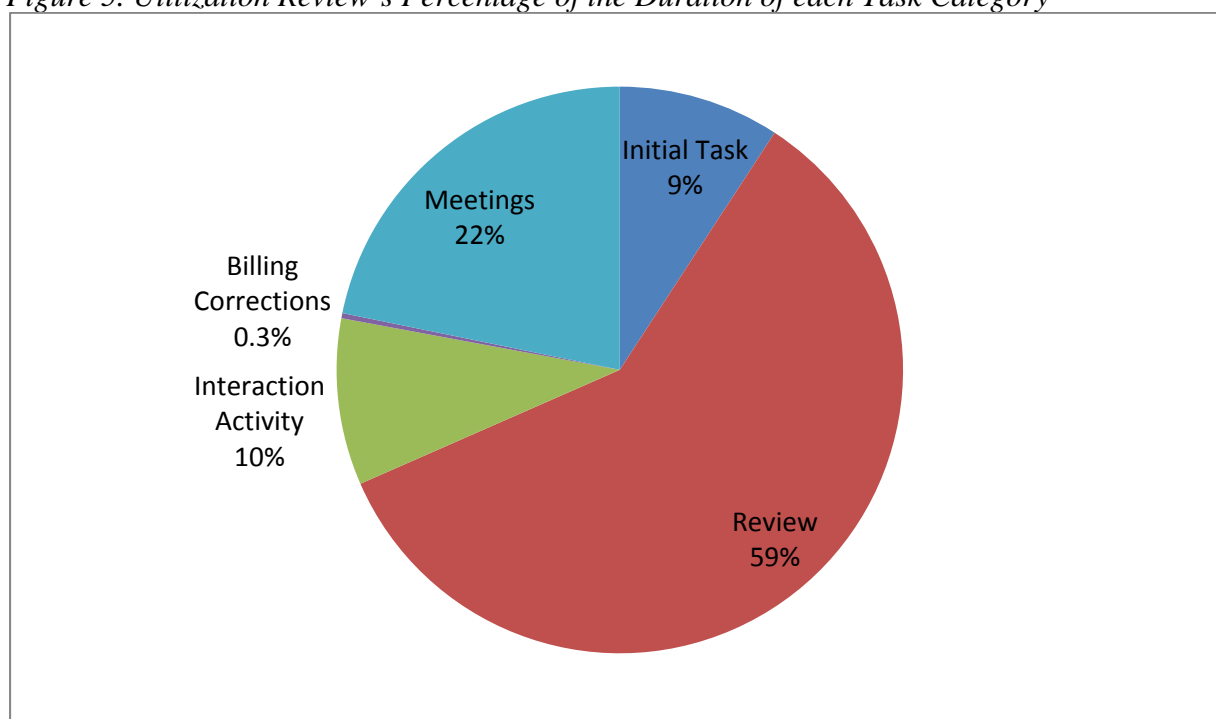
Table 6 below shows average length of each task performed by UR. The number of sample size, which is the number of times the task was performed in one week, standard deviation, sum of the total time spent on the corresponding task in one week, and the percentage of each task category for this study is also shown.

Table 6. Utilization Review's Average Task Duration

Task	Duration (in min)				
	N	Mean	St Dev	Sum	Percentage
Initial Task	17	27.35	18.72	465	9.2%
Review	444	67.95	51.72	2990	59.2%
Interaction Activity	22	21.82	15.24	480	9.5%
Billing Corrections	1	15	-	15	0.3%
Meetings	21	52.38	39.77	1100	21.8%

Figure 5 below is a pie-graph of the percentage of the duration of the task categories performed by the data entry staff throughout one week.

Figure 5. Utilization Review's Percentage of the Duration of each Task Category

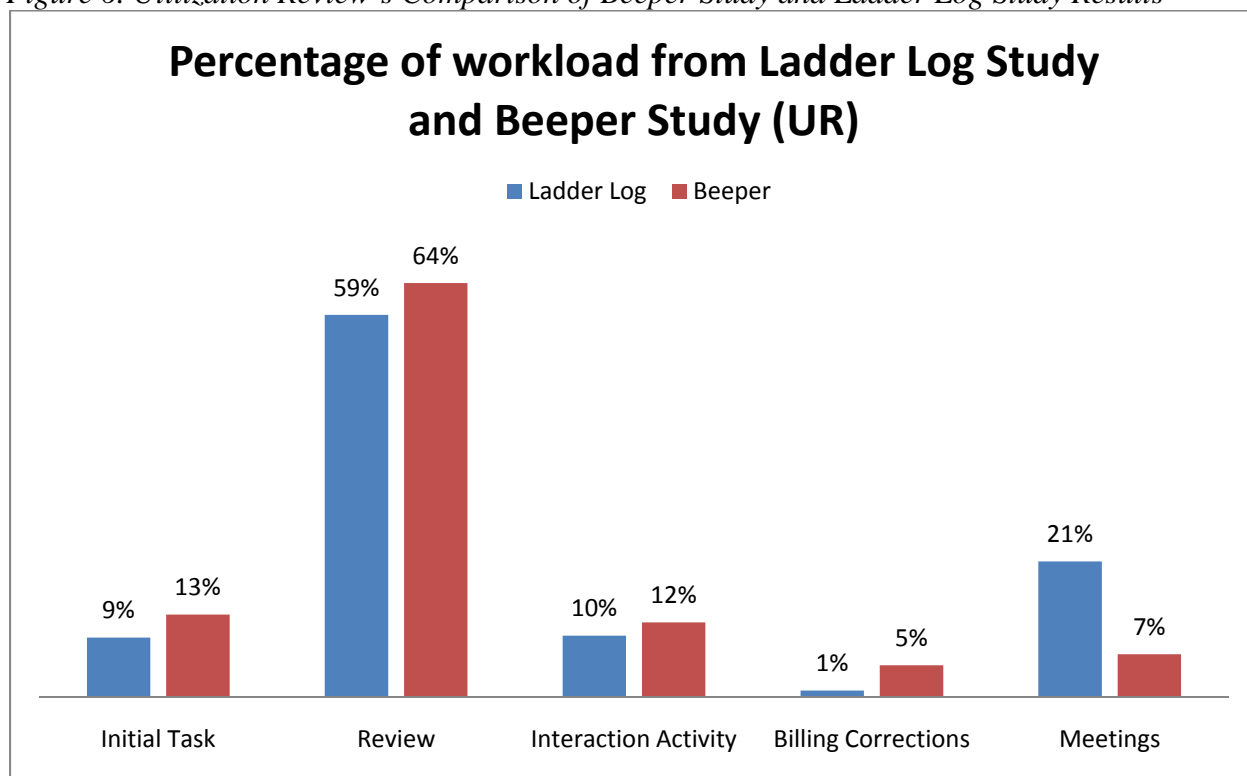


Key findings from Table 6 and Figure 5 include:

- UR spent 59.2% of their time to review, which validates what we have found in the beeper study.
- Each time a staff starts review, it takes on average 67.95 minutes with a standard deviation of 51.72 minutes. The large standard deviation represents the limited sample size.

Figure 6 below is a comparison of results from the beeper study and the ladder log study. Data from both studies are clearly verified to be used.

Figure 6. Utilization Review's Comparison of Beeper Study and Ladder Log Study Results



Task Volume Study

The purpose of this study was to analyze the volume of the tasks UR staff performed. For this study, we mainly focused on Interaction Activities and Billing Corrections to see the number of tasks performed throughout one week due to errors and problems. Table 7 below shows the task volume of tasks performed due to errors by UR in one week, which is categorized under interaction activity and billing corrections.

Table 7. Utilization Review's Task Volume of Interaction Activities and Billing Corrections

Interaction Activity	N	Percentage
Discuss case with field staff and make changes	93	72%
Confer with Data Entry staff and make changes	21	16%
Confer with supervisors	10	8%
Confer with Billing staff and make changes	5	4%
Billing Corrections		
Run & reconcile discharges due and upcoming recerts	7	88%
Write orders, visit after D/C, insurance change, etc	1	13%

Key findings from Table 7 include:

- 72% of the work related to Interaction Activity was to discuss with field staff due to initial documentation errors and make those changes, which occurred 93 times in one week.
- UR staff conferred with data entry staff 21 times in one week.
- UR staff conferred with billing staff 5 times in one week.

Utilization Review Key Conclusions

The following summarizes the key findings which will be used to develop recommendations for utilization review.

- Reviewing Point of Care (POC) accommodates for 60% of utilization review's workload.
- The time spent on review varies depending on the sample size.
- 72% of interaction activity (non-value added work) consists of discussing the case with the field staff to make changes on the patient files and other documentations.

Billing

Billing area consists of 4 staff members who are in charge of work operations of assigned insurance companies such as Medicare, Bluecaid, and other private companies. The following presents the findings from the workload studies performed on 4 staff members of billing.

Beeper Study

The purpose of the beeper study for the billing area was to determine the frequency of the workload of each staff. A full analysis of the beeper study for billing can be found in Appendix W. Table 8 below summarizes the findings from the beeper study for each staff in billing conducted for one week. Because all 5 staff in billing perform different tasks depending on their assigned insurance company, the team could not combine the data. The major tasks of the each staff member are listed and measured as shown in Table 8.

Table 8. Billing's Task Frequency of each Staff Member

Staff 1	N	Percentage
Bluecaid and Medicaid	38	39%
Cash Activities	37	38%
Other UM Departments	19	19%
Initial Tasks	4	4%
Staff 2	N	Percentage
BCBS, BCN and BCN Premier Care	71	46%
Others	68	44%
HomeMed	10	7%
Initial Tasks	4	3%
Staff 3	N	Percentage
Final Claims	50	40%
Initial / General Tasks	24	19%
Other	24	19%
Corrections / Other claims	16	13%
RAP	10	8%
Staff 4	N	Percentage
Others	63	43%
Activities Related to Contacting Insurance Companies, etc.	33	23%
Activities Related to Processing Claims	20	14%
Activities Related to Posting Payments & Voucher	17	12%
Initial Tasks	13	9%

Key findings from Table 8 include:

- Staff 1 spent most of time working on Bluecaid/Medicaid tasks and cash activities with 39%, 38% respectively.
- Staff 2 spent 46% of the time on BCBS, BCN, and BCN premier care tasks.
- Staff 3 spent 40% of the time working on final claims for the Medicare.
- Staff 4 spent more than 40% of the time on other activities that was not identified.

Ladder Log Study

The purpose of the Ladder Log Study was to explore the total time of each task and multi-tasking. The study also discovered the percentage of time spent on each task and multi-tasking. A full analysis of the ladder log study results of hours spent per week on each task for each staff member can be seen on Appendix X.

Figures 7 through 10 show the percentage of task duration of each task performed by each staff in billing for one week.

Figure 7. Percentage of Task Duration of each Task for Staff 1 of Billing

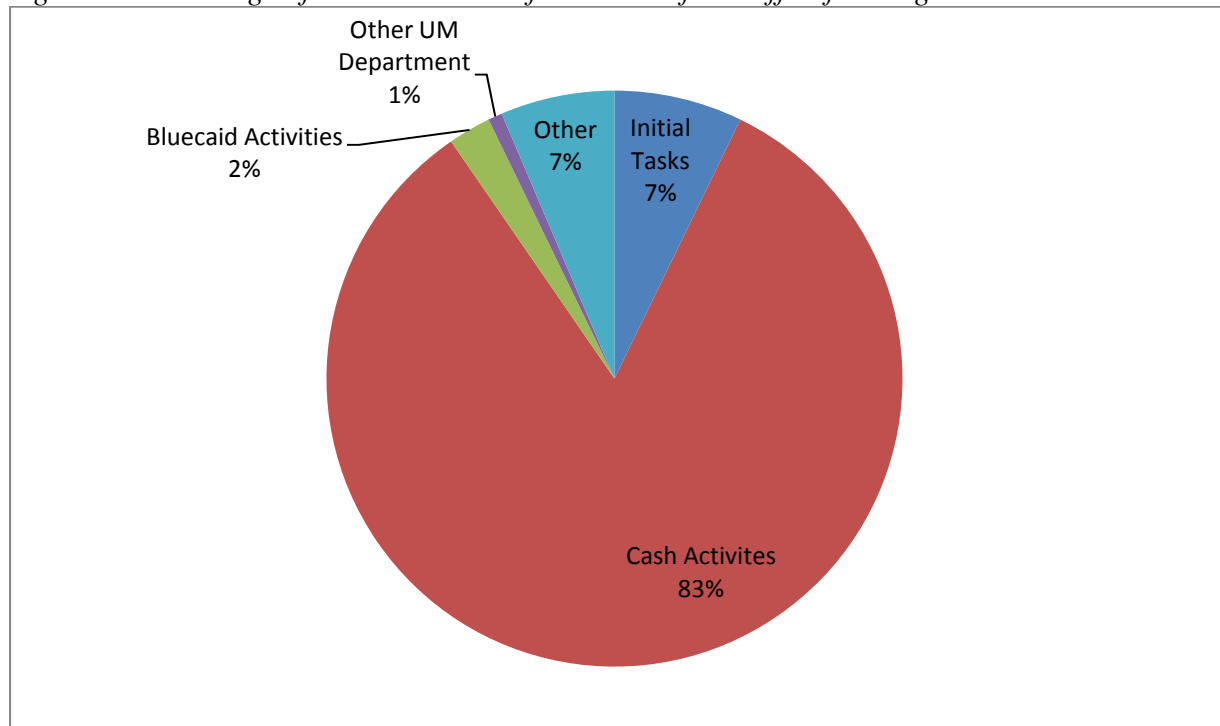


Figure 7 illustrates that staff 1 spent 83% of his/her time on cash activities, which is the most time-consuming task category. On the other hand, associating with other UM departments is the least time-consuming task category with 7%.

Figure 8. Percentage of Task Duration of each Task for Staff 2 of Billing

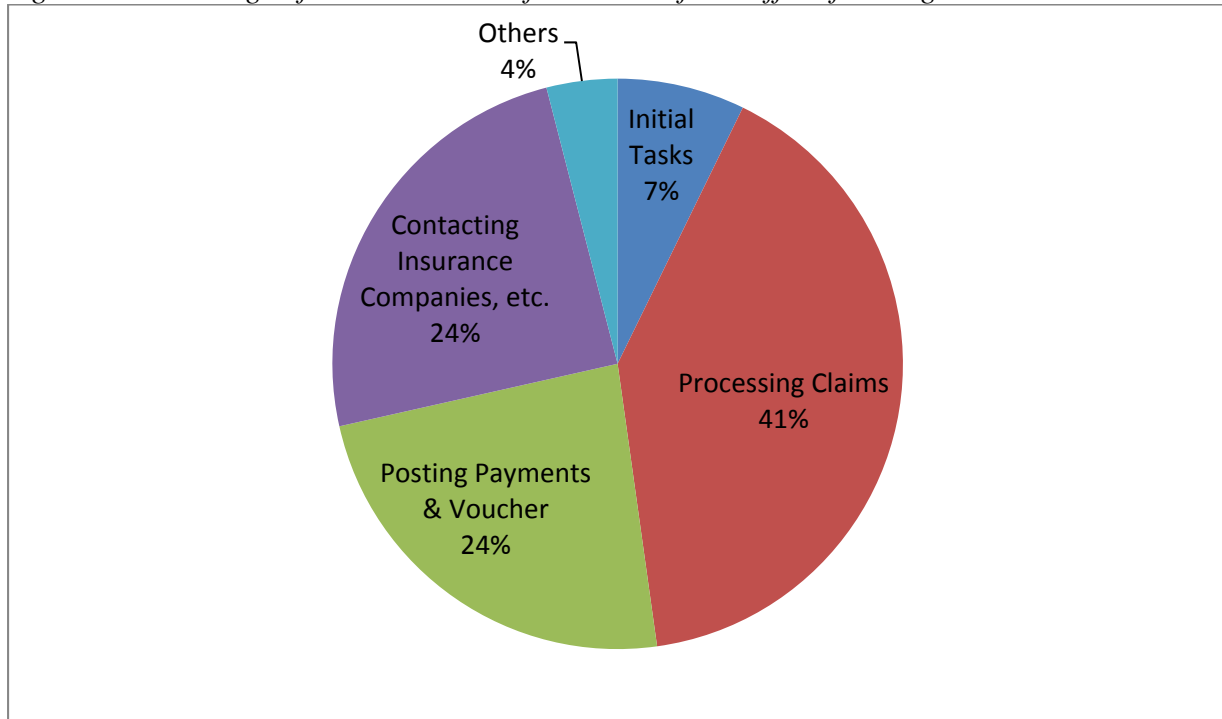
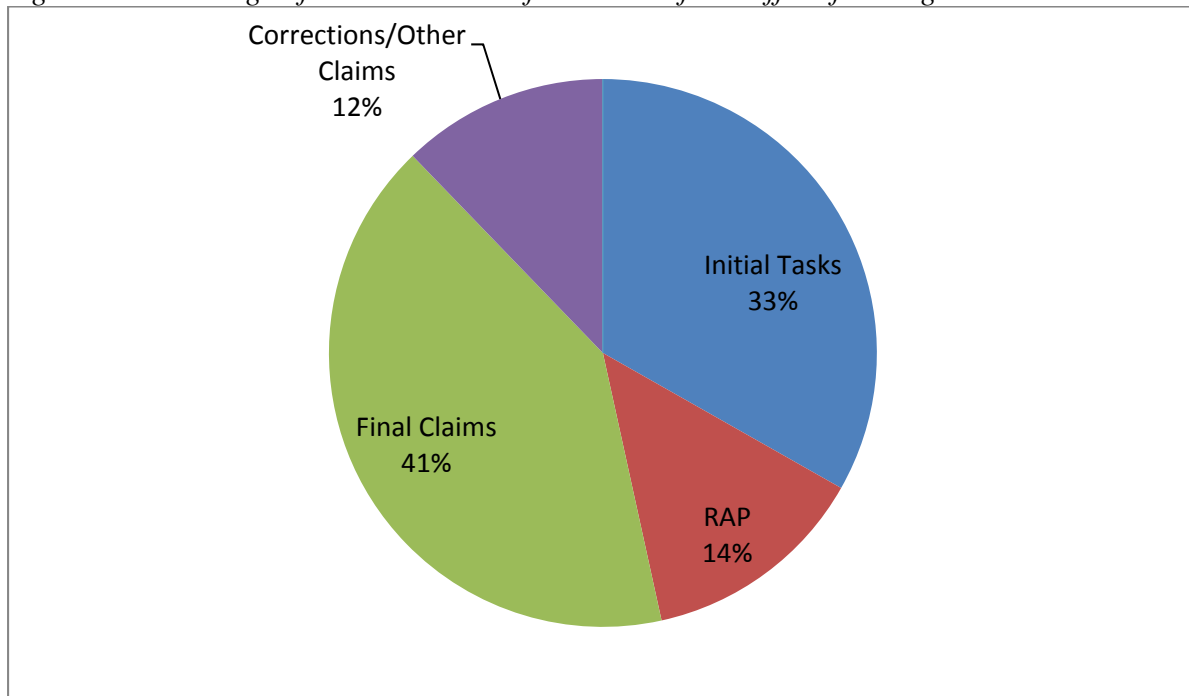


Figure 8 indicates that staff 2 spent 41% of his/her time on processing claims, followed by posting payments and voucher with 24%, and contacting insurance companies with 24%.

Figure 9. Percentage of Task Duration of each Task for Staff 3 of Billing



From figure 9, it can be seen that staff 3 spent 41% of work hours on final claims, followed by working on RAP with 14%.

Figure 10. Percentage of Task Duration of each Task for Staff 4 of Billing

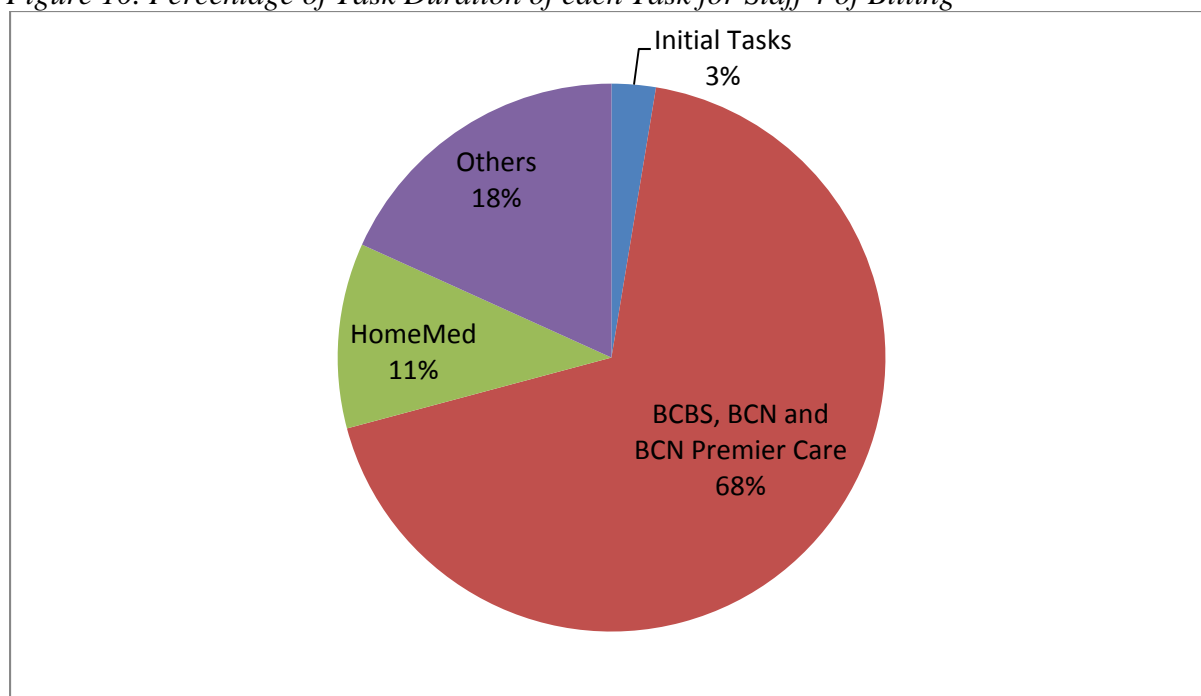


Figure 10 shows that staff 4 worked on the BCBS, BCN and BCN premire care tasks for 68% of the time in one week. In addition, staff 4 spendt 11 % of his/her time on HomeMed tasks.

Table 9 below displays the percentage of time of multi-tasking done by each staff member in billing over a period of one week.

Table 9. Multi-Tasking Percentage of Time Spent by each Staff Member in Billing

Name	Total Time Observed (in min)	Total Time Multi-Tasking (in min)	% of Time Multi-Tasking
Staff 1	1250	50	4%
Staff 2	2490	130	5%
Staff 3	1310	90	7%
Staff 4	1920	30	2%
Total	6970	300	4%

Table 9 demonstrates how much percentage of time each staff member performed multi-tasking in one week. On average, each staff member performed multi-tasking 4% of the time throughout one week. Staff 2 performed multi-task the most with 130 minutes in one week while staff 4 spent the least of 30 minutes.

The comparison of results from beeper study and ladder log study to verify the usability of the team's data can be seen for each staff in Appendix Y.

Task Volume Study

The purpose of the task volume study was to track the frequency of redundant work, which would cause the bottleneck of the system. Table 10 below shows each staff member's task volume of working on rejected claims due to errors (working on rejections and errors).

Table 10. Billing's Task Volume of each Staff Member

Staff 1	N	Percentage
<i>Work on Rejections and Errors</i>		
Visit after discharge	1	6%
Incorrect payments	1	6%
Medical notes request	3	19%
Send Problem claim to UR(incorrect start of care date)	5	31%
Incorrect or change in insurance company	6	38%
<i>Phone Calls, emails, other methods of contact due to Problems/Rejections</i>		
Contact patients	1	17%
Contact insurance companies	5	83%
Staff 2		
<i>Work on Rejections and Errors</i>		
No authorization from specialists	1	9%
HMO active	1	9%
Claims missing/invalid info (Medicaid HMO)	1	9%
Incorrect or change in insurance company	3	27%
Up Front Edit Denials	5	45%
<i>Phone Calls, emails, other methods of contact due to Problems/Rejections</i>		
Contact patients	1	100%
Staff 3		
<i>Work on Rejections and Errors</i>		
Incorrect or change in insurance company	1	3%
Medical notes request	3	10%
Not a covered benefit	3	10%
Print orders and Pass out	5	16%
Send Problem claim to UR(Worked on VC Billing Project)	19	61%
<i>Phone Calls, emails, other methods of contact due to Problems/Rejections</i>		
Contact patients	3	5%
Contact other U of M dept.	25	38%
Contact insurance companies	38	58%
Staff 4		
<i>Work on Rejections and Errors</i>		
No authorization from specialists	1	13%
Not a covered benefit	2	25%
Send Problem claim to UR(incorrect start of care date)	2	25%
Incorrect or change in insurance company	3	38%
<i>Phone Calls, emails, other methods of contact due to Problems/Rejections</i>		
Contact patients	4	100%

Table 11 below represents total task volume of all 4 staff members in billing working on tasks related to rejections and errors.

Table 11. Billing's Total Task Volume of Work Related to Rejections and Errors

<i>Work on Rejections and Errors</i>	N	Percent
Send Problem claim to UR(incorrect start of care date)	26	39%
Incorrect or change in insurance company	13	20%
Medical notes request	6	9%
Up Front Edit Denials	5	8%
Not a covered benefit	5	8%
Print orders and Pass out	5	8%
No authorization from specialists	2	3%
HMO active	1	2%
Claims missing/invalid info (medicaid HMO)	1	2%
Visit after discharge	1	2%
Incorrect payments	1	2%
<i>Phone Calls, emails, other methods of contact due to Problems/Rejections</i>	N	Percent
Contact insurance companies	43	56%
Contact other U of M dept.	25	32%
Contact patients	9	12%

Key finding from table 10 and table 11 include:

- Staff 3 contacted insurance companies and U of M department 63 times, which was the most among other staff members.
- Staff 3 sent problem claims to UR 19 times, which was at least 10 times more than any other staff members.
- Incorrect start of care date and incorrect or change in insurance company account for most of cases on rejections and errors, 59%.

Billing Key Conclusions

The following summarizes the findings for billing area.

- Each staff member had their own set of daily tasks with their own assigned insurance companies.
- 40% of patients admitted to MVN's service are under Medicare or Medicaid.
- 59% of claim rejections are caused by errors in dates and insurance companies.

Recommendations

Team Infinity developed several recommendations based on the findings from the observations, interviews, questionnaires, beeper study, ladder log study, and task volume study. The team first developed overall recommendations that can improve the overall work system of all three areas: data entry, utilization review, and billing. The team then developed recommendations for each area on ways to develop and improve standardized work practices, efficient work schedules and work methods, and allocation of human resources.

Overall Work System

Team Infinity recommends the following three key improvements for the current work system.

- Create one- piece flow: Currently, most of the work operations start with batches. All initial documentations and other workload arrive at MVN in batches. These documentations start the workflow for the three areas and should not be in batches. One area starts working on this batch, and passes on the finished batch to the next area for more work that needs to be done. If one-piece flow can be created, there will be no waiting time by the areas that perform work in the downstream (later in the process) of the workflow.
- Maximize use of Point of Care (POC): Train all field staff to use POC. The field staff should all use POC to eliminate paper work. Using POC will also help to create one-piece flow. Use of POC will allow both data entry and utilization review to access the initial documentations as soon as the files are uploaded electronically.
- Improve field staff's time management and work operations: Perform additional studies and projects on the workload and time schedules of the field staff. If the field staff can submit the necessary documentations in time to MVN, the workflow of MVN will improve significantly. By developing a time schedule for the field staff to submit their work in a more timely fashion, staff at MVN can also develop a more efficient schedule accordingly. Also, if the field staff can improve their First-Time-Quality (FTQ) performance, a much more efficient workflow will be developed at MVN due to less redundant work from initial documentation errors.

Data Entry

The following recommendations were developed for the data entry staff.

Standardized Work Practices, Efficient Work Schedules, and Efficient Work Methods

- Train all staff to perform all tasks from start to finish: Currently, the 5 staff members do not perform the same tasks, because not every staff member was trained to do certain tasks. For example, Staff 1 may receive a patient admission folder from a field staff, and start the workflow by checking for errors on patient name, date, insurance company, patient background, etc. Next, Staff 1 will pass the folder to Staff 2 for entering the data onto a computer program. Once Staff 2 finishes, Staff 2 will contact Staff 3, who will start coding the patient diagnoses. This process is very inefficient, because the staff members have to wait for the previous staff member to finish their task. By training all staff members to perform the tasks from start to finish, this waiting time will be eliminated, which will result in a better workflow.
- Edit Point of Care (POC) monitoring task (All work process related to POC): All 5 staff members perform POC monitoring process for their assigned nurses (field staff).

However, because the field staff does not have a set time to submit their POC folders to the data entry staff, the workload varies every day. This process needs to be remodeled to allow the data entry staff to know the exact workload they will receive on a given day, so that the data entry staff can also plan an efficient daily schedule. Because of the non-standard work procedure of the field staff, the team recommends that data entry staff all prioritize the POC monitoring task and work on it on a first-come first-basis any time of the week without having assigned nurses.

- Eliminate non-value added work: All redundant tasks due to errors and other unnecessary tasks found in the “other tasks” category in the workload studies need to be eliminated. Once again, if the field staff can improve their FTQ, redundant tasks will be reduced. The data entry staff also needs to identify the “other tasks” provided in the team’s studies. The team recommends another study to be performed on the data entry area to discover and reduce the “other tasks” category.
- Set up daily meetings in beginning of the day: By setting up daily initial meetings, the initial tasks done by the staff will be reduced. The meetings will allow even distribution of work among the staff to maximize efficiency in the workflow.
- Set Thursday or Friday to work only on filing room activities: Given from the team’s findings that Thursday and Friday are the least busy days for the data entry staff, the team recommends that all filing room activities be moved to one of the two days.
- Reduce paper work, which is to reduce tasks related to entering data onto computer: Paper work will be reduced once all the field staff is trained to use POC. By reducing paper work, non-value added work such as entering data onto computer will be eliminated. Time spent entering data on to computer is very significant (currently 23% of all workload): enter 485(42%), enter orders (10.7%), enter admit, discharge and personnel for all OB visits (19.3%), enter meds-paper and paper-discharge (28%).
- Remove coding from their main tasks and train utilization review to code: Currently, data entry has 3 staff members trained to code. However, the coding task can be trained to UR instead. This can be very efficient given the fact that UR is in charge of reviewing all the patient files, which can be done simultaneously while coding. This will also eliminate redundant work, because data entry staff needs to re-code if UR finds any errors on the patient diagnoses.

Allocation of Human Resources

Data entry currently uses 5 FTE.

- Set staffing level to 3.28 FTE if non-value added work such as initial tasks, interaction activities, entering data onto computer (paperwork), and “other tasks” can be eliminated. This value was calculated by removing all the non-value added work from the current work operations of data entry.
- Set staffing level to 2.27 FTE if all non-value added work and coding can be removed. This is the FTE recommended at an ideal state once all the recommendations for data entry are implemented.

Utilization Review

The following recommendations were developed for the utilization review staff.

Standardized Work Practices, Efficient Work Schedules, and Efficient Work Methods

- Perform nurse training evaluations: UR is in charge of training nurses (field staff) of using POC and other tasks that is required for all the patients. The team recommends the training to be evaluated to increase the use of POC and to set standardized work practices for the nurses.
- Prioritize tasks: The team recommends that UR prioritize work related to billing corrections at all times. By finishing the billing corrections, more claims can be submitted by the billing area and the workflow of billing area will improve as well. Next, 485's and MD orders should be reviewed and approved to be sent out. Because the patients under MVN's service are 40% under Medicare and Medicaid, prioritize Medicare and Medicaid tasks before other insurance companies.
- Only review Medicare and Medicaid files: Medicare and Medicaid have the highest risk factor, because errors in these documents will result in severe consequences such as less profit, decrease in reputations, etc. The team recommends UR to only focus on working with Medicare and Medicaid to maximize profit and reputation, which will benefit the future of MVN.
- Perform additional studies on other insurance companies: Since the team recommended to only work on tasks related to Medicare and Medicaid, other insurance files need to be worked on. To measure the number of errors and time spent on work related to reviewing files of other insurance companies, additional studies are recommended to identify and predict the expected impact of focusing only on Medicare and Medicaid.
- Learn a new task to perform: coding: Removing the coding task from data entry and training UR to code will improve the workflow. UR staff can review the patient diagnoses and code at the same time, which will eliminate non-value added work and save time for data entry.

Allocation of Resources

UR currently uses 3 FTE.

- Set staffing level to 1.62 FTE if UR works only on Medicare and Medicaid tasks. This value was calculated by removing the workload of tasks related to other insurance companies from the original workload calculated from the team's findings.
- Set staffing level to 2.63 FTE if UR works only on Medicare and Medicaid files and learns coding. If UR can focus only on Medicare and Medicaid, and code the patient diagnoses under Medicare and Medicaid, this would allow a lower staffing level than the current FTE. By maximizing profit and saving costs, MVN can greatly improve the work system.

Billing

Billing area is the most downstream of the workflow between the three areas. If improvements are made in the upstream of the work system, the downstream of the work system will automatically improve. Improvements made in data entry and UR will improve the work system of billing. If the patient files and initial documentations can be approved after data entry and UR finishes their tasks, billing will perform their tasks of filing a claim to receive payments. The workflow of billing depends on the workflow of the other areas to achieve maximum efficiency.

Currently billing uses 3.5 FTE. Each staff member has their own unique set of tasks according to the insurance company they are working with. Because each staff performs totally different tasks

from one another, deriving staffing levels for the area as a whole was not possible. The team concluded that 3.5 FTE was the most efficient staffing level for billing according to the findings.

The following presents some general recommendations that can be implemented to achieve better outcomes in the future for billing.

- Assign at least 1 more staff to work with Medicare: Currently one staff member is in charge of all activities related to Medicare. Majority of the patients under MVN's service are under Medicare. 60% of the profit that MVN makes also comes from Medicare and Medicaid. Because of this crucial risk factor, the team recommends possibly assigning 1 more staff to review and help the current staff with the workload.
- Create instructional text for each insurance company's main tasks: Each staff only knows how to manage the tasks for their assigned insurance company. In cases of emergency, where a staff may be absent, the team recommends creating an instruction text for the tasks that need to be performed for each insurance company. This will allow the billing staff to cooperate and help each other in cases of emergency.
- Improve McKesson to make a more billing-friendly interface: McKesson, which is a computer program currently used by billing staff to perform all their tasks, has too many buttons to press and other inconvenient features. The team recommends an evaluation of the interface to develop a more billing-friendly interface for the billing staff.

Appendix

Study Sheets

Appendix A: Data Entry- Random Sampling Beeper Study Sheet

Beeper Study										Staff:				
										Department:				
Data Entry - Workload Study										Date:				

Instructions: When the random reminder beeper sounds, please place a check mark in the box corresponding to the task performed at the time of the beep occurred. Also, please note start, lunch, and end times below.

Staff Tasks:	7:00-8:00	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00
Initial Tasks								
Assess and prioritize task list, workload for day								
Check calendar, e-mails, voice msg, and comm notes								
Extract OASIS to State / Enter OASIS to computer								
Interaction activity								
Confer with field staff and make changes								
Confer with UR and make changes								
Coding								
POC ICD9 coding								
POC and POC Dailies								
Process POC folders								
Process POC Dailies								
Review POC								
Review POC Dailies								
POD activity								
Monitor and update POD list								
POD meeting								
Printing								
Print orders								
Print clinical forms								
Print a verification message								
Entering data on the computer								
Enter 485								
Enter orders								
Enter admit, discharge and personnel for all OB visits								
Corrections								
Correct orders/485								
Other corrections								
Other								
	Start Time:	Break Time:	Lunch:					

Appendix B: Data Entry-Task List for Ladder Log Sheet

Staff:

Department: Data Entry

Date:

T1- Initial Tasks
Assess and prioritize task list, workload for day
Check calendar, e-mails, voice msg. and notes
Extract OASIS to State / Enter OASIS to computer
T2- Interaction activity
Confer with field staff and make changes
Confer with UR and make changes
T3- Coding
POC ICD9 coding
T4- POC and POC Dailies
Process POC folders
Process POC Dailies
Review POC
Review POC Dailies
T5- POD activity
Monitor and update POD list
POD meeting
T6- Printing
Print orders
Print clinical forms
Print a verification message
T7- Entering data on the computer
Enter 485
Enter orders
Enter admit, discharge and personnel for all OB visits
T8- Corrections
Correct orders/485
Other corrections
T9- Other

Appendix C: Data Entry- Task Volume Study Sheet

[illegible]

Appendix D: Utilization Review- Random Sampling Beeper Study Sheet

Beeper Study		Staff:											
		Department: Utilization Review											
UR - Workload Study		Date:											
Instructions: When the random reminder beeper sounds, please place a check mark in the box corresponding to the task performed at the time of the beep, under the time that the beep occurred. Also, please note start, lunch, and end times below.													
		8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00	6:00-7:00	
Staff Tasks:													
Initial Task													
Assess and prioritize task list, workload for day													
Check calendar & e-mails													
Set-up POC program - clinical explorer etc													
Print & highlight - for POD meetings													
Review													
Perform clinical and compliance review													
Review POC													
Review POC 485's and sign 485													
Review Paper documentation (green)													
Looking up patient and care information													
Interaction Activity													
Discuss case with field staff and make changes (coding, oasis entry, etc)													
Confer with Data Entry staff and make changes (coding, oasis entry, etc)													
Confer with Billing staff and make changes (coding, oasis entry, etc)													
Confer with supervisors (coding, oasis entry, etc)													
Billing Corrections													
Run & reconcile discharges due and upcoming recerts													
Write orders, visit after D/C, insurance change, etc													
Meetings													
Committees													
POD meetings													
Staff education													
Other													
Start Time: _____		Break Times: _____ - _____		Lunch: _____ - _____		End Time: _____							

Appendix E: Utilization Review- Task List for Ladder Log Sheet

Staff:

Department: Utilization Review

Date:

T1-Initial Task
Assess and prioritize task list, workload for day
Check calendar & e-mails
Set-up POC program - clinical explorer etc
Print & highlight - for POD meetings
T2 - Review
Perform clinical and compliance review
Review POC
Review POC 485's and sign 485
Review Paper documentation (green)
Looking up patient and care information
T3-Interaction Activity
Discuss case with field staff and make changes (coding, oasis entry, etc)
Confer with Data Entry staff and make changes (coding, oasis entry, etc)
Confer with Billing staff and make changes (coding, oasis entry, etc)
Confer with supervisors (coding, oasis entry, etc)
T4-Billing Corrections
Run & reconcile discharges due and upcoming recerts
Write orders, visit after D/C, insurance change, etc
T5- Meetings
Committees
POD meetings
Staff education
Other

Appendix F: Utilization Review- Task Volume Study Sheet

Task Volume Study						Staff:					
						Department:					
UR - Workload Study						Date:					
Instructions: Please place a tick mark in the box corresponding to the task performed at the start time of each task. Also, please note start, lunch, and end times below.											
Staff Tasks:	7:00-8:00	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	6:00-7:00
Interaction Activity											
Discuss case with field staff and make changes (coding, oasis entry, etc)											
Confer with Data Entry staff and make changes (coding, oasis entry, etc)											
Confer with Billing staff and make changes (coding, oasis entry, etc)											
Confer with supervisors (coding, oasis entry, etc)											
Billing Corrections											
Run & reconcile discharges due and upcoming recerts											
Write orders, visit after D/C, insurance change, etc											

Start Time: _____ Break Times: _____ - _____ Lunch: _____ - _____ End Time: _____

Appendix G: Billing- Random Sampling Beeper Study Sheet for Staff 1

Beeper Study					Staff:				
					Department: Billing				
Billing - Workload Study					Date:				
Staff Tasks:	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-4:30
Initial / General Tasks									
Assess and prioritize task list, workload for day									
Check calendar & e-mails									
Run episode verification									
Work Medicare FISS system									
Work on Incorrect Payments - Medicare Refunds (due to error on Medicare side)									
RAP									
Run RAP, check and submit to Medicare									
Retrieve Medicare check and post									
Send problem claims with chart to UR									
Work Medicare unpaid RAP report									
Final Claims									
Run final claims, check and submit to Medicare									
Retrieve Medicare check and post									
Send problem claims with chart to UR									
Work Medicare unpaid final claim report									
Phone calls related to final claims									
Corrections / Other claims									
Work on Incorrect Payments - Medicare Refunds (due to error on Medicare side)									
Work on Flu Claims									
Other									
Start Time: _____ Break Times: _____ - _____ Lunch: _____ - _____ End Time: _____									

Appendix H: Billing- Task List for Ladder Log for Staff 1

Staff:

Department: Billing

Date: 2/23/09 ~ 2/27/09

T1 - Initial / General Tasks
Assess and prioritize task list, workload for day
Check calendar & e-mails
Run episode verification
Work Medicare FISS system
Work on Incorrect Payments - Medicare Refunds (due to error on Medicare side)
T2 - RAP
Run RAP, check and submit to Medicare
Retrieve Medicare check and post
Send problem claims with chart to UR
Work Medicare unpaid RAP report
T3 - Final Claims
Run final claims, check and submit to Medicare
Retrieve Medicare check and post
Send problem claims with chart to UR
Work Medicare unpaid final claim report
Phone calls related to final claims
T4 - Corrections / Other claims
Work on Incorrect Payments - Medicare Refunds (due to error on Medicare side)
Work on Flu Claims
Other

Appendix I: Billing- Random Sampling Beeper Study Sheet for Staff 2

Beeper Study		Staff:
		Department:
Billing - Workload Study		Date:
Instructions: When the random reminder beeper sounds, please place a check mark in the box corresponding to the task performed at the time of the beep, under the time that the beep occurred. Also, please note start, lunch, and end times below.		
Staff Tasks:	7:00-8:00	8:00-9:00
Initial Tasks		
Assess and prioritize task list, workload for day		
Check calendar & e-mails		
BCBS, BCN and BCN Premier Care		
File paper orders		
Print claims		
Pull charts for each claim and compare to service reports		
Send Claims that match the orders and service reports to Insurance companies		
Send Claims that doesn't match the orders and service reports to UR		
Work on rejections sent back from the companies		
Work AR reports		
HomeMed		
Print claims		
Create spreadsheet and email then		
Enter supplies into Mckesson from invoice sent to us from Medline		
Add up supplies and send adding machine tape		
Work AR reports		
Others		
Work on the ALS clinic employee timesheet and email to ALS clinic		
Print Patient Statements, mail then to the patient's home		
Make phone calls to patients regarding their co-pay		
Other		
Start Time: _____		Lunch: _____ - _____
		End Time: _____

Appendix J: Billing-Task List for Ladder Log Sheet for Staff 2

Staff:

Department: Billing

Date: 2/23/09 ~ 2/27/09

T1 - Initial Tasks
Assess and prioritize task list, workload for day
Check calendar & e-mails
T2 - BCBS, BCN and BCN Premier Care
File paper orders
Print claims
Pull charts for each claim and compare to service reports
Send Claims that match the orders and service reports to Insurance companies
Send Claims that doesn't match the orders and service reports to UR
Work on rejections sent back from the companies
Work AR reports
T3 - HomeMed
Print claims
Create spreadsheet and email then
Enter supplies into <u>Mckesson</u> from invoice sent to us from Medline
Add up supplies and send adding machine tape
Work AR reports
T4 - Others
Work on the ALS clinic employee timesheet and email to ALS clinic
Print Patient Statements, mail then to the patient's home
Make phone calls to patients regarding their co-pay
Other

Appendix K: Billing- Random Sampling Beeper Study Sheet for Staff 3

[illegible]

Appendix L: Billing- Task List for Ladder Log Study Sheet for Staff 3

Staff:

Department: Billing

Date: 2/23/09 ~ 2/27/09

T1 - Initial Tasks
Assess and prioritize task list, workload for day
Run signed orders and pass out to billers
Check calendar & e-mails
T2 - Activities Related to Processing Claims
File paper orders
Print claims
Print notes to send with claims
Go through charts waiting on orders
Run claims
Pull charts for each claim and compare to service reports
Send Claims that match the orders and service reports to Insurance companies
Send Claims that doesn't match the orders and service reports to UR
Work on rejections sent back from the companies
Work AR reports
T3 - Activities Related to Posting Payments & Voucher
Post payment if cash poster needs help
Post VC Medicaid voucher
T4 - Activities Related to Contacting Insurance Companies, etc.
Contact insurance companies to status claims
Contact insurance companies about patient rejections
Contact other U of M Dept to track down our Money
T5 - Others
Other

Appendix M: Billing- Random Sampling Beeper Study Sheet for Staff 4

[illegible]

Appendix N: Billing- Task List for Ladder Log Study Sheet for Staff 4

Staff: -

Department: Billing

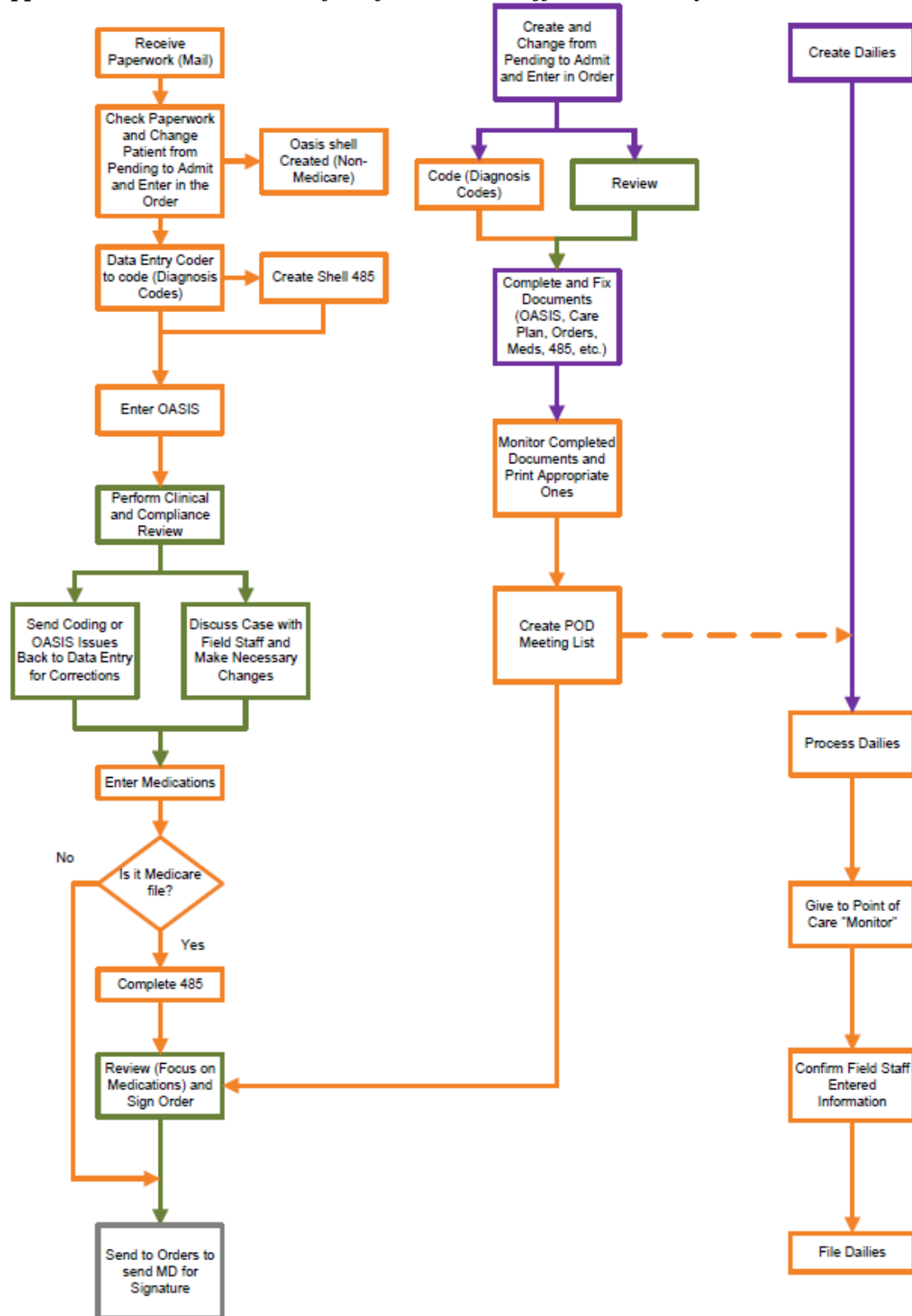
Date:

T1- Initial Tasks
Assess and prioritize task list, workload for day
Check calendar & e-mails
T2- Cash Activities
Post Cash (insurance payments) into McKesson
Update cash log
Credit balance - refund requests
Month End reconciliation
Run PPS report
Add insurance payers into McKesson upon request from intake dept.
T3- <u>Bluecaid</u> and Medicaid
<u>Bluecaid</u> journal entry
<u>Bluecaid</u> billing
Medicaid Billing
Follow up claim denials from Medicaid and <u>Bluecaid</u>
T4- Other UM Departments
Contact other UM departments if money received does not belong to MVN
Journal Entry requests for other UM departments
T5- Other

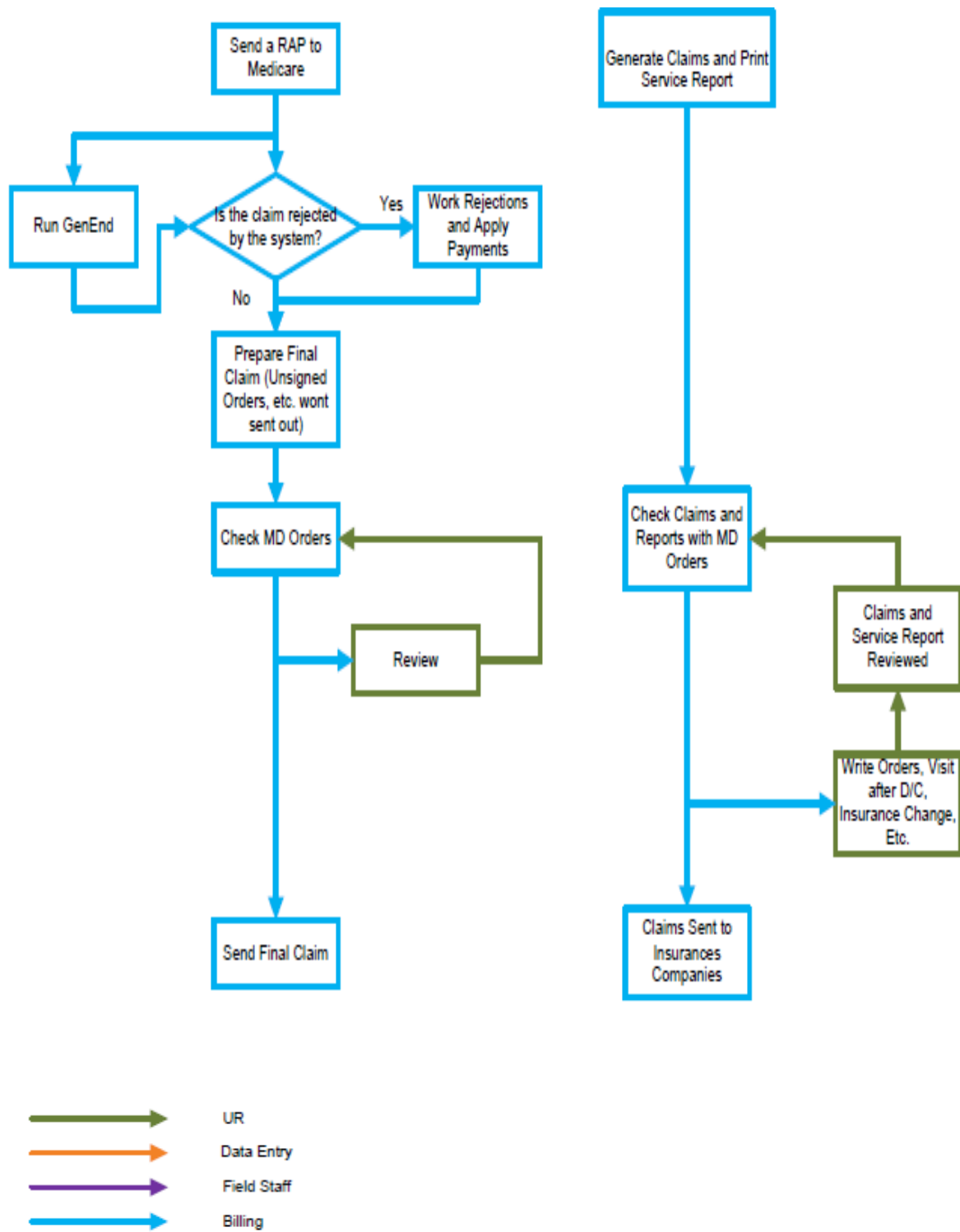
Appendix O: Billing- Task Volume Study Sheet

Task Volume Study												Staff:			
												Department:			
Billing - Workload Study												Date:			
Instructions: Please place a tick mark in the box corresponding to the task performed at the start time of each task. Also, please note start, lunch, and end times below.															
Staff Tasks:	7:00-8:00	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00					
Work on Rejections and Errors															
Hospital overlaps															
Visit after discharge															
Incorrect or change in insurance company															
Medical notes request															
No authorization from specialists															
Not a covered benefit															
HMO active															
Incorrect payments															
Other Reasons															
Phone Calls, emails, other methods of contact due to Problems/Rejections															
Contact patients															
Contact insurance companies															
Contact other U of M dept.															
Start Time: _____ Break Times: _____ - _____ Lunch: _____ - _____ End Time: _____															

Appendix P: Flowchart- Workflow from Field Staff to Data Entry and Utilization Review



Appendix Q: Flowchart- Workflow of Billing: Medicare and Other Insurance Companies



Appendix R: Questionnaire for MVN Staff

Questionnaire for MVN Staff

Hello, this is Team Infinity, group of University of Michigan, Industrial & Operations Engineering students working on a lean project for our senior design course. We kindly ask that you take about 10 to 15 minutes of your time to fill this brief questionnaire out to help us on our project. Thank you very much for your cooperation.

Name: _____

Department: _____
(e.g. Billing, Data Entry, Utilization Review, etc.)

Work hours: _____
(e.g. Monday thru Friday 8am to 5pm)

Please list all tasks that you perform during your work hours. Please be specific and please provide the frequency and duration of each task (or any other additional necessary information regarding the task).

(e.g. Enter patient insurance data from a hardcopy to computer using Microsoft Excel – everyday about 3 hours per day, each patient data takes about 15 minutes each)

(e.g. Set up appointments with customers over phone – about 10 phone calls per day, each call lasting about 5 minutes)

(e.g. Review all claims made for Medicare patients and send them over to Billing Department– all day, 30 minutes per claim)

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____
- 8) _____
- 9) _____
- 10) _____
- 11) _____
- 12) _____
- 13) _____
- 14) _____

Do you have to work overtime to complete your work? Please explain.

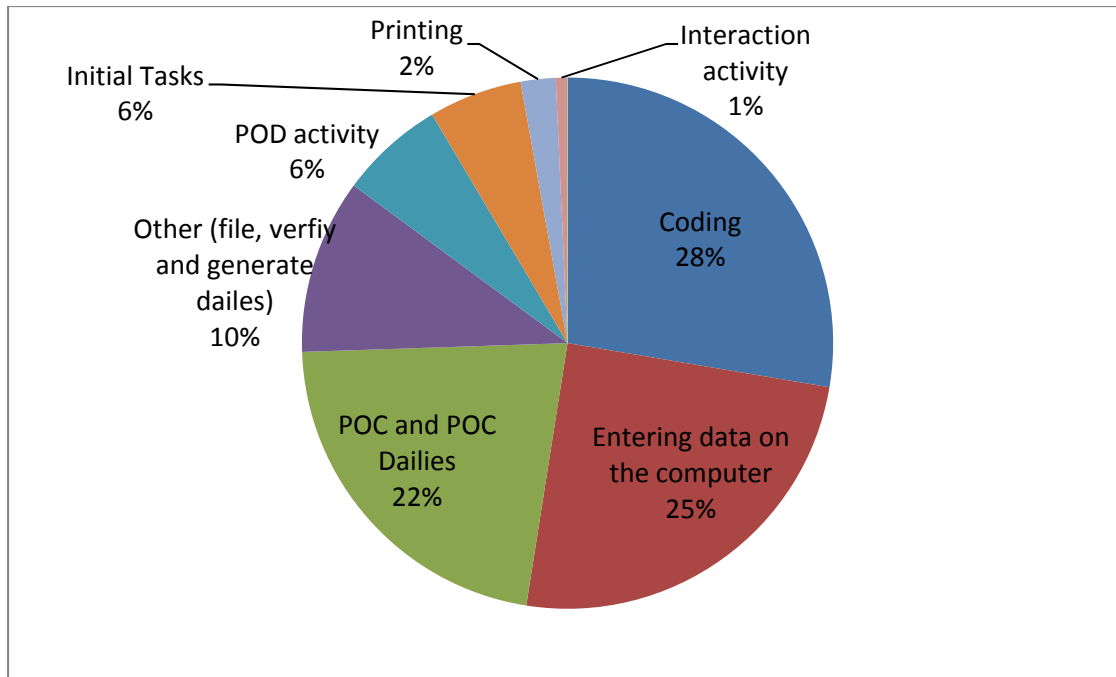
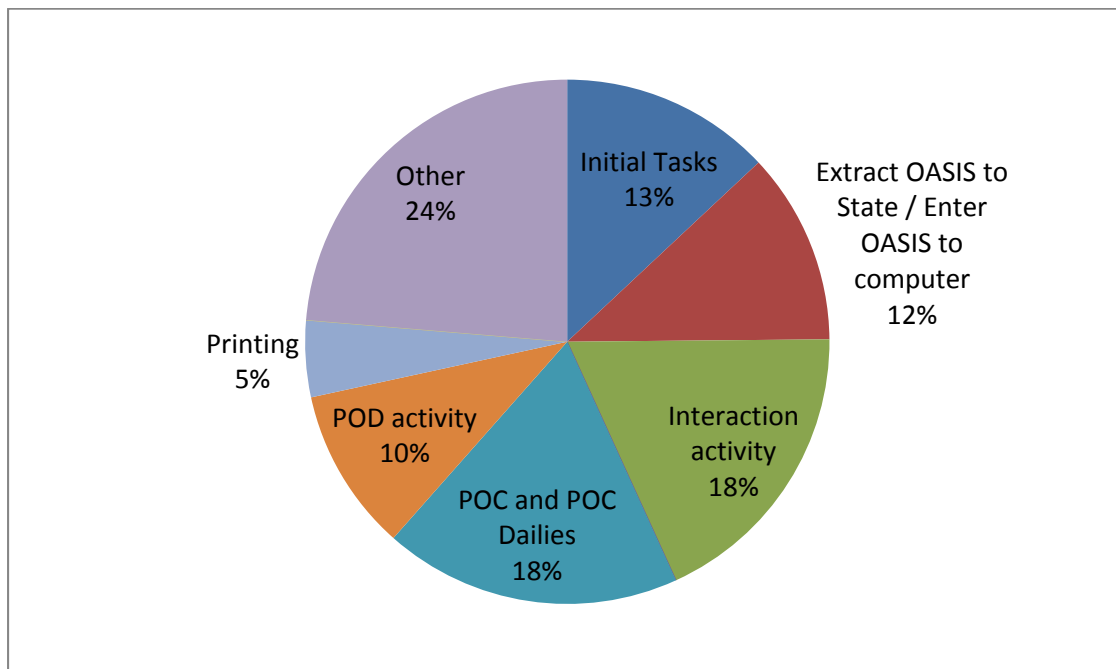
How does your workload change? Time of the day? Day of the week? Month of year?

Could you list any activities that interrupt you during your work?

How do you feel about the current system you are working in? Do you feel that it is effective and efficient? Is there anything you would change?

Could you list main reasons of rejections of claims from insurance companies? (if you are involved with this task)

If there are more tasks, please feel free to list them on the back of this sheet. Also if there is any other information you would like to let us know (*e.g. I am very busy on Mondays from 1pm to 5pm during all March*), please provide the information on the back of this sheet. Thank you very much.

Appendix S: Beeper Study Result – Data Entry**Figure S-1. Percentage of the time spent for each task for staff 1****Figure S-2. Percentage of the time spent for each task for staff 2**

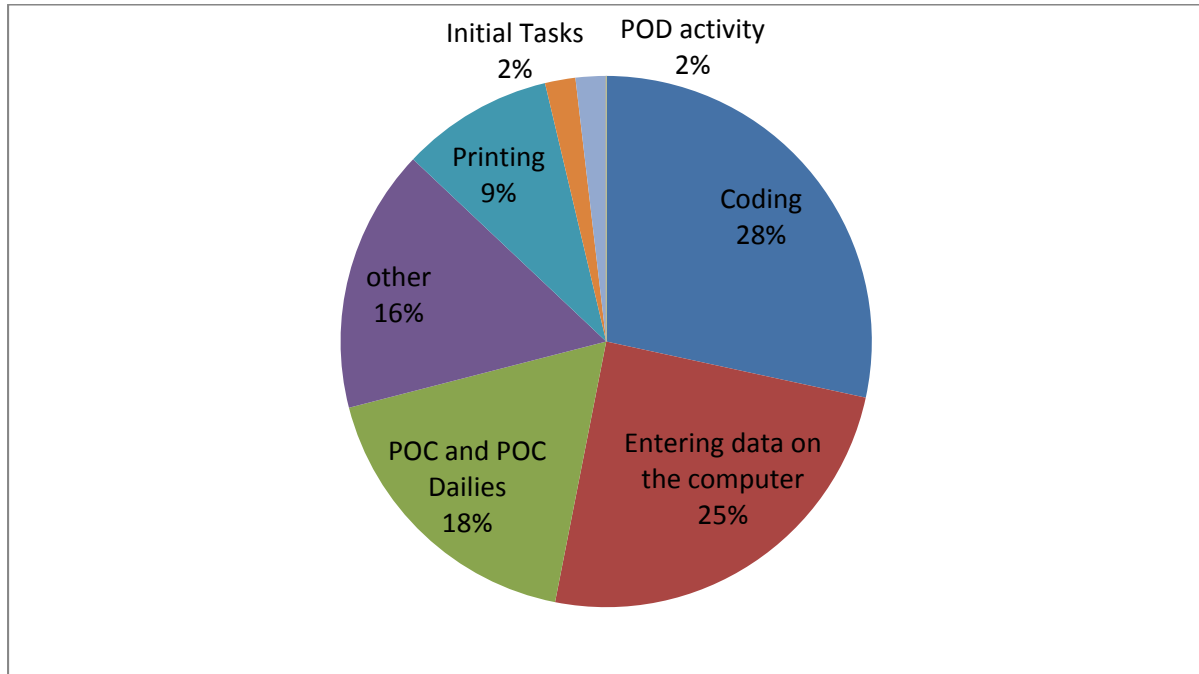


Figure S-3. Percentage of the time spent for each task for staff 3

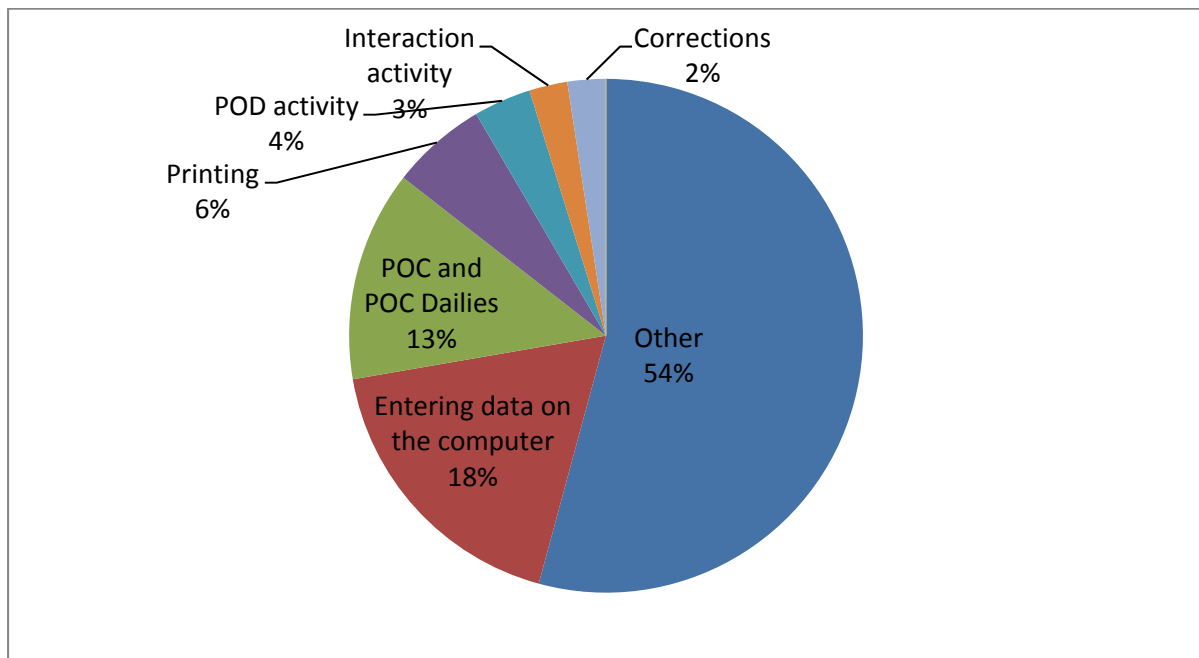


Figure S-4. Percentage of the time spent for each task for staff 4

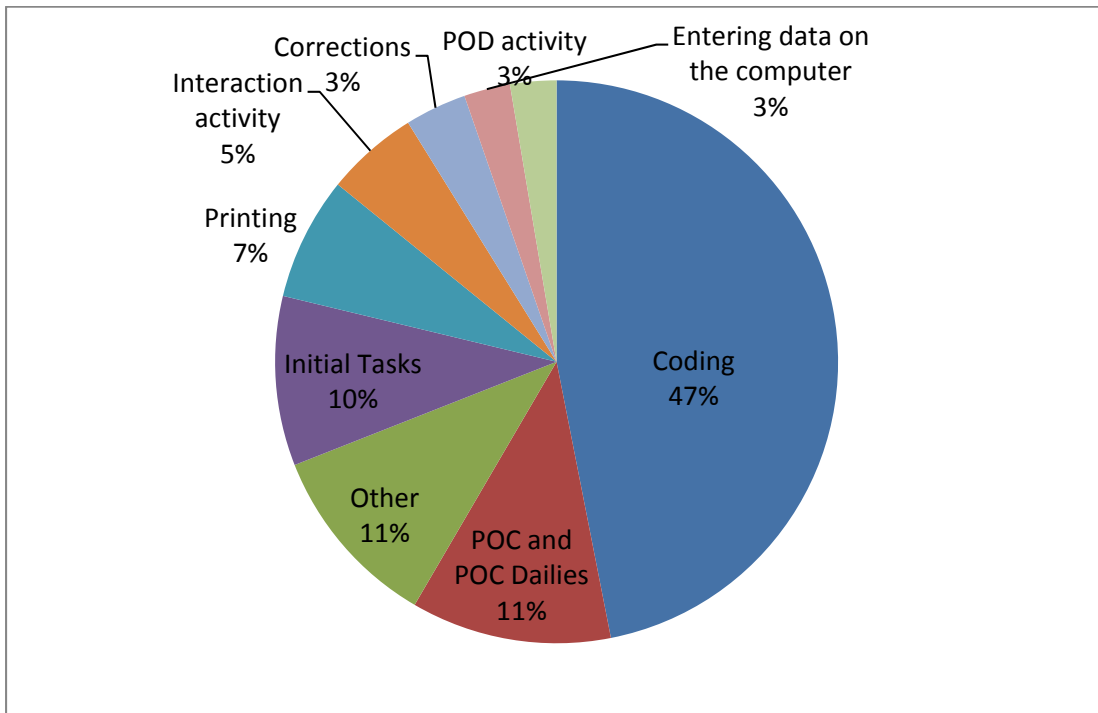
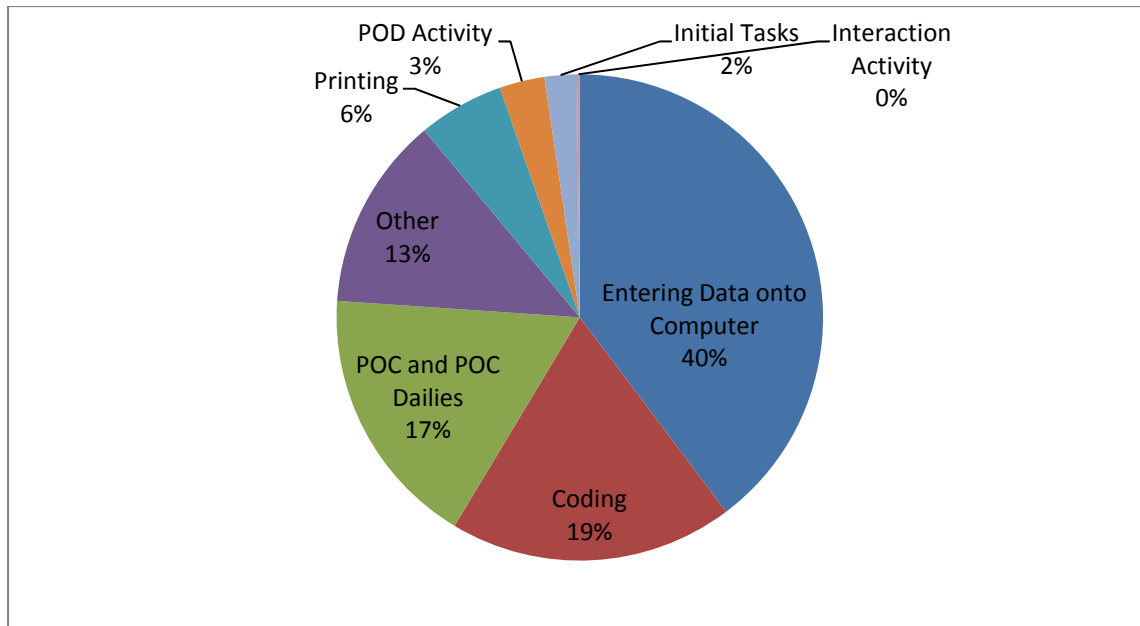
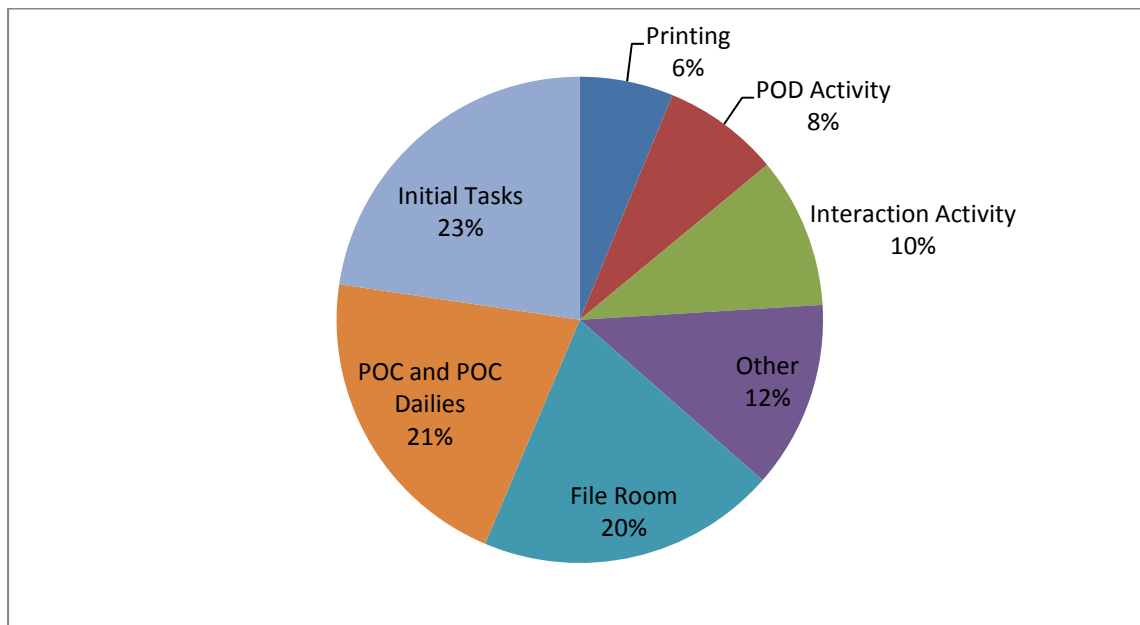


Figure S-5. Percentage of the time spent for each task for staff 5

Appendix T: Ladder Log Study Result – Data Entry**Figure T-1. Percentage of the time spent for each task for staff 1****Figure T-2. Percentage of the time spent for each task for staff 2**

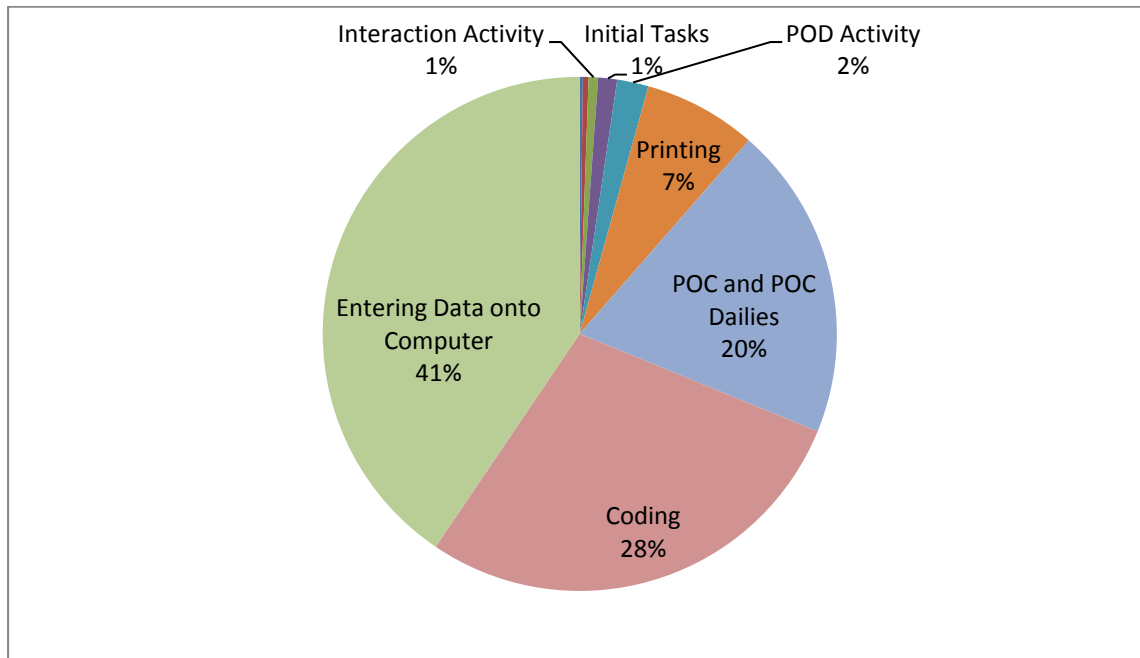


Figure T-3. Percentage of the time spent for each task for staff 3

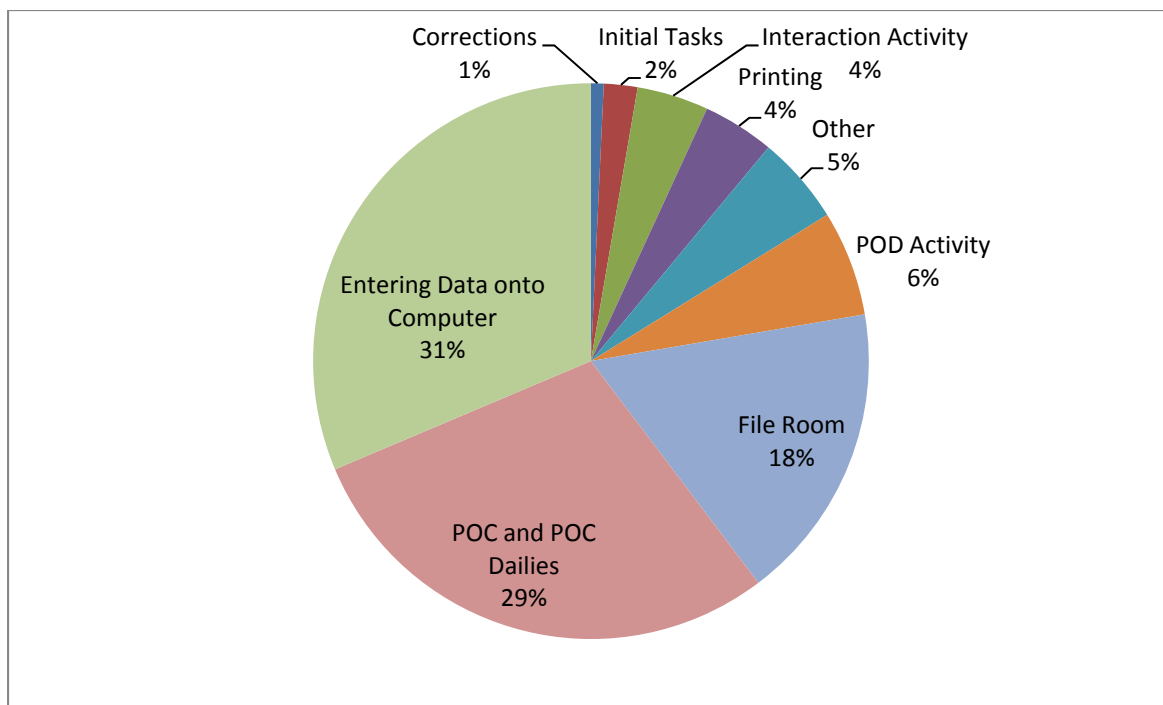


Figure T-4. Percentage of the time spent for each task for staff 4

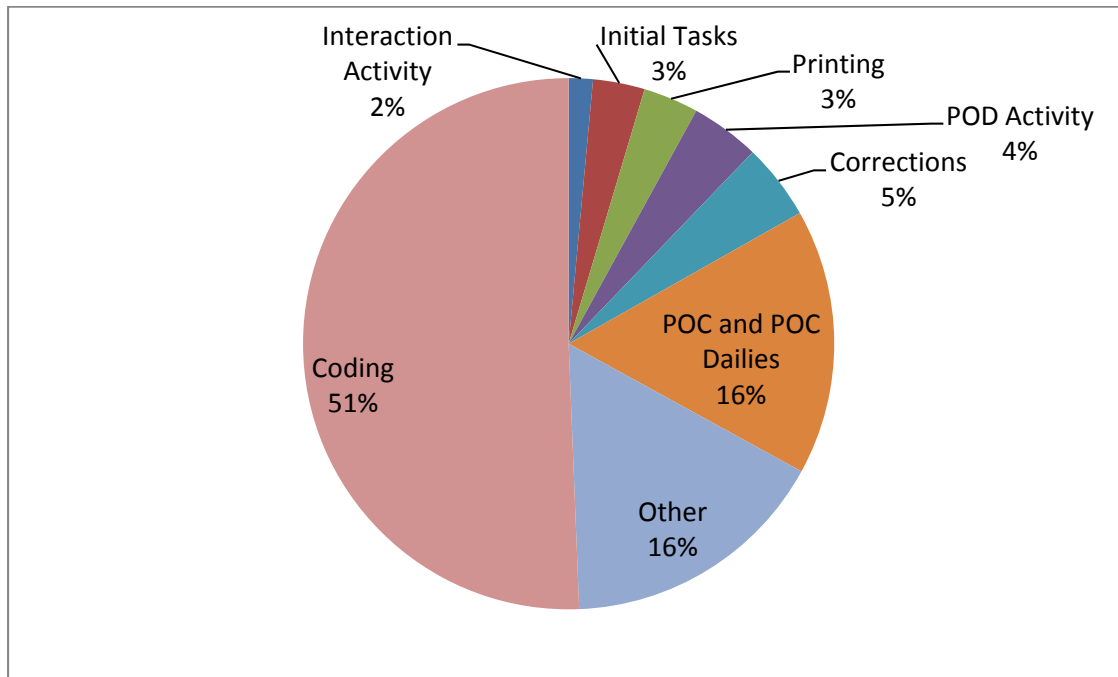
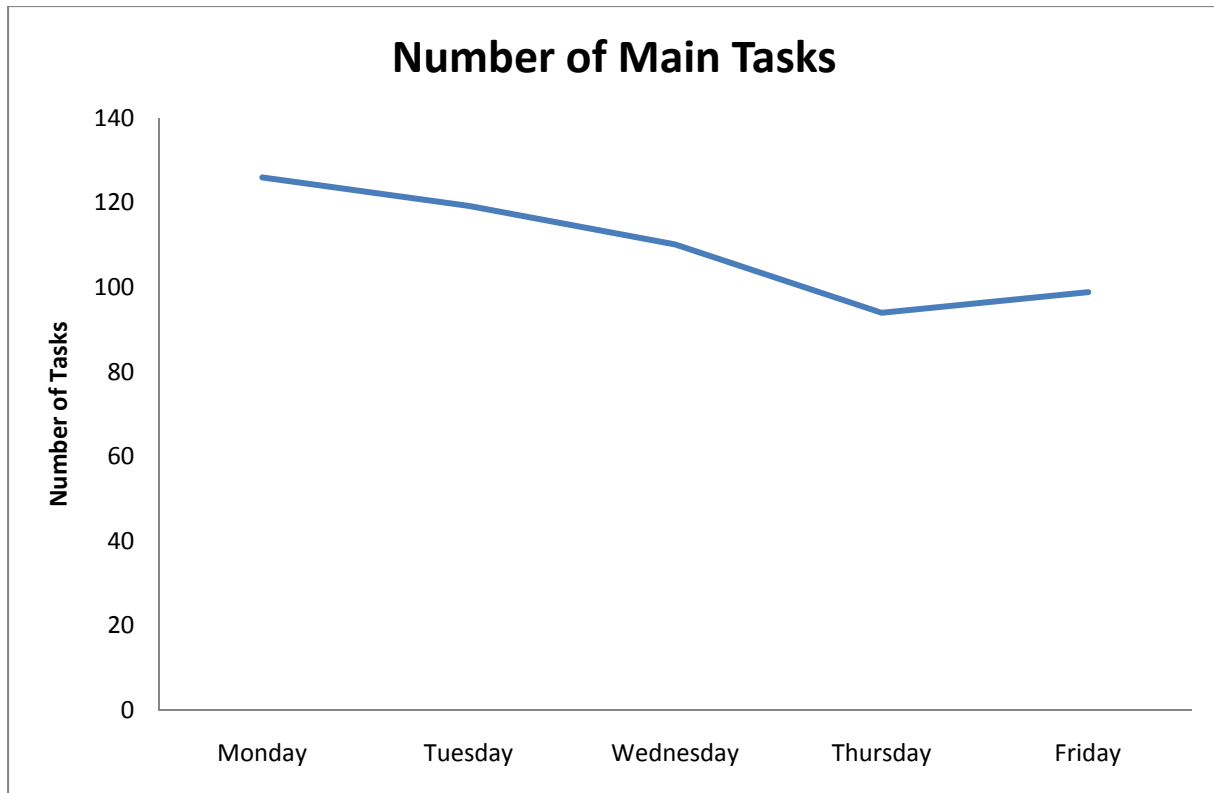
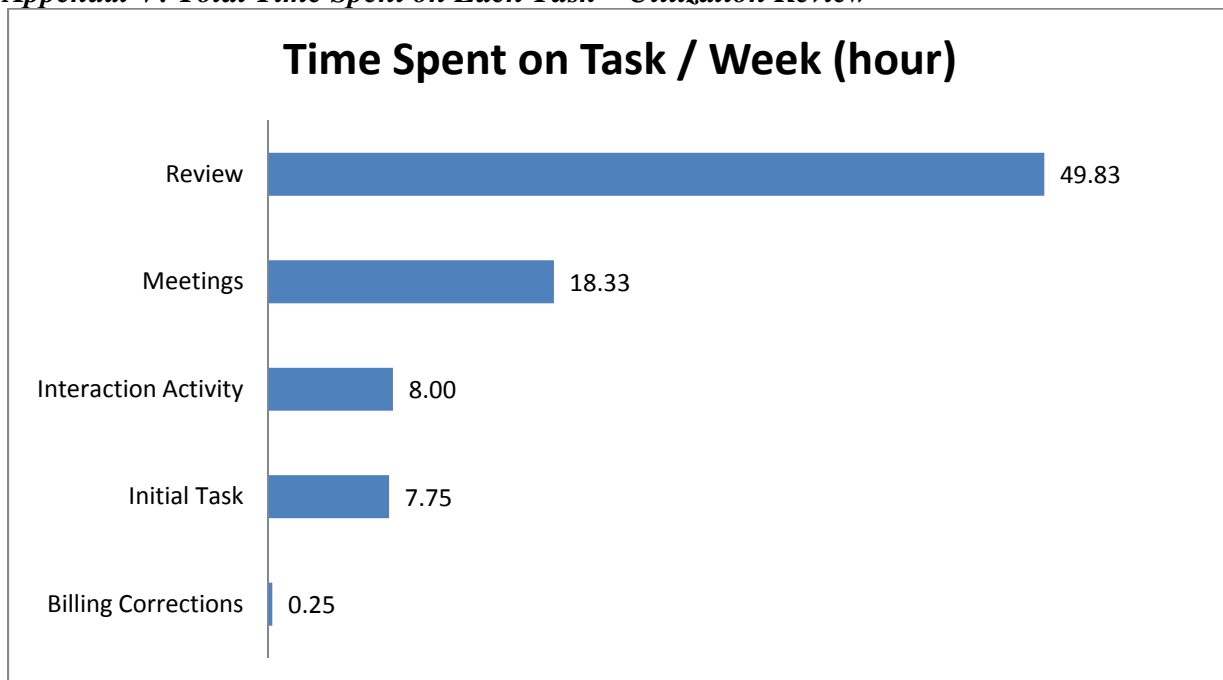


Figure T-5. Percentage of the time spent for each task for staff

Appendix U: Workload by Weekdays – Data Entry***Appendix V: Total Time Spent on Each Task – Utilization Review***

Appendix W: Beeper Study Result – Billing

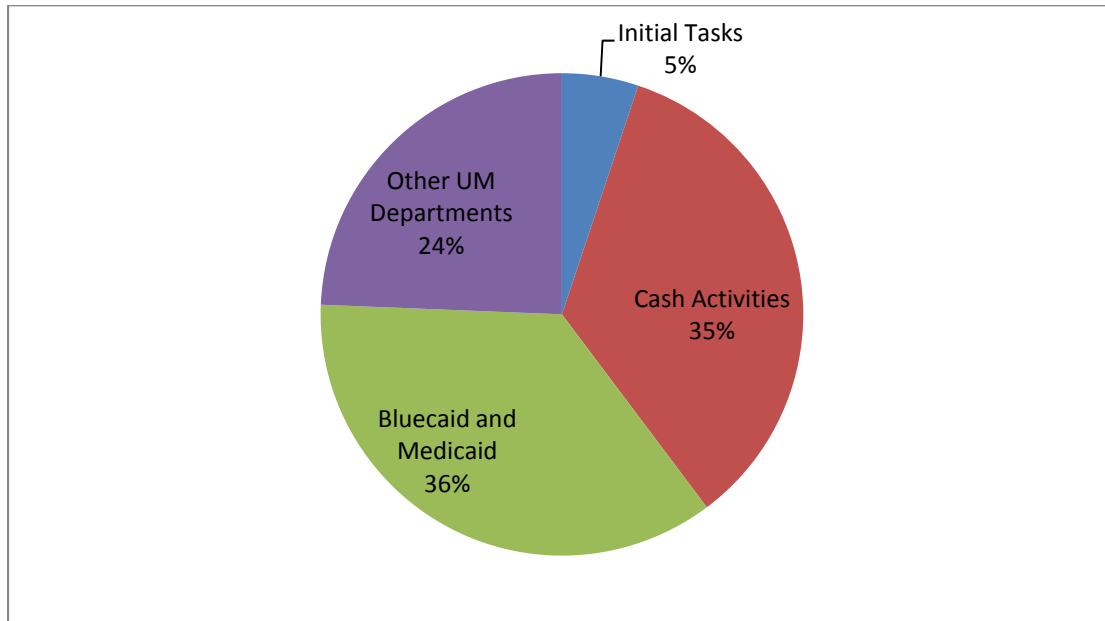


Figure W-1. Percentage of the time spent for each task for staff 1

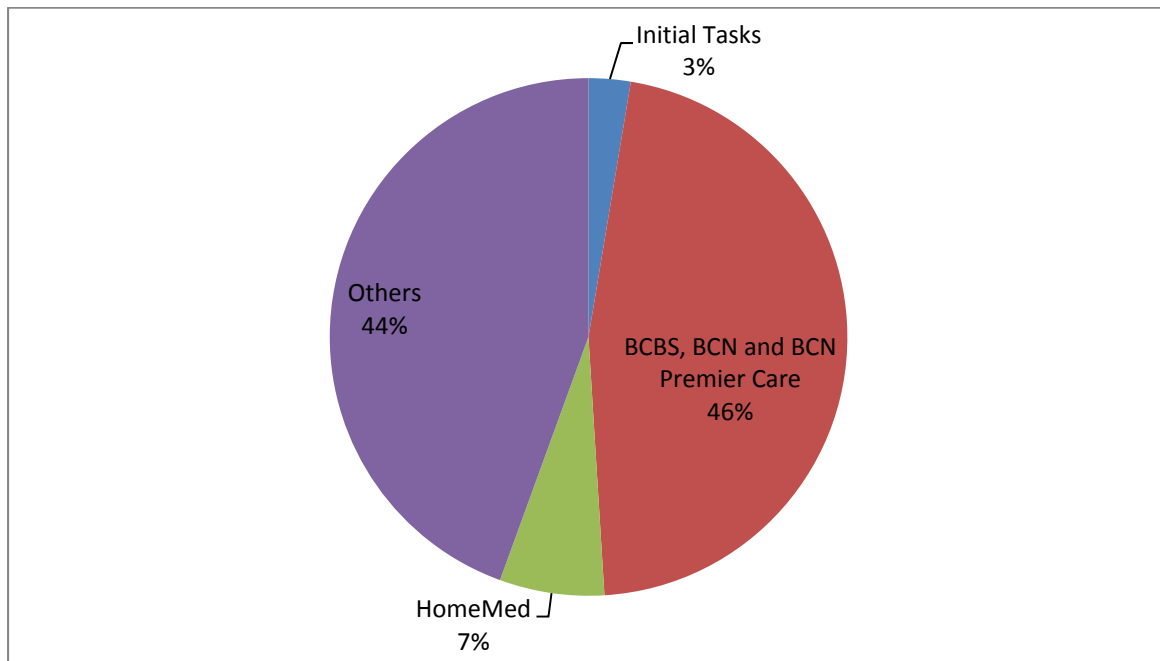


Figure W-2. Percentage of the time spent for each task for staff 2

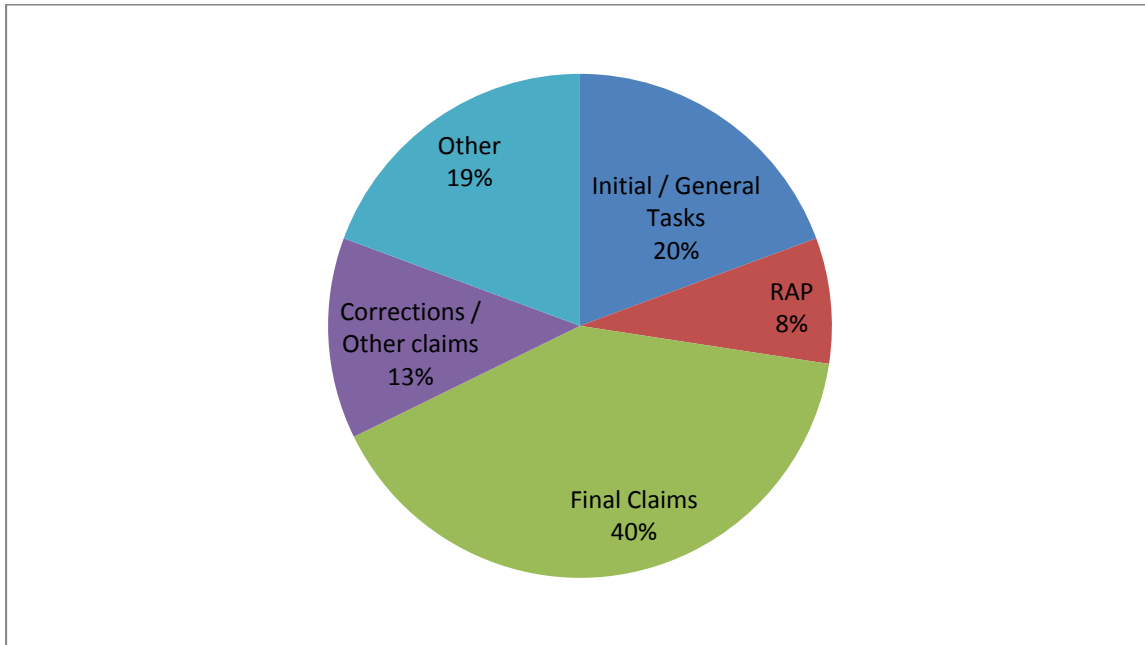


Figure W-3. Percentage of the time spent for each task for staff 3

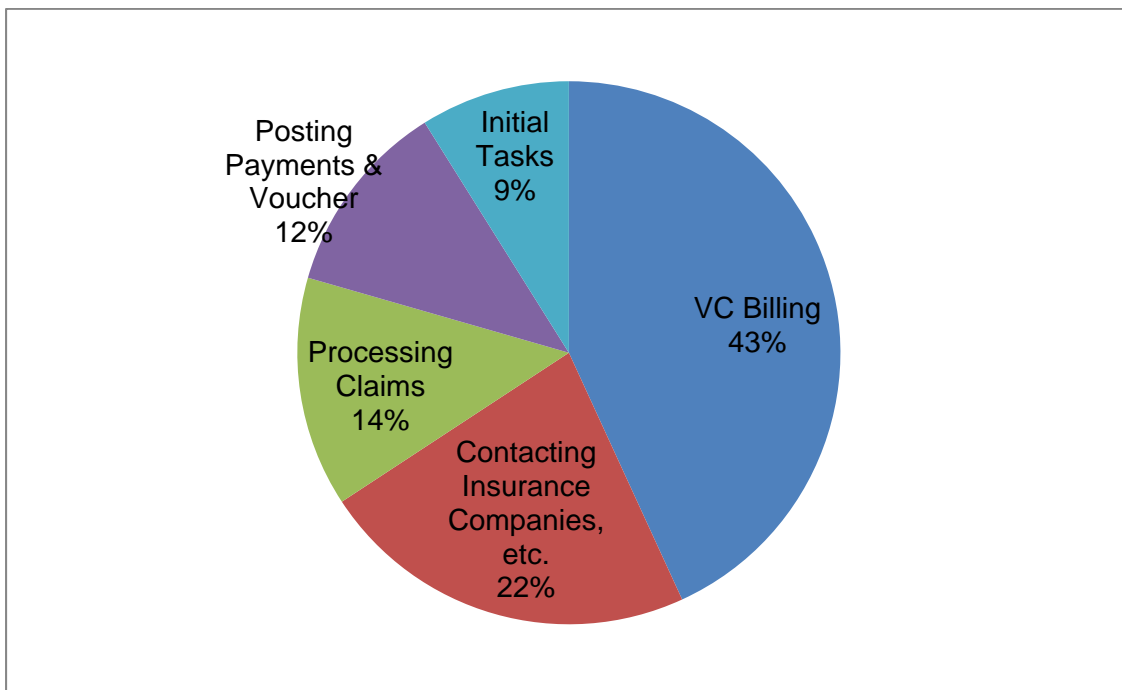


Figure W-3. Percentage of the time spent for each task for staff 4

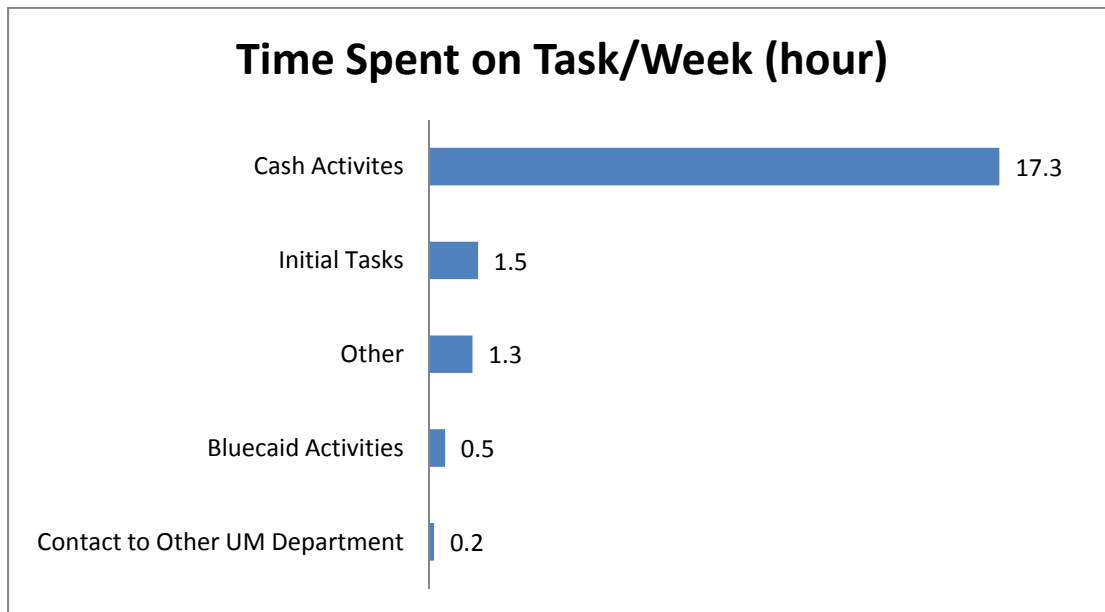
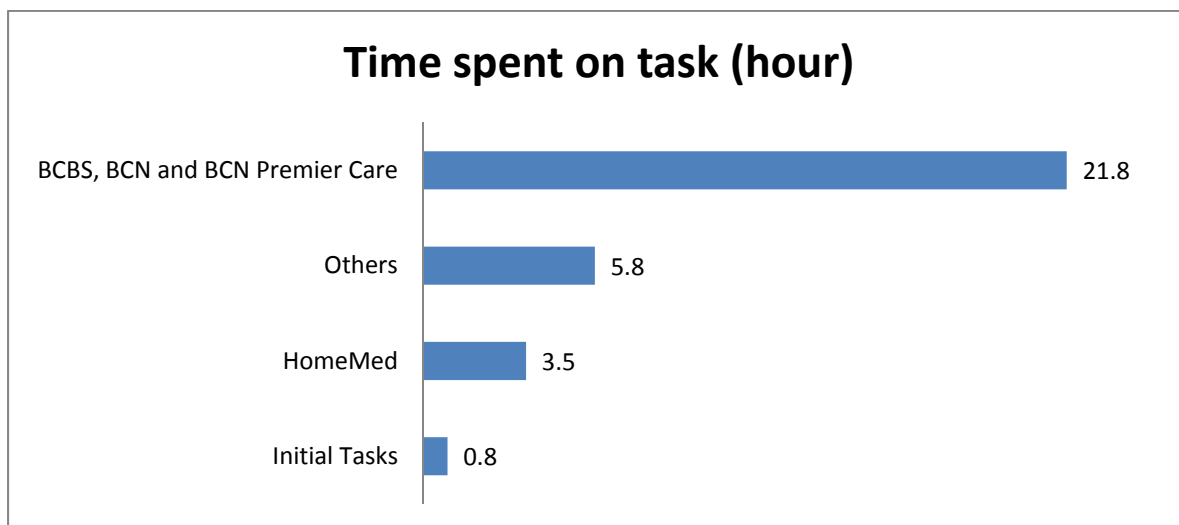
Appendix X: Ladder Log Study Result – Billing**Figure X-1. Total Time Spent for Each Task for staff 1****Figure X-2. Total Time Spent for Each Task for staff 2**



Figure X-3. Total Time Spent for Each Task for staff 3

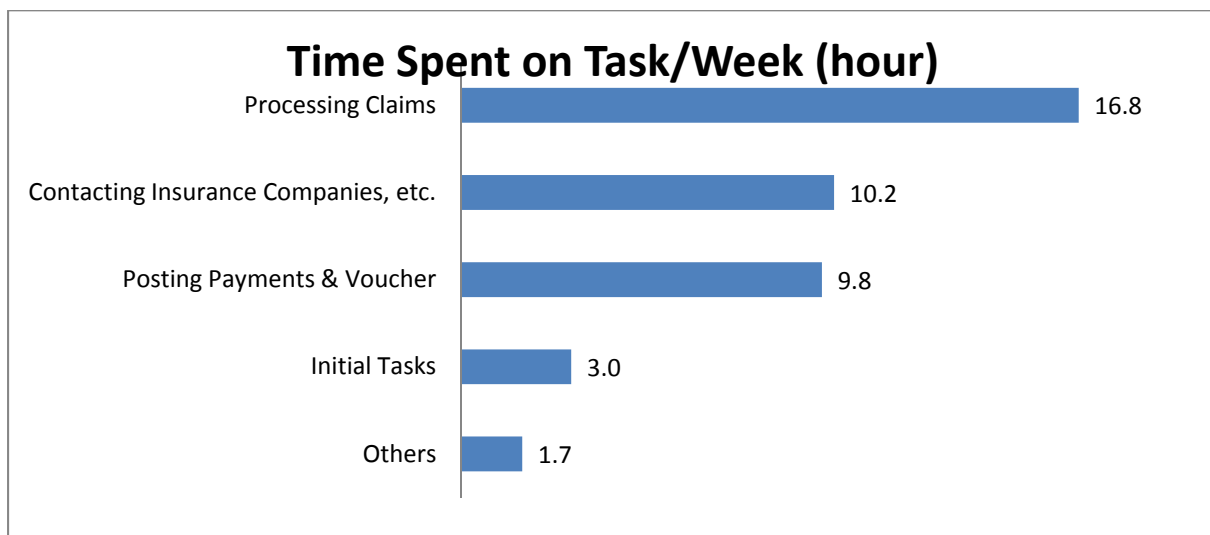


Figure X-4. Total Time Spent for Each Task for staff 4

Appendix Y: Billing's Comparison of Beeper Study and Ladder Log Study Results

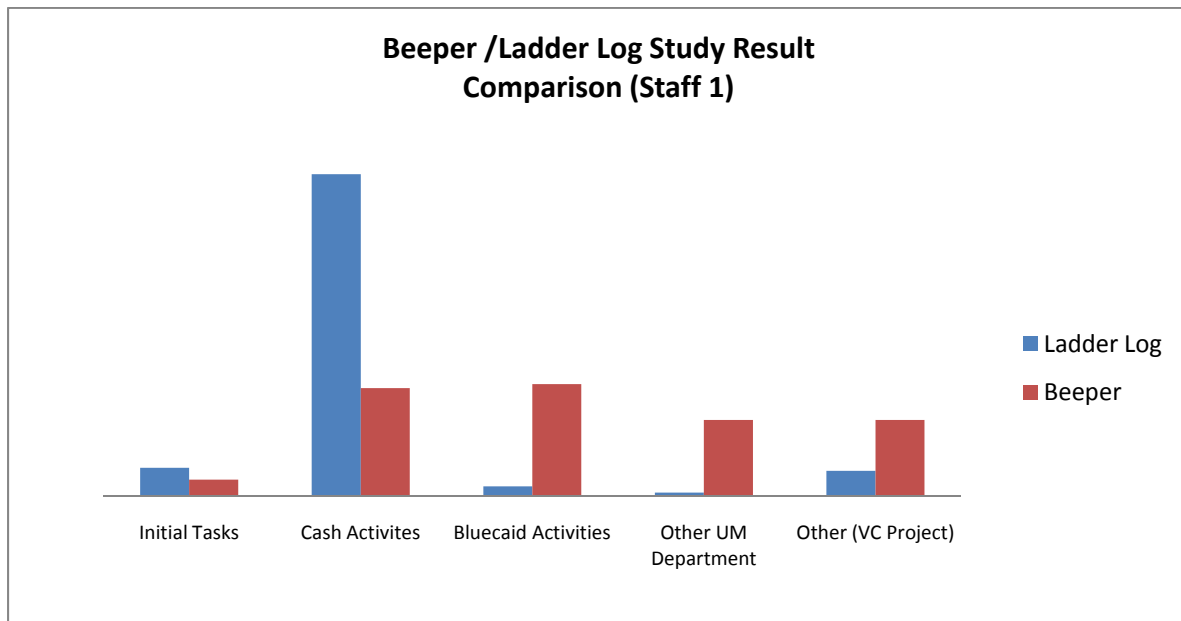


Figure Y-1. Data Comparison of Beeper Study and Ladder Log Study for staff 1

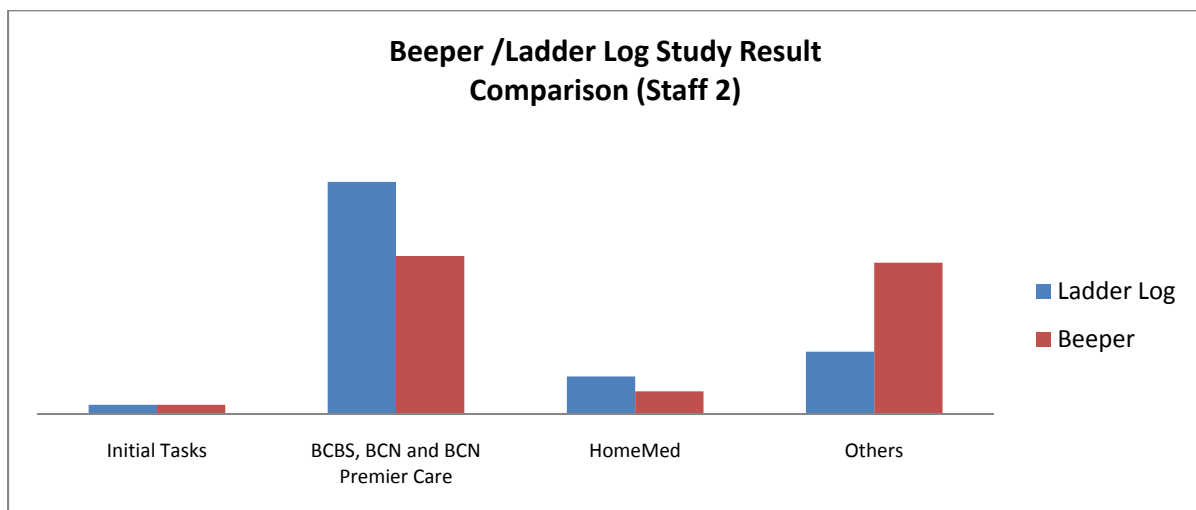


Figure Y-2. Data Comparison of Beeper Study and Ladder Log Study for staff 2

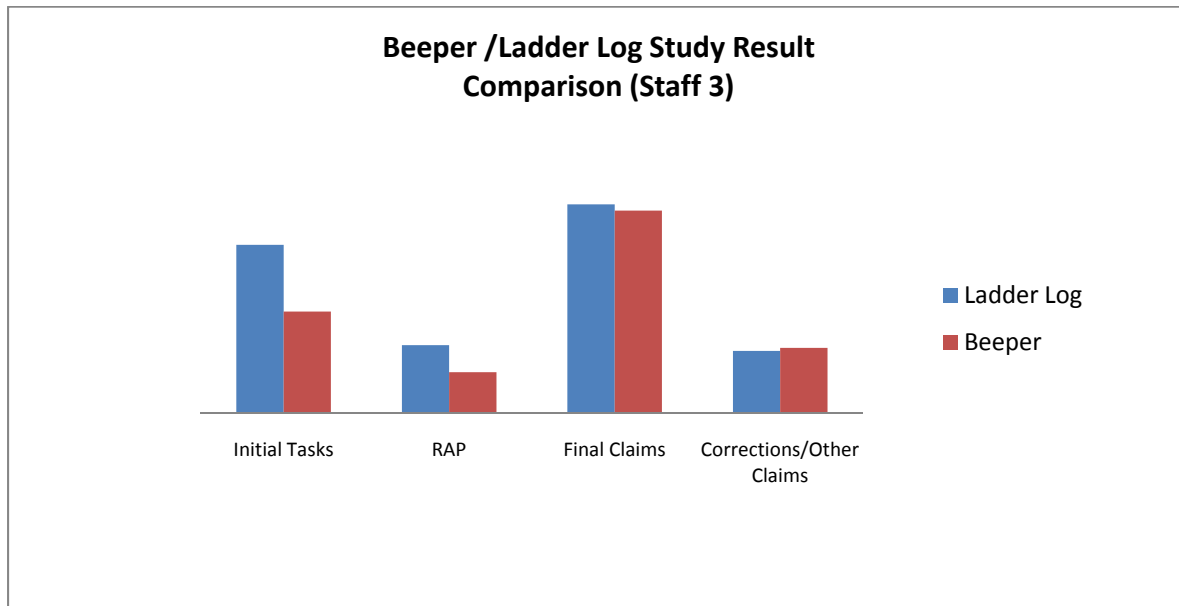


Figure Y-3. Data Comparison of Beeper Study and Ladder Log Study for staff 3

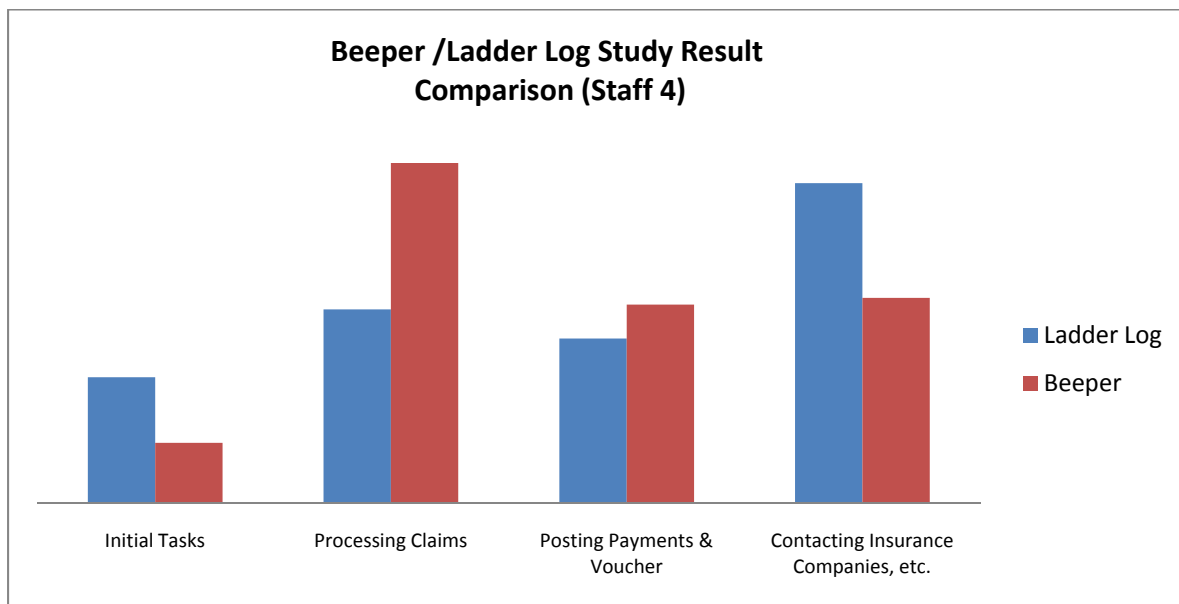


Figure Y-4. Data Comparison of Beeper Study and Ladder Log Study for staff 4