

University of Michigan Health System
Team 1: Cable Management Analysis
Program and Operations Analysis
Project Final Report

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Table of Contents

Executive Summary	i
Introduction	1
Background	1
<i>Key Issues</i>	2
<i>Project Scope</i>	2
Expected Impact	2
Methods	3
<i>Cable-Checklist</i>	3
<i>Interviews</i>	3
Findings	4
<i>Cable-Checklist</i>	4
<i>Interviews</i>	5
Conclusion	8
<i>Cable-Checklist</i>	8
<i>Interviews</i>	9
Recommendations	10
<i>Current</i>	10
<i>Recommendations</i>	10
<i>Further Exploration</i>	11
Appendix	13
<i>Interview Questions</i>	13
<i>Cable Checklist</i>	14
<i>Types of Cables</i>	15
<i>Interactive Map</i>	16

List of Figures and Tables

Table A	ii
Table 1	4
Table 2	5
Figure 1	8

Executive Summary

This project is a detailed account of the team's analysis of the current cable management process at the University of Michigan Health System (UMHS). The Materiel Services Department at the UMHS is looking to improve the cable management system at the Cardiovascular Center (CVC) and the main hospital. Currently, cables often get lost or misplaced during the patient transfer process. Nurses, consequently, have to spend valuable times searching for the missing cables. These problems not only lead to inefficiency in the cable transfer process, but also high repurchasing cost and dissatisfaction among the nurses. A Study was performed in 2007 to analyze these problems, and a new scheme was implemented; however, the problems continue to persist. The Materiel Services Department asked the IOE 481 team to validate this study and to recommend an improved system that will reduce the time nurses spend searching for cables.

Background

Under the current system, when a patient is transferred from one unit to another, the cables remain on the patient throughout the transfer. The nurse from the sending unit is then supposed to take cables of the same type from the receiving unit, so that after the transfer both units contain the same number and type of cables as before the transfer. However, this cable exchange process is often not being carried out. The effect of imbalanced cable transfers is that some units often run out of cables, and other units have more cables than they need. According to a previous study performed by a student team at the University of Michigan, nurses from the unit that is missing cables spend an average of 24 minutes per day looking for cables. The Materiel Services Department at the University of Michigan Health System (UMHS) have expressed a desire to validate this data, as well as further analyze and improve the current cable transfer process.

Project Goals

The primary goals of this project were to recommend a more efficient cable management system. The team reached this goal by accomplishing the following tasks:

- Validate the finding of the previous study performed in 2007
- Provide the usage data for each type of cable in each unit
- Develop and recommend an improved system that reduces time wasted searching for cables by the hospital staff

Methodology

The team performed three types of tasks to evaluate and improve the cable management system at CVC and the main hospital.

- *Selected four units from CVC and two units from main hospital.* First, the coordinators, the clients and the team selected six units because they represent the problems about

cable management system. The units selected in CVC were Pre Anesthesia Care Unit (PACU), Operating Room (OR), Cardiovascular Intensive Care Unit (CVICU), and CVC 5. The units selected in the main hospital were PACU and Surgical Intensive Care Unit (SICU).

- *Observed and interviewed staff of each unit.* Within each unit, the team observed at least four times per week during the peak time. The peak time of each unit varies. The team also interviewed staffs such as nurses, patient care techs, and unit hosts during each observation.
- *Collected data on cable usage in each unit by using cable checklist.* The team stationed in front of the receiving unit and waited for the nurses to transfer the patients. The team then asked the nurse about the patient's treatment type and what kind of cables the patient had on at that moment. After the patient arrived at the receiving unit, more cables might be needed to add to the patient. Therefore, the team asked what kind of cables might be needed on the patient and if the cables were available. The team tried to complete as many cable checklists as possible during the peak time of each unit. Therefore, the team would know what kinds of cables were used the most in each unit.

Findings

Since the team does not know the available numbers of cables in each units because it is out of our scope, the team decide to provide a table of minimum numbers of cable required in each unit. The team derives these numbers from multiplying the percentage of cables needed with the maximum capacity in each unit. Therefore, each unit knows the minimum numbers of cables that should be kept in stock before the peak time. The following table is the minimum numbers of cables needed in each unit.

Table A: Minimum Numbers of Cables Needed in Each Unit

Type of cable	NIBP	Pulse ox	EKG	Cardiac	Pressure	Temp Sensing
CVC PACU	18	19	10	1	5	0
CVC OR	7	10	10	2	9	6
CVICU	12	24	24	18	51	3
CVC 5	14	14	24	0	2	0
Surgical ICU	14	20	20	10	19	0
Main PACU	54	54	54	0	0	0

According to Table 1, zero temp sensing cables are required in CVC PACU because temp sensing are rarely or never used during the peak time. However, this does not mean that temp sensing cables should not be kept in stock in CVC PACU because there might be some cases where temp sensing cables are required in CVC PACU.

The interviews provided insight into how the nurses and techs manage the cables. The nurses and techs in the CVC expressed little dissatisfaction with the cable management system, trading cables upon most patient transfers. In the main hospital, the nurses in the PACU did express concern for the cable management system. The PACU is a very large unit and is therefore more difficult to manage. In addition, neither unit in the scope in the Main Hospital, the Main PACU and the SICU, trade cables upon patient transfer.

The team was tasked to validate findings from a 2007 study regarding nurses searching for cables for 24 minutes per day. From nurse interviews, it was found that no nurses search over 20 minutes and they do not have to search for cables on a daily basis.

Conclusions

For units in the CVC, the NIBP, Pulse Ox, and EKG are ones that every unit needs. These are cables that should be traded between units to keep the balance in each unit. However, the Cardiac, Pressure and Temperature Sensing cables are needed in only a few units. Those units should not trade, so it can preserve their stock, if it is trading with a unit that does not need that cable. For the main hospital, conclusions cannot be drawn from the data that is limited to two units. The Main OR would have to be studied to gain a true understanding of the Main Hospital cable management system.

Recommendations

The team recommends that the current cable trading system; where the nurse or tech receives the same cable he or she is giving away in a patient transfer, remain intact. The lower nurse searching time demonstrates that trading cables is an effective system, and the issue lies in the lack of communication of the correct practice and a lack of communication between units. The team has developed guidelines for nurses and techs to follow to maintain a good level of cables in each unit:

1. Lock up the cables that you will need.
2. Trade cables upon transfer of patient. Get back any cables that you will lose, check to make sure the ones you get are the same kind you gave up.
3. Get the cables you need as soon as possible, even before the patient arrives. Then you will know if a cable is missing beforehand.
4. Save broken cables for Materiel Services.
5. Please be courteous to other units – if you have extra cables lying around, give them to a unit that will need them.

The team has provided these guidelines on a flyer to be distributed around the hospital units. Further studies should be done on the main hospital if the issue of cable management persists after these guidelines are distributed.

Introduction

Patients at the University of Michigan Health System (UMHS) are regularly transferred between diagnostic and treatments departments to patient care units. To ensure a patient's comfort and safety, hospital staff seeks to cause as little disruption as possible when making patient transfers especially with regard to patient monitors. Transport monitors are used when a monitored patient is moved from one area to another. Historically, UMHS has employed a practice of the sending unit leaving the monitor cables at the receiving unit. The sending unit then takes a replacement set of cables from the receiving unit thereby allowing all areas to maintain a consistent supply of cables. However, this process is not consistently followed, resulting in an imbalance of cable inventories (too many in one area and none in another area. Nurses must search for cables in different units when this situation occurs. In addition, many different types of cables exist for various types of patient monitors, adding further complication to the management system.

To address these issues, a study was performed in 2007 to analyze and resolve the situation. However, the problems continue to persist. The Materiel Services Department at the UMHS asked the University of Michigan IOE 481 team to validate the previous study. In addition, the clients asked the team to recommend an improvement to the cable management system. The following report is a detailed account of the team's analysis of the current situation, validation on the data obtained from previous study, and recommendations for an improved system that will reduce the time nurses spend searching for cables.

Background

Many patients within UMHS require cardiac monitors (see Appendix C). During the patient transfer process, the cables that attach the cardiac monitors to the patients often get lost due to mismanagement of cables. The following section details the current cable management process, the key issues, and the scope of this project.

Cable Management Process

Under the current system, when a patient is transferred from one unit to another, the cables remain on the patient throughout the transfer. The nurse from the sending unit is then supposed to take cables of the same type from the receiving unit, so that after the transfer both units contain the same number of cables as before the transfer. However, this is often not being carried out. The effect of the imbalanced cable transfer is that some units often run out of cables, and other units have more cables than they need. Additionally, nurses have reported missing cables. Missing cables are caused by unwarranted disposal of cables, or in certain cases one unit taking cables from another. Incorrect cable transfers and missing cables are the two main issues that the team studied in this project.

According to a previous study performed by a student team at the University of Michigan, nurses spend an average of 24 minutes per day looking for cables. The Materiel Services Department at

the University of Michigan Health System (UMHS) have wants to validate this data, as well as study the current cable transfer process. This study has since taken place in many units of the Cardiovascular Center (CVC) and two units of the main hospital because those areas have the most incidents with lost and misplaced cables which result in significant cable searching time.

Nursing and Materiel Services would like to know what changes to the current system can be made to reduce the time nurses spend looking for cables. They have also requested an implementation plan for any changes to the system, and they want to know any costs to implement the new system, including material costs and man hour requirements. If Materiel Services needs extra resources to implement the new cable management system, the department would like to acquire resources from the resources saved by the new system in each unit of the CVC and main hospital.

Key Issues

The following key issues are driving the need for this project.

- Cables are often lost and misplaced during patient transfer process
- Nurses are dissatisfied with lost and misplaced cables
- Nurses spend valuable time looking for cables due to the inefficient cable management

Project Scope

This project includes cables at the following units at main hospital and CVC:

Main hospital

PACU

ICU

CVC

PACU

OR

CVICU

CVC 5

The project scope included cables attached to both incoming and outgoing patients from CVC and the main hospital. Cables that are not from CVC and the main hospital were not part of the project. The team would not participate in implementing the recommendation.

Expected Impact

Since this is a continuation of a previous project conducted in Fall of 2007, the team began the study by validating the existing data and information. The team then used both existing and newly collected data to statistically analyze the problems. Through this analysis, the team developed the recommendations that will improve the current Cable Management Process. Specifically, the client can expect the following from the implementing the recommendation:

- Simplified process for cable transfer
- Reduced or eliminated time nurses spend searching for cables
- Reduced number of cables misplaced or lost
- Improved patient and nurses satisfaction

Methods

The team interviews nurse and completes cable checklists. The team will interview nurses and technicians in both the main hospital and the CVC. Furthermore, some nurses in CVC will help the team complete cable checklists. Samples of nurse interview questions and the cable checklist are shown in Appendix A and B. Part of cable checklists activity is to observe the cable process, including detaching and adding cables to the patients from one unit to another unit.

Cable Checklists

The team collected data at the peak time of each unit using cable checklists. The peak time of different units varies. For instance, the nurses reported that the peak time of Pre-Anesthesia Care Unit (PACU) at CVC is around 6 am on weekdays. The team completed cable checklists in the following steps:

- The team stationed in front of the receiving unit and waited for the nurses to transfer the patients.
- The team asked the nurse about the patient's treatment type and what kind of cables the patient had on at that moment.
- After the patient arrived at the receiving unit, the team asked what kind of cables might be needed on the patient.
- The team asked the nurse if the needed cables were available.

The purpose of cable checklists is to have a rough estimate of how many cables are available and needed in each unit. From the cable checklist, the team can identify the types of cables are used the most in each unit.

Interviews

While waiting at the receiving unit for patients to arrive, the team interviewed nurses as they worked in the unit. The nurse interviews are designed to gather information about how the nurses obtained and managed cables. Another purpose of this nurse interview is to validate the cable search time in the previous report by asking nurses' average time spent searching for cables. Since the nurses didn't start searching for cables right after they know that they needed a cables, the search time cannot be found accurately. Therefore, the team decided to ask the nurses about the search time to validate the previous findings.

Findings

Cable Checklists

Based on the information collected using the cable checklists, the team conclude that the following cables are significant to discuss:

- Non-Invasive Blood Pressure Cuff (NIBP)
- Pulse Ox Cables
- EKG Cables
- Cardiac Cables
- Pressure Cables
- Temperature Sensing Cables

The team provides the percentage of cables that are needed for each unit by summing the numbers of cables that are already on the patients and the cables that are needed to be added on to the patients. The team then divides the number of cables by the number of patients observed in each unit. The following is the percentage of cables needed in each unit.

Table 1: Percentage of Cables Needed in Each Unit

Type of cable	NIBP	Pulse ox	EKG	Cardiac	Pressure	Temp Sensing
CVC PACU	92 %	96 %	52 %	4 %	24 %	0 %
CVC OR	67 %	100 %	100 %	22 %	89 %	56 %
CVICU	50 %	100 %	100 %	75 %	213 %	13 %
CVC 5	60 %	60 %	100 %	0 %	10 %	0 %
Surgical ICU	71 %	100 %	100 %	50 %	93 %	0 %
Main PACU	100 %	100 %	100 %	0 %	0 %	0 %

According to Table 1, 92% of the patients are using NIBP in CVC PACU. There are 213% of pressure cables being used most of the time in CVICU because one patient usually requires two to three pressure cables.

Since the team does not know the available numbers of cables in each units because it is out of our scope, the team decide to provide another table of minimum numbers of cable required in each unit. The team derives these numbers from multiplying the percentage of cables needed with the maximum capacity in each unit. Therefore, each unit knows the minimum numbers of cables that should be kept in stock before the peak time. The following table is the minimum numbers of cables needed in each unit.

Table 2: Minimum Numbers of Cables Needed in Each Unit

Type of cable	NIBP	Pulse ox	EKG	Cardiac	Pressure	Temp Sensing
CVC PACU	18	19	10	1	5	0
CVC OR	7	10	10	2	9	6
CVICU	12	24	24	18	51	3
CVC 5	14	14	24	0	2	0
Surgical ICU	14	20	20	10	19	0
Main PACU	54	54	54	0	0	0

According to Table 2, zero temp sensing cables are required in CVC PACU because temp sensing are rarely or never used during the peak time. However, this does not mean that temp sensing cables should not be kept in stock in CVC PACU because there might be some cases where temp sensing cables are required in CVC PACU.

Interviews

The following sections summarize the nurse’s and technician’s opinions on the cable management process. The order of the answers parallels the following questions:

1. What is the maximum capacity of your unit? What is the typical number of patients in your unit?
2. If you need to add a cable to the patient, where would you look? If the cable you need is not there, what would you do? How long do you spend searching for cables on average?
3. When sending a patient to another unit, is there any procedure to obtain replacement cables for the ones attached to the outgoing patient?
4. Who manages the cables in each unit?
5. How frequently do they check inventory? What do they do?
6. What are the cables that you are missing the most?

The actual interview document can be found in Appendix A.

CVC PACU

1. The maximum capacity of the unit is 20. On average, the unit has around 14 patients at any one time.
2. The first place a nurse or technician, or tech, would look for a cable is in drawers located by each bed or the unit Omnicell [a medical storage device]. The nurses expressed little concern for cable searching time, because the unit keeps around 20 cables on hand, so there is almost no shortage of cables. If a cable set is missing, the nurse or techs would look in an equipment room nearby.
3. The nurses and techs trade the appropriate cables during patient transfer process around 90% of the time.
4. Both the nurses and techs manage the cables in this unit.

5. The nurses and techs check every room for the correct cables at the beginning of each day.
6. The cables missing the most from this unit are the EKG cables and the temperature sensing cables. These are the ones that are not traded with the receiving unit.

CVC OR

1. The CVC OR has 10 beds and is almost always full.
2. This unit almost always gets their cables from Pre-Op and occasionally from the CVICU. If a cable is missing the techs take cables from the anesthesia work rooms. The nurses said that they spend an average of 10 minutes searching for missing cables.
3. Two different trading methodologies exist. If the outgoing patients are going to the CVICU, then the techs trade the cables. If the patient is going to Post-Op, then there the techs do not trade any cables. The CVC OR keeps all cables if a patient is routed in this manner.
4. The techs manage the cables in this unit.
5. The interviewees were unable to identify the frequency of cable replacement.
6. The Pulse Ox and the Temperature Sensing cables are missing the most in this unit.

CVICU

1. The CVICU has a maximum capacity of 24 patients, and on average the unit is full.
2. The cables are kept in the charge nurse's desk. If a nurse or tech cannot find a cable there, they look in another patient's room. The nurses search on average 20 minutes for missing cables.
3. The nurses believe that everyone in this unit trades cables upon patient transfer.
4. There were conflicting answers regarding the responsible parties for managing cables in this unit. One interviewee stated that there was no one responsible for managing the cables, while another interviewee said that the techs are responsible for managing the cables.
5. The techs are responsible for cleaning and replacing the cables.
6. The pulse ox and cardiac output cables are missing the most.

CVC 5

1. This unit has a maximum capacity of 24 patients, but on average has around 20 at one time.
2. Cables are kept in each room, one set per room. If a nurse or tech cannot find cables in the room then they look in the charge desk or in the utility rooms. However, this only happens occasionally. When the nurses cannot find the cables, the nurses spend on average of 20 minutes searching for cables.
3. Upon patient transfer, nurses and techs trade cables around 90% of the time.

4. Both the techs and nurses manage the cables. This includes searching for cables when they do go missing.
5. The interviewees did not know how often the cables were checked. But both relayed few complaints about the cable management system.
6. The cables that are missing the most are the pressure cables.

SICU

1. This unit has a maximum capacity of 20 patients. The unit is full most of the time.
2. The first place a nurse or tech would look for a cable is in the two Omnicells in the unit, or in a cable drawer. Otherwise, the nurse and techs look in any empty room for the cables they need. The average time spent searching for cables is 6 minutes.
3. The techs and nurses only occasionally trade with anesthesia when a patient enters the unit.
4. The techs manage the cables in the SICU.
5. The housekeeping department cleans the cables in the rooms.
6. The NIBP cable is missing the most, but it is not missing often.

Pre-Op (Main PACU)

1. This large unit has capacity of 54 patients. This unit is most often full.
2. If the nurses need cables, they look in the storage room in the unit. If cables are not present, the nurses can call anesthesia, which will sometimes have the desired cables. Otherwise, the unit waits for cables to be sent from the SICU or 4B, who occasionally send multiple sets of cables. It takes about 10 minutes to search anesthesia for missing cables.
3. The nurses are supposed to trade cables when sending a patient to the OR, but often do not.
4. There is no single person that manages the cables in this unit, but the nurses in general are responsible for finding the necessary cables.
5. The interviewees did not know how often the cables get replaced. The cables are cleaned after every use.
6. The EKG leads are missing the most. The interviewee believes these are the most taken cable, especially over the weekend.

The team compared the current searching time for cables to the reported value from the study performed in 2007.

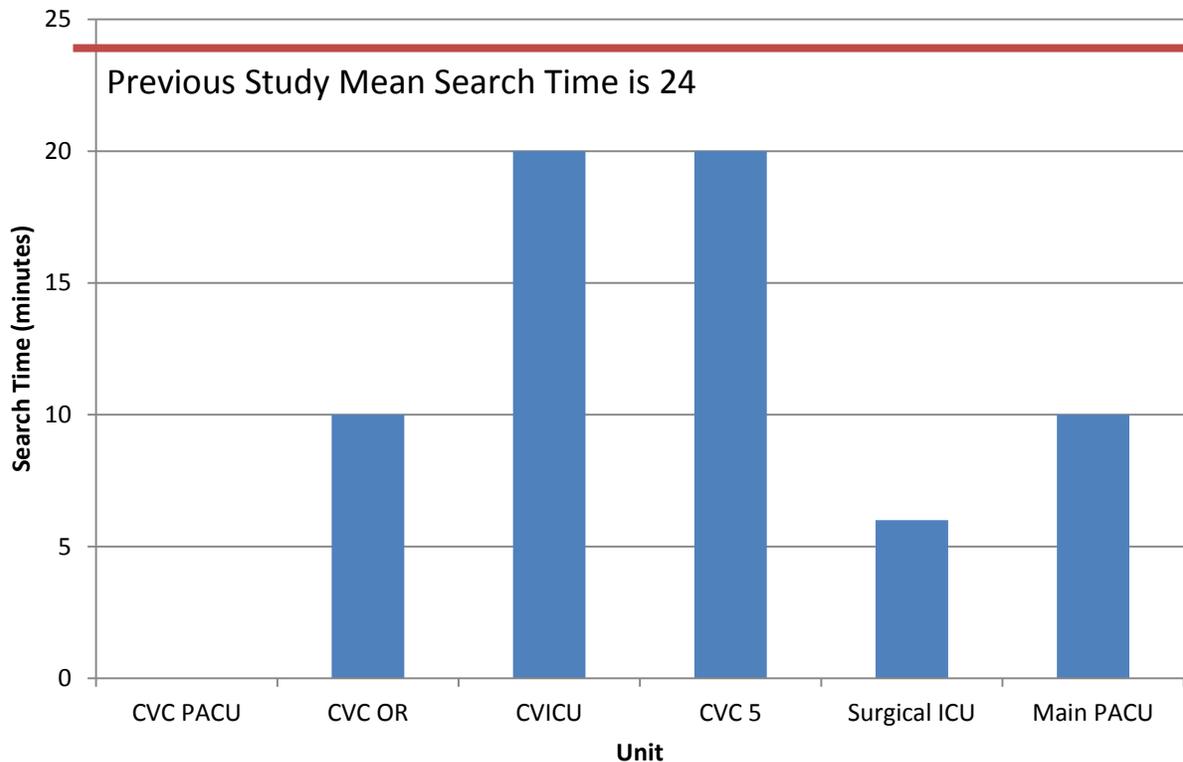


Figure 1: Current Search Times less than Previous Search Times

All of the current search times are less than the reported values from the previous study. In addition, the previous study claimed that nurses search for cables for 24 minutes every day. The nurses that participated in this round of interviews stated that nurses only search occasionally. So, although the maximum current search time is 20 minutes, this happens less frequently than reported in the 2007 study.

Conclusions

The team concluded that the issue of cable management is not a critical issue of the units within our scope. Although some nurses related bad incidents in the past, the majority the team spoke with did not express a strong concern with the search time associated with searching for missing cables.

Cable-Checklist

When examining the data collected through the cable-checklists, the team wanted to understand where cables are needed in the system so each unit to have all of the cables it needs. In a simple scenario where all the units needed the same amount of cables, the optimal method would be to keep the current process of trading upon transfer of patients; however, this does not work for

every cable, because different units need more of a certain type of cable than others. Dividing the units in our scope into the four units in the CVC and the two units in the Main Hospital is the best way to analyze the most efficient cable transfer process.

CVC

The units in the CVC populate the first four rows of Table 1. There are certain cables that are needed in all units, and the number of these cables does not deviate significantly between each unit. The NIBP, Pulse Ox, and EKG cables fall under this category. These cables should be traded because all the units should have them on hand. Trading the cables upon patient transfer would allow the units to maintain the number of cables they have before patient transfer.

The other cables - cardiac, pressure, and temperature sensing - all have high use deviations, such as Pressure cables (Table 2, Column 6) from unit to unit. For these cables, it would be beneficial for the units that need them the most, like the CVICU, to keep them on hand. It would not make sense for the units that do not need these cables to keep them on hand just to trade.

Main Hospital

All of the cables between these units are needed in vastly different numbers. Also, because cables do not go sequentially from the Main PACU to the SICU, it is difficult to draw conclusions on whether to trade cables or not. The unit most typically dividing these units, in terms of patient flow in the Main Hospital, is the Main OR. If the OR has the cables in abundance then the SICU could trade with them upon patient transfer; however, if the OR does not, it would not be useful to trade.

Interviews

The following conclusions were drawn from the interviews performed on the nurses and the technicians from each unit within the scope. Again, analysis is best broken down into the CVC and Main Hospital.

CVC

In general, the interviews demonstrated a lack of an urgent cable management problem in each of these units. Most of the interviewees stated that finding cables is a problem, and in certain units, such as the CVC PACU, more cables are kept on hand than the average number of patients in the unit. The interviewees expressed a belief that cable trading happens most of the time, which is the current methodology of cable management in the hospital. All the nurses and techs that were interviewed had a certain place they would look for cables if the desired cables were missing from the normal place. This is a desired answer, as opposed to not knowing where to look or stealing a cable from another unit. Finally, with relatively small and similar unit capacities, the size of the problem is mitigated in the CVC as opposed to the Main Hospital.

Main Hospital

Of the two units of the hospital examined for this project, the SICU was the most similar to the units in the CVC. The nurses in the unit have specific places to look for the cables and the techs are designated to manage the cables. However, the Main PACU is different from the CVC PACU, or any other unit within the project scope. It is about twice as large as any other unit, meaning that the management system is more difficult. Yet, no person is designated to keep track of the cables. The interviewee stated that the nurses are supposed to manage the system as a whole, but that is difficult with their workload. In addition, both the Main PACU and SICU do not consistently trade cables when sending or receiving a patient. If another unit in the main hospital does trade, then this could cause a shortage or abundance in one area. From the interviews, it is safe to conclude that the Main Hospital has more issues with maintaining correct amounts of cables than the CVC, especially in the Main PACU.

The search time graph shows that the current process of trading cables upon patient transfer, which was adopted in 2007, is slowly being adopted. With more and more people following the system, fewer and fewer cables are being lost, and the nurses and techs have to do less and less searching.

Recommendations

The following section states the team's recommendations regarding the trading of cables upon patient transfer. It is broken down into current recommendations and further exploration.

Current Recommendations

Given the analysis from the cable-checklists and the interviews, the team recommends that the current trading system should not be overhauled. Instead, more communication between units would help the process run smoother.

The team felt that long searching times for cables resulting from problems with the trading system, especially within the CVC, were isolated events, which mirrors the cable management system as a whole. Most of the nurses and techs that were interviewed knew there was a trading system in place, but also knew of times when it wasn't executed. Therefore, the goal of Materiel Services should be to encourage trading upon patient transfer and free flow of cables between units. This will only happen when the nurses and techs take time to trade, or make sure they have the needed cables before the patients arrive. The team has developed 5 simple guidelines for cable management, which nurses and techs should follow:

1. Lock up the cables that you will need.
2. Trade cables upon transfer of patient. Get back any cables that you will lose, check to make sure the ones you get are the same kind you gave up.

3. Get the cables you need as soon as possible, even before the patient arrives. Then you will know if a cable is missing beforehand.
4. Save broken cables for Materiel Services.
5. Please be courteous to other units – if you have extra cables lying around, give them to a unit that will need them.

The team believes that if the nurses and techs follow these guidelines, many of the problems of missing cables from the units will be eliminated. The guidelines could be posted in each unit so the nurses and techs could see them. The constant reminder of the correct way to manage the cables would ideally make everyone follow the same procedure. Also, note guideline number four. If Materiel Services were to collect broken cables, they would get a better understanding of how many of each is broken over a given amount of time. Even if cables are unfixable, this knowledge would be useful, especially if a par system was established. However, this guideline is not necessary to the management system and can be taken out if desired.

Guideline number 2 states that cables should be traded. Yet, in the conclusions, it is stated that if a unit needs a cable more than another unit (like the Pressure cable for the CVICU versus CVC-5) it would be bad to trade. The team considered this contradiction, and decided that every unit should trade every type of cable. The nurses and techs are likely to follow the guidelines if the guidelines are simple. Making a trading system based on unit and cable type is too complicated. Also, if the nurses follow guideline number five, then the unit where the excess cables are building up will contact the unit that needs them and send the cables to the needy unit.

Because the team's recommendation is to leave the current system alone, the cost analysis has been left out of this report. Although there is a cost involved in distributing the guidelines, it is so minimal that it is not worth reporting. The low cost of improving the current system was considered a major benefit of the team's recommendation. Implementing a new system would incur a cost to the nursing staff because of the time needed to learn and implement anything new.

The team has provided, in a Microsoft Excel file, an interactive map that contains the checklist data. This is a more graphical model that displays the percentages of patients that require each type of cable going through each unit of the CVC and Main Hospital within the scope of the project. A screenshot of the map can be seen in Appendix D.

Further Exploration

After reviewing the checklist and interview data, the team thought of various ideas for future projects for Materiel Services. Given the time constraints, the team did not get to study the entire UMHS for an extended period of time. Therefore, the main method for any further exploration is to collect more data using the cable checklists. Better estimations of the cable usage rate could be developed using more data for each unit in the hospital. In addition, the team recommends that future studies be performed on the Main Hospital instead of the CVC. From

our conclusions, the Main Hospital presented more challenges concerning the managing of cables. If any change is required to the current trade-upon-transfer process, the main hospital is where it would be needed.

Different types of data would also be helpful to understand what cables are needed in each unit. A future study could be performed focusing on the inventory in each unit. This would aid in the formation of a par value that Materiel Services could give to each unit.

Appendix B: Cable Checklist

From unit		Treatment Type				
Type of cable	NIBP (black)	Pulse ox (blue)	EKG (green)	Cardiac (brown)	Pressure (red)	Temp Sensing (Brown)
already on the patient						
need to be added on						
Cables not available						

Appendix C: Types of Cables



Figure C-1: NIBP Cuff



Figure C-2: Cardiac Cable

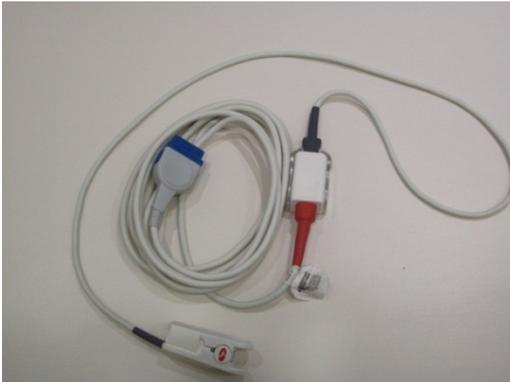


Figure C-3: Pulse Ox Cable



Figure C-4: Pressure Cable

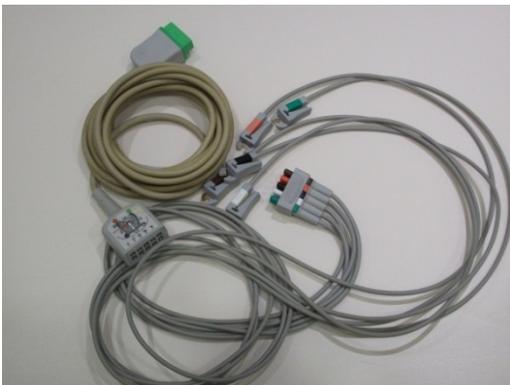


Figure C-5: EKG Cable



Figure C-6: Temp Sensing Cable

Appendix D: Interactive Map

