Increasing Communication Flow Regarding Patients on Contact Precautions in the Adult Anesthesiology Department to Minimize Costs of Restocking and Disinfecting Anesthesia Carts

Final Report

Delivered to:
Joe Dipsinski, Allied Health Senior Supervisor
Adult Anesthesiology Department
University of Michigan
j dip@med.umich.edu

Sheila Kellogg, Chief Certified Registered Nurse Anesthetist
Adult Anesthesiology Department
University of Michigan
shmil@med.umich.edu

Matthew Claysen, Coordinator, Program and Operations Analysis
mclaysen@med.umich.edu

Amanda Silva, Coordinator, Michigan Quality Systems
amlindsa@umich.edu

Mark P. Van Oyen, Ph.D., Supervising Faculty Member
vanoyen@umich.edu

Prepared by:
IOE 481 – Team 7
Joshua Bolla, Senior Student in Industrial and Operations Engineering
Kelly Miller, Senior Student in Industrial and Operations Engineering
Cecilia Yung, Senior Student in Industrial and Operations Engineering

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EXECUTIVE SUMMARY

In the Adult Anesthesiology Department (AAD) at the University of Michigan’s University Hospital (UH), two types of carts that contain anesthesia supplies are used in medical procedures: Anesthesia carts and contamination carts. Anesthesia carts contain all supplies an Anesthesiologist may need whereas a contamination cart contains minimal anesthesia supplies. These carts and their supplies are being exposed to the highly contractible virus *Clostridium Difficile* (C. Diff). When an anesthesia cart is exposed, thousands of dollars of supplies are discarded. When a contamination cart is exposed, only a small fraction of supplies are discarded. In one instance, five occurrences of anesthesia cart exposure happened in a week’s time costing the AAD $15,000 in total according to the Allied Health Senior Supervisor (AHSS). If the AAD had instead used contamination carts, this cost should have been $390.

The AAD believes that communication breakdowns relaying a patient’s C. Diff status are causing anesthesia cart exposure. The AAD’s process for minimizing anesthesia cart exposure is to communicate a patient’s C. Diff status and use contamination carts on patient with a positive C. Diff status. The AAD asked Team 7 of Industrial and Operations Engineering (IOE) 481 to investigate the communication process being used within the department and ensure that minimal supplies are exposed to C. Diff patients, identify the communication breakdowns in the current process, and recommend solutions to minimize communication breakdowns. The purpose of this report is to document identified concerns about the current state of C. Diff status communication flow to and within the AAD; data gathering methods; data collected; and the team’s findings, conclusions, and recommendations.

Background

Two types of carts are used by the Anesthesiologists at University of Michigan’s University Hospital: anesthesia carts and contamination carts. A contamination cart costs approximately $78 to replace, whereas an anesthesia cart costs approximately $3,000. The price difference between the two carts results from the number and type of supplies each contain. A contamination cart contains minimal supplies whereas an anesthesia cart contains all anesthesia supplies. To determine contamination cart use, Anesthesiologists, Anesthesia Technicians, Nurse Anesthetists are expected to follow a list of patients with Contact Precaution (CP) status provided by Infection Control every morning for medical procedures the following day. Patients with CP include C. Diff patients along with other highly contractible conditions. However, cases of C. Diff are still missed by the CP list.
Methodology

The team performed eleven tasks to evaluate and improve the process of communicating patient C. Diff status through the AAD.

- **Toured the AAD and Operating Rooms (OR).** To gain a better understanding of the overall layout and operations of the AAD.

- **Performed a literature search on past studies concerning communication, C. Diff, and Anesthesia carts.** To find out if any previous research had been done that could be relevant to this study.

- **Observed and interviewed 7 Pre-Op OR,, PACU staff.** To gather qualitative data and understand implemented processes

- **Observed and interviewed 2 Anesthesiologists.** To gather qualitative data and understand the job tasks and views regarding C. Diff patient procedures of Anesthesiologists

- **Interviewed 2 Allied Health Intermediate Supervisors from Infection Control.** To understand where the AAD receives patient’s C. Diff status and ensure that the CP list is accurate.

- **Observed and interviewed 1 clerk from each inpatient unit 6A and 5B of UH.** To understand how CP patient data was inputted into the UH’s patient information systems.

- **Interviewed 1 Anesthesia Technician.** To understand how technicians are made aware that a C. Diff patient will use particular OR.

- **Interviewed 1 Application Systems Analysis Project Supervisor of MCIT.** To understand how Centricity, the patient information system used by the AAD, communicates with other patient information systems used in the UH to track C. Diff patients.

- **Analyzed interview responses and observations.**

- **Created current state map of communication within the AAD.** To ensure understanding of communication within the AAD and identify communication breakdowns

- **Developed recommendations to improve communication of patients with positive C. Diff status in the AAD along with a future state map.**
Findings and Conclusions

With the communication of C. Diff patient status to and within the AAD mapped, the team identified areas where communication breakdowns are most prevalent on a current state map. Identified areas where communication breakdowns occur in this study are:

- Based on 4 interviews, CP list is used irregularly and infrequently by the AAD.
- Based on 2 interviews, anesthesia cart is preferred over contamination cart.
- Based on an interview with Applications Systems Analysis Project Supervisor of MCIT, patient information systems do not communicate both ways.
- By observation, signs are not available or used on all OR doors.

Conclusions made based on the above findings are:

- Organization of CP list is unintuitive.
- Responsibility and incentive for contamination cart use is lacking outside of upper management.
- Patient information systems do not always contain all known data regarding a patient.
- Lack of standard work practices.

Recommendations

The team has six recommendations that help minimize C. Diff patient communication breakdowns. In the team’s opinion of easiest to hardest to implement, the team recommends:

- Equip every OR with CP and C. Diff signs to improve the credibility of the visual cues.
- Review with providers and anesthesia technicians when and why AAD personnel should use contamination carts on C. Diff patients.
- A paging system to communicate patient’s C. Diff status to the technicians.
- An incentive program that offers providers motivation to better inform their technician of a C. Diff patient.
- Use of an Incident Report Form to track anesthesia cart misuse.
- Further investigation.
INTRODUCTION

Patients at the University of Michigan’s University Hospital (UH) with select communicable diseases, conditions, or microorganisms are put on contact precautions (CP). Contact precautions are used in addition to standard precautions (SP) when the consequences of spread may be extreme and/or when standard precautions alone may not prevent transmission. Patients with CP require different operating procedures and may require different equipment from non-CP patients.

The Adult Anesthesiology Department (AAD) asked Team 7 of Industrial and Operations Engineering (IOE) 481 at the University of Michigan to look at the current flow of C. Diff patient status to and within the AAD, identify points where communication breakdowns occur and recommend ways to minimize communication breakdowns. In this study, the team is examining procedure and equipment distinction of C. Diff patients, a subset of CP patients, within the AAD. According to the Allied Health Senior Supervisor (AHSS), any cart used on a C. Diff patient must be completely disinfected and restocked. A contamination cart is a subset of an anesthesia cart, costing less than 3% of an anesthesia cart. On C. Diff patients, a contamination cart should always be used instead of an anesthesia cart. When an anesthesia cart is used on a C. Diff patient instead of a contamination cart, a communication breakdown has occurred. Communication breakdowns are defined as the lack of or miscommunication regarding C. Diff patient status causing anesthesia cart misuse.

The Adult Anesthesiology Department (AAD) at University Hospital wants to decrease communication breakdown between the Pre-Operations, Operations, and Post Anesthesia Care Units by increasing communication of patient’s C. Diff status, referred to as communication flow herein. By minimizing communication breakdowns of C. Diff patients, the team can increase the use of contamination carts, resulting in fewer medical supplies being replaced.

The team has completed this work. The purpose of this report is to document identified concerns, data gathering methods, and data gathered. Additionally, the team’s assessment of communication breakdowns can be found in the Conclusions and Recommendations sections.

BACKGROUND

Contamination carts are a subset of anesthesia carts. The price difference between the two carts results from the number and type of supplies each contain. Anesthesia carts cost $3,000 to disinfect and restock whereas contamination carts cost $78. Both serve the same function during a procedure, however, an anesthesia cart contains most of the supplies and medication anesthesiologists may need where a contamination cart contains the basic necessities for any procedure and none of the medication. When a provider comes into contact with C. Diff patient followed by contact with a cart, cart replacement is necessary upon procedure completion.

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1 University of Michigan Hospitals and Health Centers Infection Control Committee, Policy VI-62 Contact Precautions
Currently, there is no documentation regarding the number of carts disinfected and restocked annually due to C. Diff patients nor how anesthesia carts are misused.

C. Diff is one of the conditions that require CP. To determine a patient’s C. Diff status, the AAD uses a list of CP patients forward by Infection Control (IC). This list arrives at the AAD no later than 6 A.M. the morning prior to the patient’s procedure. However, unlisted cases of CP patients exist. During such cases, AAD usually finds out about the patient’s C. Diff status after beginning the procedure, causing necessary cart replacement. Regardless, five C. Diff cases with anesthesia cart misuse occurred in one week.

**Goals and Objectives**

The main project goal is to minimize communication breakdowns of C. Diff patient status to increase the use of contamination carts on C. Diff patients. The team’s objectives are as follows:

- Identify how patient’s C. Diff status is communicated within the AAD using a current state map
- Identify where and how communication breakdowns regarding C. Diff patient’s status
- Quantify the number of anesthesia carts discarded annually
- Quantify the cost difference between replacing the contents of an anesthesia cart and a contamination cart

With this information, the team has developed recommendations to:

- Give the AAD leadership a current state map of how patient’s C. Diff status flows through the AAD
- Enable the AAD to track communication breakdowns and collect data regarding anesthesia carts misuse on C. Diff patients
- Provide recommendations to clarify communication about C. Diff patients to anesthesia technicians prior to the operations

**Project Scope**

This project included only the study of patient information flow, regarding C. Diff patients, to and within the AAD at University Hospital. For the purposes of this study, the AAD communication scope begins at Pre-Op and ends once the patient leaves PACU.

Any task not connected to the University Hospital’s AAD was not included in this project. Specifically, the team did not study tasks or activities associated with the actual processes the department uses during medical procedures, focusing instead on the communication flow of patient’s C. Diff status. Cart replacements that take place outside of the specified scope above were also not studied under this project. However, the team expects the findings from this project to be applicable to other similar areas in the future. Additionally, implementation of recommendations is not included due to time constraints of this project.
KEY ISSUES

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

- Communication breakdowns are occurring for reasons not fully understood.
- Anesthesia supplies are being needlessly discarded due to amendable errors.
- Cost associated with discarding supplies is higher than necessary.

The primary focus of this project is the patients and their safety; monetary factors are secondary.

METHODS

The team used various methods to collect qualitative and quantitative data, to better understand how C. Diff patient status is communicated to and within the AAD. This section discusses the methods used for each type of data. Interviews and observations best recognize areas of communication breakdown, while numerical data is best identifies severity of the communication breakdowns.

Qualitative Data

At the start of the project, the CCRNA and AHSS informed the team that no data on communication breakdowns in the AAD exists. The number of organization system errors can be determined quantitatively; however the type of organization system error cannot. As a result, interviews were chosen to find the system errors. Prior to conducting interviews, the team was given instruction on sterile procedures to gain a better understanding of the OR environment.

The team collected qualitative data by interviewing 15 personnel that have an impact on the communication flow within the AAD.

The team interviewed personnel of the AAD, Infection Control, and MCIT. Details regarding the personnel interviewed are as follows:

- 2 Anesthesiologists of AAD
- 1 Anesthesia Technician of AAD
- 3 Charge Nurses of Pre-Op, OR, and PACU
- 2 Staff Nurses Pre-Op and PACU
- 2 Administrative Clerks of Pre-Op
- 2 Administrative Clerks of Impatient Units 6A and 5B of UH
- 2 Allied Health Intermediate Supervisors of Infection Control
- 1 Application Systems Analysis Project Supervisor of MCIT

Data from these interviews allowed the team to create a current state map of the flow of patient’s C. Diff status. The interviews focused on how C. Diff patients were handled and how different parts of the AAD handled patient’s C. Diff status. The team met with both Allied Health Intermediate Supervisors of Infection Control to clarify questions regarding all systems used by
AAD Staff to track patient data. The team also interviewed the Application Systems Analysis Project Supervisor of MCIT to determine how Centricity, a patient information system used by the AAD, communicates with other patient information systems used in the UH to track C. Diff patients.

**Quantitative Data**

Using quantitative data, the team measured the severity of each communication breakdown identified. Quantitative data on the number of C. Diff patients handled by the AAD and the number of anesthesia carts misuse will highlight the financial significance of this study.

On February 1st, 2012, the team requested the help of the AHSS to keep track of the number of anesthesia carts misused over the next two months. Since occurrences of carts being disinfected and restocked happen infrequently, the team would not have been able to track this data without help. In addition, the AHSS provided cost data for each type of cart.

In addition, the team asked the Pre-Op Charge Nurse of morning shift to provide to the team with copies of the CP patient information from the Pre-Op area, which consists of:

- The CP patient list received from the clerks
- The CP patients manually added from transfer slips over eight days.

The team intended to use this CP patient list to identify communication breakdown points by comparing it with the AAD CP patient list.

**FINDINGS**

Communication breakdowns are defined as the lack of or miscommunication regarding C. Diff patient status causing anesthesia cart misuse. In order to organize the data collected to date, the team created a current state map. With the communication of C. Diff patient status to and within the AAD mapped, the team identified areas where communication breakdowns are most prevalent on the current state map. The current state map created can be found in Appendix A. Identified areas where communication breakdowns occur in this study are:

- CP list is used irregularly and infrequently by the AAD.
- Not all CP patients are included on this list
- Patient information systems do not communicate both ways.
- Signs not available or used on all OR doors.
- Responsibility and incentive for contamination cart use is lacking outside of upper management

Additionally, the team has noted that the AAD sees about one C. Diff patient approximately every three weeks, and that a communication breakdown regarding anesthesia cart misuse on a C. Diff patient occurs approximately 10% of the time. Due to the infrequency of C. Diff patients, the team could not statistically determine the frequency of C. Diff patients or the number of
communication breakdowns. The above numbers given were found through qualitative data gathering, more specifically, interviews with various personnel. Through Anesthesiologist and Anesthesia Technician interviews and team observations, the team learned that an anesthesia cart is always kept outside of the procedure room when a contamination cart is used in case of an emergency or need for additional supplies during a medical procedure. The interview, meeting, and observation notes can be found in Appendix B. Between February 1st, 2012 and April 1st, 2012, one case of anesthesia cart misuse was observed. The following sections discuss the identified areas of communication breakdowns listed above.

CP List Use within the AAD

During the data gathering process, through interviews, the team discovered two groups primarily used the CP List: the Pre-Op Clerks and the AAD upper management. The Pre-Op Unit accesses a digital copy of the CP list through the patient information system ReportTrack. The AAD receives an electronic list of known CP patients two mornings before the patient’s medical procedure from Infection Control, generated by MCIT. While the copy accessed through ReportTrack is not visually identical to the copy forwarded to the AAD, it contains the same information. Both of these lists contain information regarding all CP patients in the University of Michigan’s Hospital System organized by location (UH, Mott, IR).

The Pre-Op Clerks go beyond just the list found on ReportTrack. The Pre-Op Clerks search for a patient’s medical records, when a patient enters Pre-Op, to find all medical information concerning a patient when none is available. Pre-Op clerks call the patient’s primary provider and identify pertinent data from a patient’s transfer slip as necessary.

Communication between Patient Information Systems

Patient information systems are electronic systems designed to organize and manage various facets of patient data. After interviewing with Application Systems Analysis Project Supervisor of MCIT, the team has confirmed that most patient information systems within UH do not wholly communicate with one another because systems currently used in the UH were developed at the same time by different groups for specific purposes. The team would like mention that this is a partial view of how these patient information systems interact with one another, specifically with CP patient status.

Centricity, the Patient Information System used by the AAD

According to the Application Systems Analysis Project Supervisor, Centricity is a one-way system. It only speaks to other systems but does not listen to the other systems. From the team’s understanding, Centricity receives all its data from the manual entry of both the Anesthesiology History and Physical Examination and the Pre-Op Nursing Assessment. The Anesthesiology History and Physical is sent from Centricity to CareWeb, but not the Pre-Op Nursing Assessment. The team observed a PACU nurse toggling a CP flag, thus enabling it and causing a red “ISOLATION PRECAUTION” banner to appear in Centricity.

When interviewing Application Systems Analysis Project Supervisor, the team discussed the feasibility of having Centricity receive data from other patient information systems. MCIT
deemed it unnecessary as Centricity will be replaced by MiChart, an all-encompassing medical information program, in the foreseeable future.

*CareWeb, the Patient Information System used by most providers*

When CareWeb receives the Anesthesiology History and Physical from Centricity, it is strictly a text document. CareWeb does not process the information and does not integrate this new data with the patient’s assessment on CareWeb. Currently, CareWeb is in the process of switching to MiChart. Due to the short time since the first phase of the MiChart switchover, the team does not know how this will affect patient information system communication in the future, but suspects that it would be greatly improved because MiChart will be all encompassing and is built by one company with integration in mind.

*CareLink, the Patient Information System used by most providers*

CareLink is a computerized order entry system that most providers at UH use. Through CareLink, providers order tests, procedures, and medications necessary for patients. The team suspects that CareWeb automatically updates data regarding a patient’s CP status, but only when a new order is placed in CareLink. The team observed CareLink being used by PACU nurses.

*ReportTrack, the Patient Information System used by clerks*

The clerks in Pre-Op use ReportTrack to acquire the list of CP patients. The team did not observe any other group using ReportTrack and does not know how ReportTrack acquires data. The team speculates that the data is acquired from what Infection Control referred to as the Mainframe, the best source of all patient information.

*Signs on OR Doors*

When interviewing and touring the OR, the team observed two CP signs: One for patients with C. Diff and another for all other CP conditions. These CP signs are not consistently found on OR doors. Some ORs had both signs, some had one of the signs, and others had neither sign. Additionally, no standard was observed in updating and removing door signs. Updating and removing door signs appeared to vary from nurse to nurse as well as case to case.

*Responsibility and Incentive for Contamination Cart Use*

Based on both interviews and observations, the team found that the responsibility and incentive for contamination cart use lies within AAD upper management. The Anesthesiologists interviewed preferred using the anesthesia cart, compared to the contamination cart. They were frustrated when using contamination carts, because all supplies were not at hand, causing an overall inconvenience. Anesthesiologists would prefer using anesthesia carts all the time. The Anesthesia Technician interviewed did not believe it would be possible to completely eliminate anesthesia cart misuse on C. Diff patients.
CONCLUSIONS

The team concludes that there are two types of communication breakdowns: system error and human issues. A balance between system and human is how every provider and technician learns of positive C. Diff patient status.

System Error

From the findings, the team concludes that patient information systems at UH do not always contain all known data regarding a patient and are not fully integrated or well understood by the team. According to MCIT, Centricity is only gives out data; however, the team’s observations do not support this. Reasons patient systems are considered unreliable by the team include lack of system integration and visual cues in the systems triggered by humans. Human error of not imputing patient’s C. Diff status is unavoidable.

Furthermore, the team considers it impractical to use a contamination cart on every patient, because the net gain is offset by the time spent retrieving or waiting on supplies from the outside anesthesia cart, the costs of acquiring more contamination carts, and the storage space required by these contamination carts. Thus, a system-wide use of contamination carts is infeasible.

Human Issues

Human communication breakdowns stem from a lack of standard work practices. Each person performs a task in their own manner. For example, providers, technicians, and nurses are mostly using visual cues, and not the CP list. The CP list is readily available to all Anesthesiologists, Nurse Practitioners, and Anesthesia Technicians, but most see it as spam and do not use the information provided. The list contains too much information. Other than organization by location, the team finds the list unintuitive.

Standardization is also lacking in the OR. Not every OR door being equipped with a CP and/or C. Diff signs. Additionally, these signs are put up at varying times prior to a procedure. The lack of standardization devalues the creditability of the sign. Also, providers cannot consistently meet with their technicians prior to a procedure, giving the technician the impression the patient does not have C. Diff, as C. Diff cases are infrequent.

Responsibility and incentive for contamination cart use was not observed outside of management. Based on observations, the attitudes and views of the AAD personnel interviewed indicated the desire to use contamination carts consistently and accurately is low.

RECOMMENDATIONS

The team has six recommendations that minimize C. Diff patient communication breakdowns. A visualization of these recommendations implemented can be found on the future state map in Appendix A.
The following list is the team’s recommendations, in order of easiest to hardest to implement in the team’s opinion:

- Equip every OR with CP and C. Diff signs to improve the credibility of the visual cues.
- Review with providers and anesthesia technicians when and why AAD personnel should use contamination carts on C. Diff patients.
- A paging system to communicate patient’s C. Diff status to the technicians.
- An incentive program that offers providers motivation to better inform their technician of a C. Diff patient.
- Use of an Incident Report Form to track anesthesia cart misuse.
- Further investigation.

**CP and C. Diff Signs on Every OR Door**

The AAD should also equip every OR with CP and C. Diff signs to improve credibility of the visual cues. More signs need to be printed and attached to the binder ring containing various warnings to providers and technicians entering an OR.

**C. Diff Policy Review with Providers and Anesthesia Technicians**

The team recommends that the entire AAD reviews contamination cart policy and requires all providers, technicians, nurses, and other personnel to attend a presentation that explains when, where and why a contamination cart is used. This presentation also goes over the procedure of how the AAD wants patient’s C. Diff status relayed. This is to ensure that the entire department has the same understanding of how C. Diff patient data should be relayed and how C. Diff patients should be handled.

**C. Diff Status Paging System**

The team recommends a paging system to communicate patient’s C. Diff status regarding C. Diff to the technicians. The following tables are three different options to the paging system.

**Table 1: Paging System using Anesthesiologists**

<table>
<thead>
<tr>
<th><strong>Paging System to Anesthesia Technicians</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Who Sends</td>
<td>Anesthesiologists</td>
</tr>
<tr>
<td>Who Receives</td>
<td>Technicians Individually</td>
</tr>
<tr>
<td>When</td>
<td>Right after anesthesiology assessment</td>
</tr>
</tbody>
</table>
| Pros                      | • Simple  
|                           | • Standardized |
|                           | • Implementable right away |
|                           | • Minimal workload added |
| Cons                      | Increased workload (minimal) |
Table 2: Paging System using Centricity

<table>
<thead>
<tr>
<th></th>
<th>Paging System to Anesthesia Technicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who Sends</td>
<td>Centricity</td>
</tr>
<tr>
<td>Who Receives</td>
<td>Technicians Individually</td>
</tr>
<tr>
<td>When</td>
<td>Automatically</td>
</tr>
<tr>
<td>Pros</td>
<td>• No workload added</td>
</tr>
<tr>
<td></td>
<td>• Long term solution</td>
</tr>
<tr>
<td></td>
<td>• Automatic</td>
</tr>
<tr>
<td>Cons</td>
<td>• Not implementable right away</td>
</tr>
<tr>
<td></td>
<td>• Breakdowns can occur if information isn’t entered into Centricity</td>
</tr>
</tbody>
</table>

Table 3: Paging System using Clerks

<table>
<thead>
<tr>
<th></th>
<th>Paging System to Anesthesia Technicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who Sends</td>
<td>Clerks</td>
</tr>
<tr>
<td>Who Receives</td>
<td>Technicians</td>
</tr>
<tr>
<td></td>
<td>• As a whole</td>
</tr>
<tr>
<td></td>
<td>• By block</td>
</tr>
<tr>
<td></td>
<td>• Individually</td>
</tr>
<tr>
<td>When?</td>
<td>• In the morning</td>
</tr>
<tr>
<td></td>
<td>• Throughout the day</td>
</tr>
<tr>
<td>Pros</td>
<td>• Implementable right away</td>
</tr>
<tr>
<td></td>
<td>• More accurate</td>
</tr>
<tr>
<td>Cons</td>
<td>• Increased workload</td>
</tr>
<tr>
<td></td>
<td>• Significant if page individually</td>
</tr>
<tr>
<td></td>
<td>• Technicians would ignore a page as a whole</td>
</tr>
<tr>
<td></td>
<td>• Outside of AAD</td>
</tr>
<tr>
<td></td>
<td>• Chaotic</td>
</tr>
</tbody>
</table>

The team highly recommends the system outlined in Table 1, because it is easiest to implement, incurs minimal cost and increases total workload the least. Paging by Centricity, as outlined in Table 2, is considered highly unlikely by the team based on the complexity of integration determined from interviews with the Application Systems Analysis Project Supervisor of MCIT. The paging system with clerks, outlined in Table 3, is harder to implement than the first because the clerical staff lies outside the AAD. This recommendation would require a change in the clerical staff’s job description and increase the workload of another department.

Incentive Program to Better Communicate C. Diff Status

The team suggests an incentive program to address the frustrations of the providers. This program offers providers motivation to better inform their technician of a C. Diff patient.
Currently, anesthesia cart misuse does not affect providers personally. By implementing this program, the providers now have a reason to maximize contamination cart use.

For every contamination cart successfully used on a C. Diff patient, the Anesthesiologist is rewarded. The team recommends a $100 or a free meal for each contamination cart successfully used with a C. Diff patient. One anesthesia cart would be equivalent to thirty $100 rewards. According to the team’s findings, there are approximately 13 – 18 C. Diff cases a year. The cost of the incentive program per year is a fraction of the cost disinfecting and restocking one anesthesia cart.

**Incident Report Form Use to Track Anesthesia Cart Misuse**

The team recommends using an Incident Report Form found in Appendix C, developed by the team, to collect qualitative and quantitative data regarding communication breakdowns. The data collected from these Incident Report forms can help analyze improvement based on the above recommendations and further investigate unidentified problems that may cause anesthesia cart misuse with C. Diff positive patients.

**Further Investigations**

The team recommends continuation of this project. A future student group could analyze the data gathered by the Incident Report forms found in Appendix C and the effectiveness of the recommendations.

Additionally, the team recommends further investigation on how patient information systems interact. This will yield greater understanding of the events observed by the team. Once there is a complete understanding of patient information systems, further recommendations are possible and system solutions can be given. Secondly, the team recommends extensive testing of the future patient information system that will be replacing CareLink. Testing will ensure that the new patient information system is correctly integrated with other patient information systems.

**EXPECTED IMPACT**

In conducting this study, the team thoroughly analyzed how patient’s C. Diff status is communicated in the AAD. The team expects the proposed recommendations above to minimize communication breakdowns and be applicable to other CP patients and other areas of University of Michigan Health Systems. The decrease in communication breakdowns will reduce the number of discarded anesthesia supplies. Specifically, the recommendations, if properly implemented should result in:

- Better communication flow of C. Diff patient information
- Increased contamination cart use on C. Diff patients
- Monetary savings
APPENDIX B: MEETING, INTERVIEW, AND OBSERVATION NOTES

Meeting Notes

Client Meeting (1/24/12)

- Working with the Adult Anesthesiology Department (AAD)
- If a patient is on contact precautions (CP) special treatment
  - Effects AAD by all the cart’s supplies must be discarded, the cart is disinfected and restocked
  - CP can be MRSA, C. Diff, etc.
  - If known a contamination cart is used
    - Simple cart
    - Minimal Supplies
- Too many Anesthesiology cart supplies are being discarded
- Before patient comes in for surgery any CP patients are sent to staff via daily email
  - Email is 6am the day before for AAD
    - CNRAs
    - PACU
    - Mott
- Can find out a patient is on CP at anytime
- Cart was dumbed 5 times in one week once
- H&P = History and Physical
- Carts used at places like
  - OR
  - CT, MRI
  - MPU
  - Offsite
- In addition to the list CP is on
  - Careweb
- Test for C. Diff by stool sample
- Infection control contact: Lisa
- Request to Joe for # of items in the carts

Client Meeting (1/31/12)

- Last minute add-ons are not on the CP List email
- Centricity:
  - Charting System for Anesthesiology Department
  - Medical Records
  - Pre-Op Nursing
  - Post - Ope Nursing
  - Documentation for Anesthesiology
- There is a question on Centricity for CP, asking if they are confirmed
  - At the bottom...not always answered
• Careweb is just a document viewer  
  o Brings everything together  
• Lisa (IC) has a staff member go through and create the CP list the day before  
• Need to meet with Lisa  
• Ormis???
• Nurses tend to know patients are are CP before AAD  
  o Need to talk to them first  
• Some way to alert AAD... Icon??  
  o On to the schedule??  
  o Have a little guy in the boxes on centricity

Observations/Interviews with Pre-Op/OR/PACU (2/3/12)

• Premade Questions for Pre-OP  
  o What are your standard procedures for each new patient?  
  o When it comes to CP what do you check and where?  
    ▪ Are you finding out from H&P?  
    ▪ Do you know where they are finding it out from?  
    ▪ Are you finding out from other nurses?  
  o How do you convey that a patient is on CP to other not in the pre-op?  
  o Do you ever run tests from items that may need CP?  
  o What does your training include?
• Notes from Pre-Op  
  o Nurse from Pre-OP  
    ▪ Charge Nurse puts up sign, sets out gowns and leaves a sleep bedside on why the patient is on CP  
  o Charge Nurse from Pre-Op  
    ▪ Clerk pulls up report of patients on CP (they call it ARP) once a day  
    ▪ 3 Copies are printed  
      ▪ 1 for OR Charge Nurse  
      ▪ 1 for PACU Charge Nurse  
      ▪ 1 for Pre-Op Area  
    ▪ Some patients are manually written on the list  
    ▪ The list is very similar to the AAD CP list, same name different order  
      ▪ Doesnt include the manually written ones (Add-ons?)
  ▪ Add-Ons: Clerk Deals with  
    ▪ Checks the Transfer Slip for Precautions  
    ▪ If not on there, they check CareWeb  
    ▪ Add-Ons get wristbands (CP wristbands)
  ▪ Wristbands  
    ▪ Inpatients should have them on  
    ▪ Admitted, outpatients would get them placed on there
• Pre-Made Questions for Anesthesiology  
  o What is your routine before each surgery?  
  o What do you check for?
o When it comes to CP what do you check and where?
  o Do you use the list provided via email?
  o What does your training include?
- Notes from Anesthesiologists
  o Rely on sign/visual queues for CP patients
  o Sign is hung on the patients curtain and the curtain is shut when the patient is on CP
  o If the Anesthesiologists don’t like something, they don’t do it
  o If it’s an add-on during the weekend, they double check
  o Hates the “little cart”
    ▪ Have to leave the OR sometimes
    ▪ Takeaway: really have no incentive to use the contamination cart

Clerk → Day Charge → Nurses → Anesthesiology

- Pre-Made Questions for PACU (Post Anesthesiology Care Unit)
  o What is your routine for each new patient coming to the PACU?
    ▪ What do you check, where and why?
  o When it comes to CP what do you check and where?
  o Several Anes. Techs have mentioned that you will know a patients is on CP and they don’t, do you have any idea why/how this is happening?
  o What does your training include?
- Notes from PACU
  o CareLink is order writing
  o Also use Centricity
  o Steps for receiving a patient
    ▪ PACU Charge Nurse gets a page from OR
    ▪ Patient assigned a spot
    ▪ Nurse gets a page
    ▪ Patient on CP?
      ▪ Centricity
      ▪ Charge Nurse will tell them
      ▪ Gowns
- OR
  o Many rooms don’t have CP sign on door
  o Couple different signs for CP
  o OR Nurses put up the signs from the report (given by the OR Charge Nurse)

Clerk → Pre-Op Charge Nurse → OR Charge Nurse → OR Nurse (Via Report) → Sign

- Clerks
  o ReportTrack
  o Type P
  o Look Patient on Isolate
• General Notes
  o Inpatients on CP
    ▪ Should be in CareLink
    ▪ Banner at the Top
    ▪ Whoever discovers: should put in CareLink
  o Centricity: Charting
  o CareLink: Orders
    ▪ Labs
    ▪ Medicine
• Patient A Example
  o On the CP List
  o Reminded OR
  o Not on CareLink
  o Nurse forgot to mark in CareLink
  o When did mark
    ▪ Didn’t change CareLink’s banner
    ▪ Changed Centricity’s box to say “Iso”

Client Meeting (2/7/12)

• MPU: Minor Procedure Unit
• Add-Ons: 48-24 hrs
• ER < 24 hrs
• A cart was disinfected and restocked
  o Emergency Situation
  o Needed to open the airway
• Floor units
  o Nursing
  o Clericals
• Wants meeting minutes at the end of the project
• How Techs are informed of CP (See below)

MCIT → Sheet → Techs ← Provider (Anesthesiologist, Attending)

Inpatient Unit Interviews/Observations

• MiChart: Scheduling
• Doctor Orders for C. Diff
  o Clerk sees a flag
    ▪ Calls admitting to put it in Carelink and will update it
• MiChart just introduced
  o Several update issues
• A time window patient isn’t in system
  o approx. 1 hr
On average common to have 2 patients a day go down (XRay, MRI, Procedure) then come back up
  o Usually out of the window by then
• Four patients since 2/1, 5 total in the “window” for approx 2 weeks
  o Not in the system
  o Charge Nurse found out from old orders

Client Meeting (2/21/12)

• Deliverable: Future State Map of Communication
• Chrisit Radcliff, Robert Hogg → other MCIT connections
• Compare CP Lists?
• Deliverable: Slides out to everyone
• Joe: Why techs using paper 24 hours old?
• Data we would like to know
  o Number of carts disinfected and restocked
  o Number of C. Diff Period
  o % chance of not finding
  o Cost of Cart
  o Common cause vs. Special cause
  o Cost trade off
    ▪ Based on information provided
• Clarify
  o Add-Ons
• Would like to track
  o Number of carts dumbed
  o Compare the CP lists
    ▪ find the number of slip throughs
    ▪ find the number of total c. diff patients
• Questions for MCIT
  o What is reporttrack pulling from
• Trying to meet with MCIT for 3 weeks, referred to Peter Bow several times
  o Extremely busy

Meeting with Jan Gombert of MCIT

• Centricity only one way
• Asked him several questions he would get back to use one
• His follow up email

Good meeting with you and your team today. I spoke with Peter, and here is what I know (a variety of disconnected notes):

1. The preop nursing assessment does not get sent to CareWeb, only the H&P does.
2. When it gets sent to CareWeb, it is strictly as a text document. There is no "intelligence" about the document that would inform the assessment on, say, the patient history page of CareWeb.
3. As I mentioned today, Centricity doesn't get anything back from CareWeb or CareLink.
4. I believe that the little "ISO" in the Centricity census is triggered by the H&P, and I can double check if this is important.
5. You had mentioned that the late entry of the preop nursing documentation did not trigger anything on the banner display. Again let me know what system the banner is part of, and I can check for you whether it is updated (but I suspect not).
6. I don't know if you are looking for changes to the existing systems to make this information more visible or more transportable, but I think any changes are unlikely. CareLink, in particular, is on it's way out in a couple of years, to be replaced by EPIC, so I suspect it is frozen.
7. You might also contact CareWeb for further information. If you don't have a contact, I can ask.

Who is the manager for this project? Somebody in anesthesiology, or your professor? I am only asking because, depending on the nature (and time) for further investigations, we may need to submit this to the department for approval.

Observations/Interviews with Anesthesia Technicians

- Divided into sections A,B,C,D
- Don’t use the CP List
  - Spam
- 15 mins to prep the room
  - Update drugs
- Knows a patient has C.Diff
  - Door
  - Provider
- Believe they cannot access patient data

Client Meeting 3/20/12

- Went over the expected deliverables:
  - Future state map
  - Current state map
  - Slides to Joe beforehand
  - Notes doc
  - Incident report form
- Cart Dumped
  - Add-On
    - CNRA knew
    - Thought the contamination cart only used in the MPU
Client Meeting 3/27/12

- Use the word provider instead of anesthesiologist
- Pager intervention?
  - Clerk?
- Presentation
  - Possible interventions
- Reminder of Deliverables
APPENDIX C: INCIDENT REPORT FORM FOR FUTURE DATA GATHERING

Adult Anesthesia Department

C. Diff Patient-Anesthesia Cart Incident Report Form

Use this form to report incident details when an anesthesia cart is used instead of a contamination cart on a C. Diff patient, resulting in the loss of the anesthesia cart contents

Date of Incident: ______________________  Time of Incident: ______________________

Location of Incident: ____________________________________________________________

Person(s) Involved: _____________________________________________________________

Type of Patient:
OUTPATIENT   INPATIENT   ADD-ON    EMERGENCY   (circle one)

Was this an emergency situation where the cart was necessary to save the patient’s life?

YES   NO   (circle one)

If yes, was a contamination cart used prior to/during the emergency?

YES   NO   (circle one)

Was a contamination cart available prior to/during the incident?

YES   NO   (circle one)

Provide a description of the cause of this incident (Include as much detail as possible):
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Were any actions taken to prevent incidents like this from happening in the future? (Include as much detail as possible):
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Completed by: ___________________________________________ (print name, title)
______________________________ (signature, date)
APPENDIX D: ISOLATION PRECAUTION WRISTBAND

APPENDIX E: PATIENT TRANSFER SLIP

Patient: __________________________  Age: ____________

Sched Time: ____________  CPI-Visit #: ________

Isolation: □ Pandemic □ Respiratory □ Droplet □ Protective
Contact: VRE / MRSA / ESBL / C. Diff / Acinetobacter

Precautions: □ None □ Suicide □ Fall □ Eloophement □ Chemo □ Seizure

Oxygen: □ NIA □ NC □ Face Mask □ Trach Mask □ Vent

Transport Level: □ High Risk □ Moderate Risk □ Low Risk

Transport Method: □ Stretcher □ Bed □ Crib □ Stroller □ Buggy □ Wheelchair
Shave: ____________

Notified (Name): ________________  Time: ____________  Room/Bed #: ____________

Unit: ____________  OR #: ____________

Prep Slot #: ____________

PLEASE CHECK PATIENT’S ID BRACELET

Printed: 8/18/2011 7:49:33AM
Report Pickup Time: C:\MASSB\5425-5430\MASS_5430.TXT
APPENDIX F: LITERATURE SEARCH – WHAT BUGS US IN THE PERIOPERATIVE SETTING?

Please refer to “What Bugs Us In the Perioperative Setting” on:

Summary: This short blurb details how isolation practices were lacking in St. Patrick Hospital in Missola, Montana, how they developed a reliable communication plan with accountability, and its success.

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APPENDIX G: LITERATURE SEARCH – PERFORMANCE IMPROVEMENT, LOOKING TO FRONT-LINE CLINICIANS, STAFF FOR LASTING IMPROVEMENTS

Please refer to Performance Improvement, Looking to Front-Line Clinicians, Staff for Lasting Improvements by Pat Patterson from OR Manager, Volume 27, Issue 5, Page 1 – 5, May 2011