

Fall 12-15-2017

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Clostridium Difficile: An Investigation on a Medical Surgical Unit

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Introduction

In the United States, health-care associated infections, or HAIs, have become the most prevalent complications for patients. According to a Centers for Disease Control (CDC) study, approximately 1 out of every 25 hospitalized patients develop an HAI, thus affecting nearly 650,000 patients annually. While surgical site infections (SSIs) and those associated with indwelling devices such as urinary catheters have the highest incidences, there has been an increasing trend in infections caused by the bacterium *Clostridium difficile*, comprising about 12% of HAIs reported by hospitals (<https://psnet.ahrq.gov/primers/primer/7/health-care-associated-infections>). This anaerobic, spore-forming, toxin-forming, gram-positive bacillus normally resides in the human body as part of the gut flora; however, the increased use of antibiotics, which drastically alter the typical activity of gut flora, has led to a higher incidence of *C. difficile* infections. When it is, the symptom most commonly seen with these patients is uncomplicated diarrhea which, if left untreated, can quickly progress to pseudomembranous colitis (inflammation of the colon), sepsis, or even death, even with surgical intervention (Walters & Zuckerbraun, 2014). Therefore, early detection and treatment of this condition is critical in decreasing morbidity and mortality for hospitalized patients.

Clinical Leadership Theme

The clinical leadership theme being addressed for this project is risk reduction. Given the factors involved in the development and transmission of *C. difficile* in the hospital setting, a greater emphasis has to be placed on prevention strategies as well as evidence-based practices that have been proven to combat this condition. These not only include efforts such as early screening based on risk stratification and antibiotic stewardship but also an aggressive campaign that reinforces the importance of strict hand hygiene, use of personal protective equipment (PPE)

and meticulous environmental decontamination. To perform this successfully, a collaborative of health care team members and housekeeping staff is needed to tackle this issue with focus and determination.

Given this context, the global aim of this project is to decrease the current *C. difficile* rates on the Medical-Surgical Unit (MSU) at the Veterans Affairs (VA) Medical Center in Sacramento, California. Working closely with the MSU Nurse Manager, Infection Control team, unit staff and housekeeping personnel, the targeted efforts to improve staff compliance and enhance environmental cleaning techniques should, based on current evidence, lead to a reduced incidence of *C. difficile* infections and eliminate the risk of transmission from inanimate surfaces to patients.

Statement of the Problem

Compared to other co-located units within the same hospital building, why does MSU have a higher incidence of *C. difficile* cases for fiscal year 2017 (October 2016-September 2017)?

Project Overview

The intent of this evidence-based project is to examine the increased incidence of *Clostridium difficile* (*C. difficile*) cases on MSU over the past 3 quarters in 2017. The most recent data from the Nursing Dashboard Quality Indicators shows that this unit has had 10 cases compared to four cases on the Transitional Care Unit (TCU) and two cases in the Intensive Care Unit (ICU). According to the Centers for Disease Control (CDC), the national incidence of *C. difficile* infections has decreased 8% in the United States; however, California is one of 13 states in the country that has seen a 9% increase in HO-CDI compared to the national baseline. This

trend reflects a growing concern, especially on units like MSU, that there may be current infection control practices that are not being effectively implemented by the staff.

The goal of this project is to investigate all of the factors that are commonly known to contribute to the transmission of *C. difficile* in the hospital setting. These include, but are not limited to, patient demographics (age, risk factors, co-morbidities, etc.), presenting signs & symptoms, culture techniques & processing, screening & surveillance protocols, infection control measures (hand hygiene, use of personal protective equipment) and housekeeping practices (terminal cleaning procedures). This project will specifically address the nursing and housekeeping components that are within the purview of the clinical nurse leader (CNL) role.

Rationale

It is important to work on this now because there is a need to improve (1) patient safety, (2) staff knowledge and satisfaction, (3) increased compliance with the national benchmark of zero hospital-acquired infections, and (4) compliance with Joint Commission National Patient Safety Goal #7 to prevent infections.

This 12-month project began with a thorough microsystem assessment of MSU, including a review of statistical data related to the VA's Nursing Quality Indicators (located on the Intranet). This investigation revealed a disproportionate number of *C. difficile* cases compared to adjoining units located within the same building. Upon further examination, it was uncovered that this data represented a sharp increase in incidence (previous 2 years' data: 2016=6 cases, 2015=3 cases).

In order to determine the most probable contributing factors to this clinical issue, an in-depth examination was conducted on every *C. difficile* case on MSU. After analyzing all of the patient data and associated elements, the data revealed two distinct trends. First, the incidences

of *C. difficile* occurred primarily in the same rooms. Given that these are isolation rooms and are designed for infection control enhancement, it was still alarming to find this pattern of recurrence. The expectation is that the terminal cleaning process would be heightened for a room that is classified as contaminated. Second, the majority of the infections occurred in succession to one another. As one patient was discharged, the following patient, especially if placed in the same room, also developed the infection. This presents the strong possibility that either the nursing staff were not following strict contact precautions or meticulous hand hygiene, the housekeeping staff did not properly clean the room, or a combination of both. It is this discovery that led me to the presumptive conclusion that nursing and housekeeping have the most impact on this issue and should therefore be the focus of this project.

Methodology

The method of identifying my process improvement began with the microsystem assessment using the greenbook template (see Appendix A: Microsystem Assessment of a Medical-Surgical Unit). The assessment consisted of the 5 P's: purpose, patients, professionals, process, and patterns. When assessing the patient population of the Medical Surgical Unit (MSU), it was discovered that there has been an increase in the number of patients testing positive for *Clostridium difficile*. The MSU receives patients ranging from ages 18-death and provides 24-hour nursing care for a variety of medical conditions. According to the latest quarterly *Clostridium difficile* infection (CDI) report issued by the Veterans Affairs (VA) IPEC Data Management System, the VA Northern California Health Care System (VANCHCS) has a confirmed CDI rate of 13.82 cases per 10,000 bed days of care (regional average is 9.86 cases per 10,000 bed days of care). Within VANCHCS, MSU has had 10 confirmed cases of *Clostridium difficile* thus far for calendar year 2017 (other inpatient units have had 2-4 cases

year-to-date). There are numerous strategies and topics of education required to help MSU decrease these infection rates. After reviewing the current data and speaking with the nurse manager and infection control staff, the focus of my improvement project will be increased compliance with patient screening, prevention strategies and disinfection protocols that have been proven to reduce the transmission of *C. difficile*.

Data Source/Literature Review

(see Appendix B: *Clostridium Difficile* (CDI) Cases for MSU, TCU and ICU (FY2016-2017))

In fiscal year 2016 (October 2015-September 2016), the aggregate number of *C. difficile* cases on MSU was six patients. During the first quarter of 2017 (October-December 2016), there were four confirmed cases, followed by three cases in the second quarter (January-March 2017), and three cases in the third quarter (April-June 2017) (n=10). By comparison, the Intensive Care Unit (ICU) had one case (1st quarter), two cases (2nd quarter), and one case (3rd quarter) (n=4) and the Transitional Care Unit (TCU) had one case (1st quarter), one case (2nd quarter), and zero cases (3rd quarter) (n=2). While all units have an appreciable number of cases per CDC standards, MSU has an unusually high rate by comparison. Given that all three units are located in the same building, a closer examination of the reasons for this statistical difference is warranted.

Concerning nursing management of *C. difficile* infection, the three major elements that are known to contribute to the transmission of *C. difficile* amongst hospitalized patients: inappropriate hand hygiene, lack of contact isolation and inadequate environmental cleaning (Aziz, 2013; Mitchell, 2014; Walters & Zuckerbraun, 2014). Because nursing staff have the most frequent contact with patients, the literature purports that infection control practices and room decontamination play a central role in the transfer of *C. difficile* spores from an infected patient

to a non-infected patient who is susceptible. Multiple studies have demonstrated that these spores can persist from days to years and, oftentimes, surfaces in hospital settings are not properly disinfected during terminal cleaning (Mitchell, 2014). Furthermore, the evidence suggests that poor adherence to hand hygiene and contact isolation precautions is also a significant contributor to the unintentional transmission of this organism among hospitalized patients (Aziz, 2013).

Timeline

Starting February 2017, a thorough analysis of each *C. difficile* case was conducted. The following patient information was gathered: room number, gender, age, admission date, event date (tested positive for *C. difficile*), gastrointestinal symptoms, presence of fever, associated risk factors (e.g. co-morbidities, antibiotic therapy, concurrent infections, nutritional/mobility status), occurrences of loose bowel movements, and which antibiotic was prescribed for treatment. For the following 2 weeks, a review of the institution's *C. difficile* algorithm and standard operating procedure was performed. In addition, an exhaustive literature review utilizing CINAHL, PubMed and Cochrane databases was conducted using the keyword "*Clostridium difficile*." Finally, comprehensive data on *C. difficile* incidence was extracted from the 2014 National and State Healthcare Associated Infections (NHSN) Progress Report, an annual summary published by the CDC.

In March 2017, a fishbone diagram (see Appendix C: Fishbone Diagram for *Clostridium Difficile* Project) was drafted in collaboration with the MSU nurse manager about all potential causes that could have contributed to the increased incidence of *C. difficile* (see Appendix 1). This scientific tool was chosen because of its inherent thought-provoking process that examines the major categories of causation and its ability to "...stimulate the formation of hunches worth empirically testing, using plan-do-study-act (PDSA) cycles (Batalden, 2007).

For the next 3 months (April-June), ongoing surveillance was performed to track the incidence of *C. difficile*. During that time, an additional three cases were confirmed and reviewed. At this time, a pattern of room assignments emerged as a recurring issue. A meeting was held between the principal investigator (CNL student), MSU nurse manager and housekeeping supervisors to discuss current cleaning policies related to *C. difficile*. Both parties acknowledged their respective responsibilities and agreed to reinforce infection control practices and cleaning procedures with staff.

From July to September, there were no new reported cases of *C. difficile* for MSU. However, during the first 2 weeks of October, there have been two cases confirmed and reported. Coincidentally, the patients resided in the same room and bed, one was discharged and the other was admitted shortly afterwards the same day. These events have now prompted a 2-month pilot project of instituting a surveillance sheet (see Appendix D: MSU *Clostridium Difficile* Monitoring Sheet) for both nursing and housekeeping staff. The focus of this initiative is twofold: (1) nursing staff are required to document that the appropriate infection control precautions are implemented for active or rule out *C. difficile* patients, and (2) housekeeping staff are required to document their cleaning process as well as to have a nursing staff double check that all relevant items were completed. The sheet will then be signed by both staff members and turned into the MSU nurse manager. This temporary system of accountability will help to identify the most likely source of contamination and/or transmission for patients who develop this condition. The findings will then be analyzed by the CNL student for trends and solution discussions with the MSU nurse manager on future prevention strategies.

Expected Results

By working on the process, we expect decreased infection rates of Clostridium difficile through the following mechanisms: (1) early identification of patients at high-risk for contracting Clostridium difficile (2) prevention strategies to reduce the risk of transmission, and (3) collaborative efforts between nursing and housekeeping staff to ensure proper disinfection of rooms contaminated with Clostridium difficile.

Nursing Relevance

The immediate relevance of this project is to engage frontline nursing staff in helping to decrease the Clostridium difficile infection rates on MSU. This will be achieved through a partnership between the Nursing and Housekeeping departments in ensuring that environmental cleaning is performed according to the procedures set forth by the national VA Environmental Management Office and practices sanctioned by the CDC. Managing this process to ensure effectiveness and success will be based on Kotter's change theory (1996). This framework provides action steps that any organization can use to implement a new initiative or practice with target efforts and measurable outcomes. For this project, Kotter's theory will apply to the key stakeholders involved in the change process: staff nurses, nursing assistants, housekeeping personnel, nurse manager and housekeeping supervisor.

The initial four steps in Kotter's theory are critical in providing the stakeholders with the need for the change and the way in which it will be facilitated. First, the CNL has to establish a sense of urgency regarding the issue. This is accomplished primarily through the presentation of Clostridium difficile case rates, not only on the unit level but also through comparison with other facilities. Besides the obvious impact on patient outcomes, this focus on quantitative data will provide a basis for measuring progress related to the change. Second, a guiding coalition is

created to drive the change. For this project, the team will consist of the nurse manager, housekeeping supervisor, Infection Control department, staff nurses, nursing assistants and housekeeping personnel. Third, the vision and strategy for the change is developed through collaborative input from all involved parties. Nursing and Housekeeping meet to discuss the strategies that would work best to ensure adherence to cleaning guidelines and heightened surveillance of infection control practices. The fourth step involves communicating this change vision to all staff members impacted by the change. This is most effectively done through staff meetings, shift huddles, information boards, email correspondence and constant reinforcement by unit leaders such as the nurse manager, charge nurse and housekeeping supervisors.

The remaining four steps in Kotter's theory are the primary drivers for triggering action and involvement. The fifth step is identified as empowering broad-based action. In this case, the team would design a tracking tool to monitor cleaning activity for rooms that have been contaminated with *Clostridium difficile*. Once approved, the tool would be implemented for a set time frame (usually 30-60 days) to conduct a small test change under a continuous improvement model such as the PDSA (Plan-Do-Study-Act) cycle (King & Gerard, 2016). The sixth step, generating short-term wins, will follow after the PDSA cycle and will provide raw data regarding the success of the change. At this point, the team should see noticeable improvement in *Clostridium difficile* rates if the change is being executed per policy. As the positive change occurs, the process will easily move into the seventh step, consolidating gains and producing more change. As data is collected and presented to the stakeholders, their efforts are validated and recognized. This will typically inspire staff members to continue the same level of diligence and commitment to the change. The eighth, and final, step in Kotter's theory aims to anchor this new approach in practice as a permanent change in the culture. Encouragement and support from

both nursing and housekeeping leadership will be instrumental in sustaining this change and keeping frontline staff vigilant and involved in the process.

Summary

The objectives for this CNL Internship Project were to: (1) identify the strongest contributors to the rising trend of *Clostridium difficile* cases on this medical-surgical unit, (2) review all *Clostridium difficile* cases for common characteristics, patterns and correlational factors that are of significant relevance, (3) examine current unit practices and their adherence to established policies and regulations, and (4) provide recommendations for enhancing existing strategies used to prevent transmission of *Clostridium difficile* between patients. The population examined for this project included male adults between the ages of 56-83 who were being treated for other conditions on a medical-surgical unit. The methods used to address the increasing number of *Clostridium difficile* infections included both a joint venture between nursing and housekeeping staff to ensure proper terminal cleaning and a renewed emphasis on strict contact precautions, meticulous hand hygiene and environmental surveillance. For this project, a *Clostridium difficile* monitoring sheet (see Appendix D) was designed for staff to use as a reminder to implement the appropriate precautions and cleaning procedures. The data collected for this project will be the monitoring sheets that will be turned in by the staff as well as the ongoing surveillance for any active cases of *Clostridium difficile*. The project will be launched starting December 2017 and will continue for 6 months in order to allow time for the impact of these changes. The plan will be sustained under the unit's Infection Control Officer working in conjunction with the Nurse Manager to ensure continued compliance with the recommended interventions.

Conclusion

This emergent issue of increased Clostridium difficile rates on MSU has raised significant concerns regarding infection control practices and environmental cleaning procedures. This project was aimed at identifying the contributing factors associated with nursing and housekeeping staff and designing a collaborative tool for monitoring cleaning processes. By actively engaging both of these stakeholders in the process, the CNL student was able to lead the team and facilitate a change that will aid in decreasing the Clostridium difficile rates on MSU. Through such an initiative, this preventable in-hospital complication can be effectively addressed to reduce the risk of transmission to patients.

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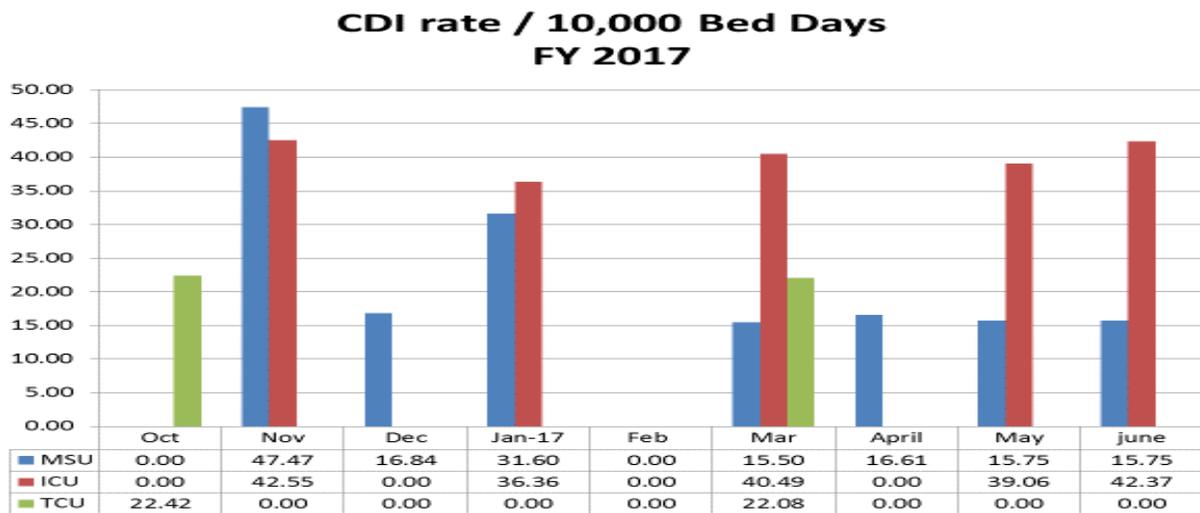
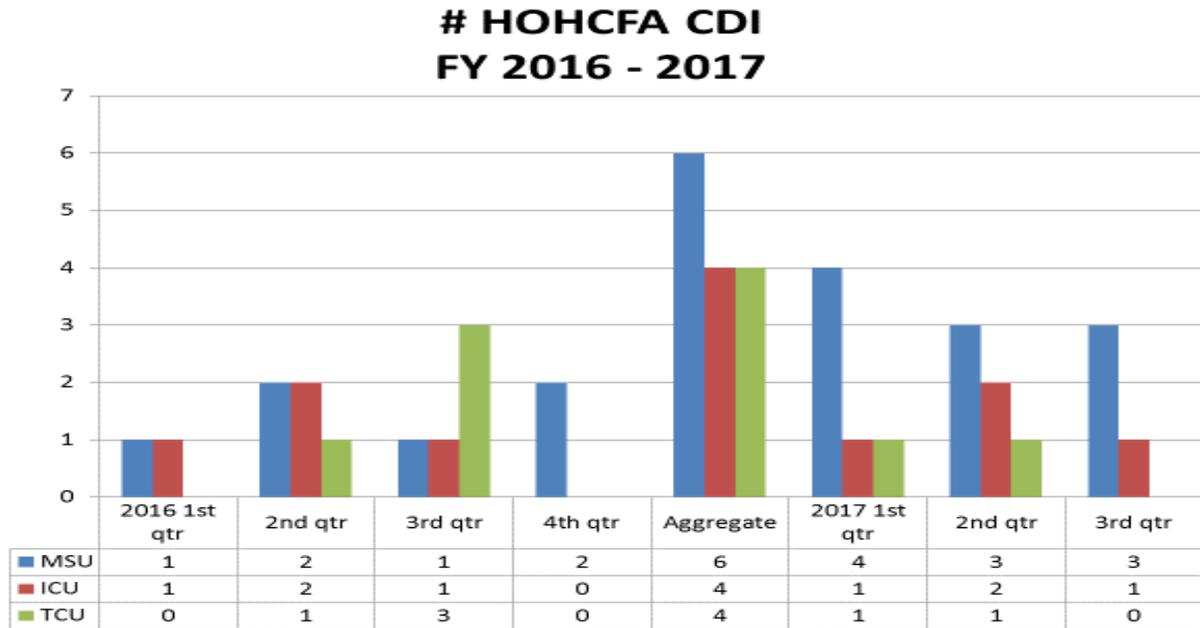
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Appendix A: Microsystem Assessment of a Medical-Surgical Unit

Inpatient Unit Profile							
A. Purpose: Why does your unit exist? Provides medical/nursing care for patients with various medical-surgical conditions							
Medical-Surgical Unit (MSU), 3 rd floor, Bldg 700		Site Contact: RN Frias, MSU Nurse Manager			Date: March 20, 2017		
Administrative Director: Mr. Stockwell		Nurse Director: Dr. Bucher			Medical Director: Dr. Cahill		
B. Know Your Patients: Take a close look into your unit, create a "high-level" picture of the PATIENT POPULATION that you serve. Who are they? What resources do they use? How do the patients view the care they receive?							
Est. Age Distribution of Pts:		%		List Your Top 10 Diagnoses/Conditions		Patient Satisfaction Scores	
19-50 years		30		1. CHF		6. AKI	
51-65 years		40		2. COPD		7. ETOH withdrawal	
66-75 years		20		3. Pneumonia		8. AMS	
76+ years		10		4. GI Bleed		9. DKA	
5. Hyperkalemia				10. CKD			
% Females		5		Point of Entry		% Always	
Living Situation		%		Admissions		Nurses	
Married		85		Clinic		Doctors	
Domestic Partner		5		ED		Environment	
Live Alone		5		Transfer		Pain	
Live with Others		10		Discharge Disposition		Discharge	
Skilled Nursing Facility		5		Home		% Yes	
Nursing Home		2		Home with Visiting Nurse		% Excellent	
Homeless		1		Skilled Nursing Facility		Overall	
Patient Type		LOS avg.		Range		Pt Population Census: Do these numbers change by season? (Y/N)	
Medical		3.2		3-4		Pt Census by Hour	
Surgical		3.7		3-5		Pt Census by Day	
Mortality Rate						Pt Census by Week	
						Pt Census by Year	
						30 Day Readmit Rate	
						Our patients in Other Units	
						Off Service Patients on Our Unit	
						Frequency of Inability to Admit Pt	
						*Complete "Through the Eyes of Your Patient", pg 8	
C. Know Your Professionals: Use the following template to create a comprehensive picture of your unit. Who does what and when? Is the right person doing the right activity? Are roles being optimized? Are all roles who contribute to the patient experience listed?							
Current Staff		Day FTEs		Evening FTEs		Night FTEs	
MD Total		10		3		3	
Hospitalists Total		2		1		1	
Unit Leader Total		1		0		0	
CNSs Total		0		0		0	
RNs Total		15		14		12	
LPNs Total		0		0		0	
CNAs Total		6		4		5	
Residents Total		8		2		2	
Technicians Total		1		1		1	
Secretaries Total		1		1		1	
Clinical Resource Coord.		0		0		0	
Social Worker		3		0		0	
Health Service Assts.		0		0		0	
Ancillary Staff		0		0		0	
Over-Time by Role		0		0		0	
Admitting Medical Service		Internal Medicine		10		5	
		Hematology/Oncology		5		5	
		Pulmonary		0		0	
		Family Practice		0		0	
		ICU		5		75	
		Other: Medicine		75			
						Supporting Diagnostic Departments	
						Radiology, Laboratory, Vascular Clinic	
Do you use Per Diems? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> NO							
Do you use Travelers? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> NO							
Do you use On-Call Staff? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> NO							
Do you use a Float Pool? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> NO							
						*Each staff member should complete the Personal Skills Assessment and "The Activity Survey", pgs 10 - 12	
D. Know Your Processes: How do things get done in the microsystem? Who does what? What are the step-by-step processes? How long does the care process take? Where are the delays? What are the "between" microsystems hand-offs?							
1. Create flow charts of routine processes.		Do you use/initiate any of the following?		Capacity		# Rooms	
						16	
						# Beds _24_	

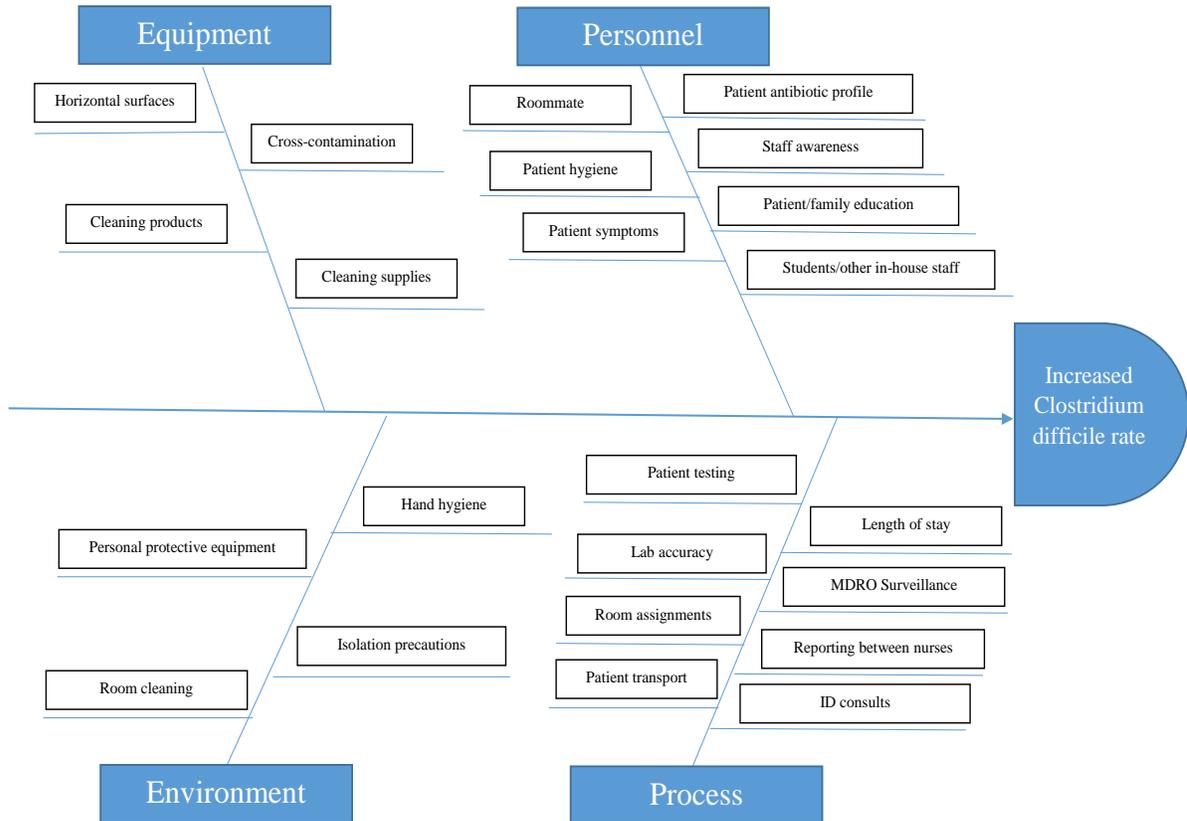
a) Overall admission and treatment process b) Admit to Inpatient Unit c) Usual Inpatient care d) Change of shift process e) Discharge process f) Transfer to another facility process g) Medication Administration h) Adverse event	Check all that apply <input type="checkbox"/> Standing Orders/Critical Pathways <input checked="" type="checkbox"/> Rapid Response Team <input checked="" type="checkbox"/> Bed Management Rounds <input checked="" type="checkbox"/> Multidisciplinary/with Family Rounds <input type="checkbox"/> Midnight Rounds <input checked="" type="checkbox"/> Preceptor/Charge Role <input checked="" type="checkbox"/> Discharge Goals	<table border="1"> <tr> <td data-bbox="909 189 1027 239"></td> <td data-bbox="1027 189 1175 239"></td> <td data-bbox="1175 189 1531 239"></td> </tr> <tr> <td colspan="3" data-bbox="909 239 1531 310"># Turnovers/Bed/Year _____</td> </tr> <tr> <td colspan="3" data-bbox="909 310 1531 464">Linking Microsystems ED, ICU, Telemetry, CLC</td> </tr> </table>				# Turnovers/Bed/Year _____			Linking Microsystems ED, ICU, Telemetry, CLC		
# Turnovers/Bed/Year _____											
Linking Microsystems ED, ICU, Telemetry, CLC											
2. Complete the Core and Supporting Process Assessment Tool, pg 14											
E. Know Your Patterns: What patterns are present but not acknowledged in your microsystem? What is the leadership and social pattern? How often does the microsystem meet to discuss patient care? Are patients and families involved? What are your results and outcomes?											
<ul style="list-style-type: none"> Does every member of the unit meet regularly as a team? Huddle boards 	<ul style="list-style-type: none"> Do the members of the unit regularly review and discuss safety and reliability issues? Huddle boards 	<ul style="list-style-type: none"> What have you successfully changed? What are you most proud of? 5 P's What is your financial picture? Federal 									
<ul style="list-style-type: none"> What is the most significant pattern of variation? Admissions 	*Complete "Metrics that Matter", pgs 20 & 21										

Appendix B: Clostridium Difficile (CDI) Cases for MSU, TCU and ICU (FY 2016-2017)



Appendix C: Fishbone Diagram for *Clostridium Difficile* Project

Fishbone Diagram for *Clostridium Difficile* Project



Appendix D: MSU *Clostridium difficile* Monitoring Sheet

VA Northern California Health Care System (VANCHCS)
 MSU *Clostridium difficile* Monitoring Sheet

Date: _____ Room Number: _____

Nursing Staff: _____ Housekeeping Staff: _____

General Information

1. This monitoring process will be a collaborative between the Nursing and Housekeeping staff to eliminate the transmission risk of *Clostridium difficile* to all patients.
2. Meticulous hand hygiene and wearing of personal protective equipment by all staff are the cornerstones of effective infection prevention measures.
3. All equipment and horizontal surfaces in *Clostridium difficile* patients' room must be cleaned and disinfected with bleach wipes once a day.
4. If equipment is needed from this room STAT, it must undergo a 2-step process:
 - a. First, clean the equipment with one bleach wipe
 - b. Second, disinfect the equipment with a second bleach wipe
5. Only one bleach wipe is needed if the equipment will go into the dirty utility room.

Contact time for Dispatch bleach wipe (per manufacturer): 3 minutes

Contact Precautions Checklist for R/O or active *Clostridium difficile* patients:

- Green "Contact Precautions" sign on the door
- Ante room (isolation room) or personal protection station (non-isolation room) has:
 - Gowns
 - Gloves
 - Dispatch bleach wipes (container)
- Disposable equipment in room i.e. yellow stethoscope, single-use BP cuff, etc.
- Dedicated equipment e.g. vital signs machine, emergency supplies, etc.

Terminal Cleaning Checklist for *Clostridium difficile* Rooms:

NOTE: Use bleach solution to clean all surfaces. Allow to dry for 3 minutes. After, spray with a hydrogen peroxide solution and let sit in room for 30 minutes.

- Bed (mattress, side rails, bed frame, pillows)
- Vital signs machine
- IV poles/pumps
- Wall unit (suction canisters, oxygen regulator, suction regulator, etc.)
- Night stand/over bed table
- Other equipment brought into the room e.g. SCD machine, wound vac, bedside commode, etc.

After terminal cleaning has been completed by Housekeeping and crosschecked with Nursing staff, please turn this form into the Nurse Manager's mailbox.