BACK TO THE BASICS WITH ENVIRONMENTAL HYGIENE

A Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

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Lynchburg, VA

September 2018
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ABSTRACT

Environmental hygiene is fundamental in preventing the transmission of pathogens that can cause health care-associated infections (HAIs). Inanimate surfaces within the patient’s environment are defined as high-touch surfaces and include areas such as bedrails, tray tables, call lights, telephones, any equipment that is attached to the patient, and the computer on wheels. HAIs develop during hospitalization and occur within 48 to 72 hours of admission or within 10 days after hospital discharge (CDC, 2014; Collins, 2008). HAIs increase the morbidity, mortality, and hospital expenditures; and critically ill patients are at greater risk for HAIs because of their compromised immune systems, prolonged indwelling medical devices, multiple invasive procedures, and antibiotic use (CDC, 2014; Collins, 2008). A 26-bed cardiac intensive care unit implemented a high-touch surface cleaning protocol in order to decrease HAI rates and improve overall environmental hygiene within the patient’s immediate surroundings. The pre- and post-survey results determined that the protocol was easily implemented into daily practice and the intervention improved environmental hygiene within the patient’s immediate environment.

*Keywords:* environmental hygiene, high-touch surface cleaning, reducing hospital acquired infections
Dedication

I would like to dedicate this manuscript and my work on this project to my mother. She has been battling cancer since December of 2017. She has shown me that strength, courage, faith, and prayer can help one overcome any adversity. She is one of the strongest and most faithful women I know. Thank you, Mom, for your support, love, and courage. I love you.
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List of Abbreviations

Catheter-Associated Urinary Tract Infection (CAUTI)

Clostridium difficile (C. diff)

Center for Disease Control and Prevention (CDC)

Colony-Forming Unit (CFU)

Chlorhexidine gluconate (CHG)

Central Line-Associated Blood Stream Infections (CLABSI)

Computer on Wheels (COW)

Cardiovascular Intensive Care Unit (CVICU)

Daily Environmental Hygiene Checklist (DEHC)

Health Care Associated Infection (HAI)

Methicillin-resistant Staphylococcus aureus (MRSA)

Portable medical equipment (PME)

Vancomycin resistant enterococcus (VRE)
SECTION ONE: INTRODUCTION

Environment hygiene is a fundamental factor in preventing health care-associated infections (HAIs). Inanimate surfaces within the patient’s environment are defined as high-touch surfaces. Examples of high-touch surfaces include bed rails, tray tables, supply carts, and computers on wheels (COWs; Jinadatha et al, 2017). These areas are highly susceptible to bacterial contamination with pathogens that can be transmitted to the patient by the hands of health care workers and visitors. These pathogens can remain viable on inanimate surfaces for hours to months (Allen, Hall, Halton, & Graves, 2018). According to Jinadatha et al., (2017), 40% of high-touch surfaces are inadequately disinfected, and 50% of surfaces were missed completely during cleaning. Improving environmental hygiene with high-touch surface cleaning is an important strategy to reduce the transmission of pathogens.

Background

HAIs are infections that develop during hospitalization. These infections are not present on admission nor incubating upon the patient’s admission to the hospital (Centers for Disease Control and Prevention [CDC], 2014; Collins, 2008). HAIs occur within 48 to 72 hours after admission or within 10 days after hospital discharge (CDC, 2014; Collins, 2008). The most common pathogens are related to invasive devices or surgical procedures. In the intensive care unit, common sources of HAIs include catheter-associated urinary tract infections (CAUTIs), ventilator-associated events, and central line-associated bloodstream infections (CLABSI); however, HAIs are not limited to these sources of entry (Collins, 2008). According to the CDC (2014), the organisms that are responsible for many HAIs include *Acinetobacter*, *Clostridium difficile* (C. diff), *Enterobacteriaceae*, *Klebsiella*, Methicillin-resistant *Staphylococcus aureus* (MRSA), *Norovirus*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Tuberculosis*,
Vancomycin-resistant Staphylococcus aureus, and Vancomycin-resistant Enterococci (VRE). These unanticipated infections result in significant morbidity and mortality and prolonged length of stay and generate added medical cost (CDC, 2014; Collins, 2008). An estimated 721,800 HAIs occurred in the United States in 2011; 75,000 of those HAIs led to death (Han et al., 2015).

Critically ill patients, including patients with compromised immune systems, prolonged indwelling medical devices, multiple invasive procedures, and antibiotic use, are at a greater risk for HAIs (CDC, 2014; Collins, 2008). The overuse of antibiotics contributes to the growth of antibiotic-resistant organisms that can be associated with HAIs, and these organisms are difficult and costly to treat. The hospital environment is predisposed to harboring potential pathogens given the volume of sick patients, the pace and acuity of patient care activities, and the complexity of hospital surfaces and medical equipment (Doll, Stevens, & Bearman, 2018). High-touch surfaces and portable medical equipment (PME) have been shown to harbor an average of 82.1 colony-forming units (CFU) of bacteria on a given surface (Jinadatha et al., 2017). CFU is the estimated unit of measurement for bacteria that is produced in one agar sample (Brugger et al., 2012).

The benchmark goal for HAIs is zero (CDC, 2014). In the past fiscal year, September 2017 to September 2018, a critical care unit within the acute care setting, had a total of 16 HAIs. According to the CDC (2007), the estimated annual medical cost for HAIs in U.S. hospitals ranges from 28.4 billion to 33.8 billion dollars.

**Defining high-touch surface area cleaning.** The CDC has recommended an evidence-based daily high-touch surface cleaning protocol that demonstrates effectiveness in reducing vectors for HAI causing pathogens. Contamination of high-touch environmental surfaces increases the risk for transmission of pathogens in the acute care setting (Han et al., 2015).
Studies have confirmed an average of 120 percent increased risk for patients to become colonized or infected with MRSA, VRE, C. diff, *Pseudomonas*, or *Acinetobacter* because of transmission from contaminated surfaces to the hands of health care workers, visitors, and the patient (Carling, 2016). A study of keyboard cleaning in an ICU revealed a 60-fold reduction in bacterial burden with chlorohexidine (CHG) cleaning (Jones et al., 2015). When performed as recommended by previous studies and governing agencies, high-touch surface area cleaning can significantly decrease the overall rates of HAIs by decreasing the bioburden on inanimate surfaces. According to Wong et al. (2018), implementing a high-touch surface cleaning protocol decreased surface contamination from 47% to 20% of surface contamination and decreased the number of HAIs to nine percent in a medical intensive care unit.

**Problem Statement**

HAIs increase the morbidity, mortality, and health care expenditures; the cardiac intensive care unit had a rate of 16 HAIs in the fiscal year 2018. Prior to the commencement of this study, standard practice in the cardiac intensive care unit did not include daily high-touch surface cleaning. The high-touch surface cleaning protocol can improve environmental hygiene in the acute care setting and assist with meeting the benchmark goal of zero.

**Purpose of the Project**

The purpose of this project was to implement an evidence-based practice change for improving environmental hygiene in the cardiac intensive care unit by incorporating the nursing staff in performing cleaning of high-touch surface areas within the patient’s inanimate environment. This intervention was expected to decrease the risk for transmission of pathogens that cause HAIs, thus improving morbidity, mortality, and health care expenditures.
Clinical Question

For patients admitted to the cardiac intensive care unit, will the use of a nurse-performed high-touch surface area cleaning protocol reduce HAIs and improve environmental hygiene within the acute care setting?

SECTION TWO: LITERATURE REVIEW

Disinfecting environmental surfaces reduces the transmission of pathogens that can lead to HAIs (CDC, 2003). Cleaning surfaces in the health care setting improves environmental hygiene and facilitates infection prevention. The hospital environment is predisposed to harbor pathogens, including drug-resistant pathogens that are complex to treat (Doll et al., 2018). Recent attention to the quality of environmental cleaning in hospitals has revealed that cleaning efforts are often insufficient, leaving microbial contamination and bioburden present on surfaces. Outbreak reports have provided evidence that patients are infected by organisms that have been acquired from the inanimate environment and transmitted to the hands of health care workers, visitors, and the patient (Doll et al., 2018). Cleaning high-touch surface areas within the patient’s environment is one practice that can significantly reduce the transmission of direct surface pathogens (CDC, 2003).

Defining Health Care Associated Infections

HAIs are defined as infections that occur within 48 to 72 hours after admission or within 10 days after hospital discharge (CDC, 2014; Collins, 2008). There are multiple types of HAIs; for the purpose of this project, the umbrella term HAIs included CAUTIs, CLABSIs, and MRSA.

Identifying HAIs for surveillance must meet National Healthcare Safety Network criteria (CDC, 2018). One criterion defines the infection window period as the “seven days during which all site-specific infection criteria must be met” (CDC, 2018, pp. 2–3). The infection
window period includes the first positive diagnostic test that is used to meet the site-specific infection criteria, three calendar days before the event and three calendar days after the event, or, in the absence of a diagnostic test, the date of the first documented localized sign or symptom that is used as a site-specific criterion (CDC, 2018). Diagnostic testing may include laboratory specimen collection, imaging testing, procedure, or exam (CDC, 2018).

The date of event is the first element used to meet a site-specific infection criterion that occurs for the first time within the seven-day infection window (CDC, 2018). The date of event is used to determine if an event is an HAI or an infection that was present on admission, the location of attribution, device association, and day one of the repeat infection timeframe (CDC, 2018). The repeat infection timeframe is a 14-day window in which there are no new infections of the same type reported (CDC, 2018). The location of attribution is the inpatient location where the patient was assigned on the date of the event (CDC, 2018). The CVICU’s HAIs are measured per event. The rates are measured per 1,000 patient days per department, per month, per fiscal year.

**Defining High-Touch Surfaces**

High-touch surfaces are defined as areas within the patient’s inanimate environment that are frequently touched during patient care activities (CDC, 2003; Jinadatha et al., 2017). *PME* is a term used to describe devices such as the COW, vital sign monitor, IV, and other equipment that is not considered as a one-patient use item (Jinadatha et al., 2017). The high-touch surfaces identified from the literature review include the patient, bedrails, bed surfaces, bedside table, tray table, COW and scanner, IV pump, and the handheld call light.
Search Strategy

The literature search to locate evidence relevant to high-touch surface area cleaning and environmental cleanliness in the reduction of HAIs was conducted through the Liberty University library databases including CINAHL Plus with full text, Journals@Ovid, PubMed, Ebsco, and Sage Research Methods. The search was limited to full-text articles. A limitation on the published date was not included in order to obtain guidelines and historical data. The following keywords and Boolean search phrases were implemented for the literature search: cleaning practices, high-touch surface cleaning, environmental cleanliness in health care, and reducing HAIs with environmental cleanliness.

The journal articles were reviewed and critiqued using the PICO question and tools from the Iowa Model of Evidence-Based Practice. Permission for use of the Iowa Model was obtained and is provided in Appendix C. Articles used for support of the project included those that supported a reduction in HAIs through high-touch surface cleaning by health care workers such as nurses and environmental service workers. Exclusion criteria for dismissing articles from analysis included settings other than the acute care setting, subjects that did not pertain to the main PICO question, duplicate publications, and lastly, languages other than English. Guidelines from the CDC for Environmental Infection Control in Healthcare Facilities was critiqued using the Appraisal of Guidelines for Research and Evaluation II tool and was found significant for this project.

Critical Appraisal

There were 12 journal articles and one set of guidelines identified from the search. Each article was critically appraised by differentiating strengths, weaknesses, limitations, and quality of the research. The articles utilized included one level I article, which is a set of guidelines,
four level III articles, five level IV articles, three level V articles, and one level VI article. The Iowa Model of Evidence-Based Practice and Melnyk’s level of evidence was used to critique the articles. The method of the studies included in the literature review include randomized and non-randomized controlled trials, an observational study, a cohort study, a blind study, and clinical guidelines.

The utilized research included studies that demonstrate a strong level of evidence, including in-depth literature reviews, randomized control trials, non-randomized control trials, and quasi-experimental designs. The utilized research demonstrates a strong level of evidence for identifying high-touch surfaces that confer the greatest risk for pathogens, developing a standard threshold for defining environmental cleanliness, and providing cleaning strategies and cleaning bundles. The literature provides strong evidence supporting improved environmental cleanliness and the reduction of HAI-producing pathogens found on high-touch surfaces. The evidence demonstrates a reduction in HAIs by decreasing the number of pathogens that can be transmitted from high-touch surfaces to the patient. A summary of the limitations of the studies that were utilized include small sample sizes, generalizability, risk of bias, and limited use of methods to consider confounding variables. A table of evidence is provided in Appendix A.

**Synthesis of Research**

Monitoring and maintaining environmental cleanliness are imperative to patient safety. According to the CDC (2003), the number of microorganisms present on environmental surfaces is influenced by the number of people in the environment, amount of activity, moisture, and presence of material capable of supporting microbial growth. The CDC (2003) has developed environmental guidelines and strategies for surveillance, prevention, and control of HAIs, antimicrobial resistance, and related events in health care settings in the United States. Multiple
studies have determined that contaminated surfaces are a reservoir for pathogens. The most common pathogens found on hospital surfaces include MRSA, VRE, C. diff, *Pseudomonas*, and *Acinetobacter* (Carling, 2016; CDC, 2014). The transmission of pathogens through direct patient contact with the environment or indirectly through contamination of the health care workers’ hands and gloves can pose a great risk for the development of bacterial infections (Han et al., 2015). Han et al. (2015) conducted a review to provide a systematic overview on environmental cleaning of hospital room surfaces to prevent HAIs. The review included 76 primary studies and four systematic reviews. Forty-nine studies examined cleaning methods, 14 evaluated monitoring strategies, and 17 addressed challenges or facilitators to implementation; the most commonly assessed outcome of the studies was surface contamination. Outcomes reported in the 76 primary studies were broadly categorized as surface contamination, patient colonization, or infection rate. Surface contamination included bacterial burden, number of surfaces cleaned, and positive microbiological cultures (Han et al., 2015). Patient colonization included new VRE and MRSA colonization, and the infection rate was defined as per 1,000 patient days. The review found the most commonly reported pathogens found on surfaces were C. diff (*n* = 40), MRSA (*n* = 30), and VRE (*n* = 30; Han et al., 2015). Environmental cleaning is fundamental in infection prevention in health care settings. Multiple studies demonstrate that high-touch surface cleaning can reduce surface pathogens and reduce the density of HAIs (Allen et al., 2018; Casini et al., 2018; Lei, Jones, & Li, 2017; Watson, Watson, & Torress-Cook, 2016).

**High-touch surface cleaning.** The CDC guidelines recommend cleaning of high-touch surface areas with disinfectant solutions such as an isopropyl alcohol solution wipe or a hypochlorite solution wipe in order to decrease the transmission of pathogens that can cause HAIs (CDC, 2003). Lei et al. (2017) explored cleaning strategies and the control of MRSA
transmission in the ICU patient. The study found that cleaning high-touch surfaces before the first patient care activities of the day was more effective in reducing high-touch surface pathogens than whole-room cleaning by decreasing MRSA exposure by 57%. To visualize the effectiveness of high-touch surface cleaning, Lei et al. (2017) used a mathematical analysis to determine that increasing the cleaning frequency of high-touch surfaces by six times per hour would result in a 72% reduction in MRSA exposure. Watson et al. (2016) also evaluated the impact of implementing a hospital-wide environmental cleaning protocol on MRSA rates, and the study found that high-touch surface cleaning reduced rates of MRSA transmission by 3.04 per 1,000 patient days to 0.11 per 1,000 patient days (Watson et al., 2016). Jones et al. (2015) determined the use of chlorhexidine gluconate two percent in isopropyl alcohol spray on keyboards demonstrated a sustained and significant reduction in bacterial CFUs compared with chlorine dioxide-based products with a 60-fold reduction in bacterial burden at four to six hours and a 16-fold reduction after 24 hours of use with CHG. Wong et al. (2018) performed a training program for the use of disposable wipes for cleaning bedside areas, areas at high risk of contamination, paperwork areas, and public areas. Fifteen high-touch surfaces were selected for evaluation by using adenosine triphosphate (ATP) bioluminescence testing. The study determined that the use of disposable cleaning wipes was affective in decreasing unclean surface areas from 47% to 20%. The density of HAIs was 32% at baseline and 14% during the intervention period. According to Wong et al. (2018), the HAI density did not decrease after the intervention period; however, there was a reduction of nine percent in the late period with continued use of the intervention.

**Determining high-touch surfaces.** Jinadatha et al. (2017) investigated the patterns and sequence of contact events among health care workers, patient surfaces, and medical equipment
in the patient’s environment. Health care workers included nurses, physicians, allied health personnel, housekeepers, and food service workers (Jinadath et al., 2017). A patient encounter was initiated when the health care worker entered the patient room and completed when the health care worker exited the room. An observation was defined as a single touch in an encounter; a sequence was defined as a string of observations during an encounter (Jinadath et al., 2017). An example of a string of observations in one encounter included “patient to COW then to bedrail and IV pump” (Jinadath et al., 2017, p. 2). A touch was defined as any contact event between a health care worker and patient, surface, or equipment; each touch was recorded in real time along with the sequence of the touches. Observations were not conducted in the bathroom for privacy. Observations were recorded sequentially throughout the day on a template designed to document the sequence of touches throughout each patient interaction. Surfaces/items that accumulated five or more touches over 24 hours were included in the sequence analysis (Jinadath et al., 2017). Data were collected from 144 hours of observation with 274 sequences. The sequences varied from one to 94 touches. The study found the top 10 most commonly touched areas in the patient room to include the patient with a total of 850 touches, the COW with 634 touches, bed rails with 375 touches, bed surfaces 302 touches, tray tables with 223 touches, IV pumps with 326 touches, vital machines/monitors 213 touches, wall shelves 110 touches, door with 90 touches, and the in-room computer 78 touches (Jinadath et al., 2017).

**Conceptual Framework**

The Iowa Model of Evidence-Based Practice was used for the quality improvement project. The steps of the Iowa Model include identifying triggering issues/opportunities and developing a question or purpose for the trigger. A multidisciplinary team included the project
leader, project chair, Director of the cardiac intensive care unit, and two level III registered nurses from the cardiac intensive care. A thorough review and synthesis of the literature was completed using tools from the Iowa Model. A preintervention survey was provided to the nursing staff of the cardiac intensive care, which determined the knowledge and attitudes of the nursing staff regarding current environmental hygiene practices in the acute care setting. After the presurvey, an educational poster regarding the intervention and high-touch surface area cleaning was posted in the breakroom for independent learning by the nursing staff.

The next step of the Iowa model included the pilot intervention. The intervention was completed from July 1 to July 31, 2019. This pilot included implementing a high-touch surface area cleaning protocol that was performed by direct care nursing staff before the first encounter with the patient or patient’s environment. The intervention included cleaning of the high-touch surfaces with the standard disinfectant wipes provided by the organization. Data were collected during the intervention through a detailed flowsheet that allowed the participant to check off the surfaces that were cleaned. The checklist was completed by every participant, every shift and for every room the participant was assigned.

The next step in the Iowa Model, was evaluation. The evaluation process assessed the HAI data and compared the preintervention data to the postintervention data in order to determine if the intervention demonstrated a reduction in the number of HAIs in the cardiac intensive care. The preintervention survey was compared to the postintervention survey to evaluate the change in practice. The project team evaluated the ease of adopting the intervention into daily practice.
Theoretical Framework

Florence Nightingale was the pioneer nurse theorist and founder of modern nursing (George, 2011). Her theory of care is more than a century old, and it remains appropriate for application for the care of patients today. Florence Nightingale developed the environmental theory that is the basis of nursing practice and research. She viewed the manipulation of the physical environment as a major component of nursing care and patient health (George, 2011). She identified areas of the environment that affected health, including ventilation, warmth, light, noise, variety, bed and bedding, cleanliness of rooms and walls, personal cleanliness, and nutrition. Nightingale stated that keeping bedding clean, neat, and dry and providing clean rooms and dust-free walls will reduce the rate of infection and improve the comfort of the patient. She found cleanliness of the patient and cleanliness of the hands of the nurse drastically reduced infection and improved patient comfort; therefore, she incorporated frequent handwashing of care giver’s hands and environmental hygiene practices in order to prevent transmission of bacteria (George, 2011).

The metaparadigm of Nightingale’s environmental theory includes health, environment, patient, and nursing (George, 2011). Health is defined as the absence of ailment or being well. The physical environment is reflected in the community health model where all that surrounds human beings is considered in relation to their state of health. The patient is defined as someone consisting of physical, spiritual, emotional, intellectual, and social aspects (George, 2011).

Lastly, according to Nightingale, nursing was a “calling from God” (George, 2011, p. 54). She believed that removing obstructions to health allowed nature to return the person back to health, thus fulfilling God’s desire for His people (George, 2011). This theory relates to the
project’s goal of improving the cleanliness of the patient’s environment in order to decrease infection and provide a safe, patient-centered environment for healing.

**Summary**

Overall, the literature review produced sound evidence supporting the reduction of pathogens on environmental surfaces with high-touch surface area cleaning. The pathogens most commonly found on hospital surfaces include MRSA, VRE, C. diff, *Pseudomonas*, and *Acinetobacter*; these pathogens cause HAIs (Carling, 2016; CDC, 2014). The increase in the HAI burden in the cardiac intensive care unit during the last fiscal year, and the benchmark goal of zero for HAIs, demonstrated a need for quality improvement; therefore, this project supported the implementation of the evidence-based high-touch surface area cleaning protocol. The purpose of the project was to return to the basics of environmental cleanliness developed by Florence Nightingale. The cardiac intensive care unit participated in the nurse-driven high-touch surface cleaning protocol.

**SECTION THREE: METHODOLOGY**

**Design**

The project was an evidence-based quality improvement project; it utilized the Iowa Model for Evidence-Based Practice. Using this model, the high-touch surface area cleaning protocol was evaluated using a pilot intervention (Iowa Model Collaborative, 2017). This project had a quasi-experimental design, and electronic surveys were administered before and after the intervention. The presurvey and postsurvey provided a rating for the cleanliness of the high-touch surfaces before and after the intervention. Participants rated the patient’s inanimate surfaces on a Likert-type scale of very soiled to very clean. The surveys also evaluated the perspective of the clinical staff on the importance of high-touch surface area cleaning in
preventing the transmission of pathogens that can cause HAIs before and after the intervention using a Likert rating scale of extremely important to not at all important. Additionally, the survey assessed the view of the participants regarding the level of difficulty of implementing a high-touch surface area cleaning protocol pre- and postintervention. This Likert-type rating provided a scale of very difficult to very easy. Lastly, the survey assisted the project leader in determining if the shift worked influenced the difficulty of implementation of the intervention. This was assessed by the participant defining their shift as dayshift (7 a.m. to 7 p.m.), night shift (7 p.m. to 7 a.m.), or do not wish to answer. The pre- and postsurveys were developed by the primary investigator and are noted in Appendix H.

The Daily Environmental Hygiene Checklist (DEHC; Appendix E) was used to document and rate the patient’s environment each shift before completing the intervention. This scale was a Likert-type scale with the rating (1) very soiled, (2) somewhat soiled, (3) have not noticed, (4) somewhat clean, or (5) very clean. The DEHC was then used to document the high-touch surfaces that were cleaned, not cleaned, or not present in the room. The checklists were completed every shift by the participants and turned in to the secured location.

Lastly, the number of HAIs retrospective to the project and postintervention were compared. The project leader documented the number of events, number of days, and the rate for MRSA, CLABSI, and CAUTI for July of fiscal year 2018 and compared them to the month representing the intervention (July 2019). The number of HAIs before and after the intervention was provided by the organization’s HAI data analyst. These data were used to assess the effect of high-touch surface cleaning on reducing HAIs in the cardiac intensive care unit.
Measurable Outcomes

The measurable outcomes for the high-touch surface cleaning protocol include the following:

1. Improvement in environmental hygiene will be evident by the postsurvey data. Environmental hygiene will be assessed using the observational method and defined using the Likert-type scale to rate the environment as either very soiled, somewhat soiled, have not noticed, somewhat clean, or very clean.

2. The high-touch surface cleaning protocol will demonstrate a 30% reduction in the number of HAIs postintervention. HAIs are measured per event. The rates of HAIs are measured per 1,000 patient days per department every month for the fiscal year. These data will be collected from the organization’s HAI data analyst.

3. The postsurvey results will allow the project leader to determine if the high-touch surface cleaning protocol will be feasible to implement in a busy, high-acuity intensive care.

Setting

The project was conducted in a community hospital. The hospital is in a metropolitan area in the third most populous county in the state. The organization is one of the largest comprehensive medical centers within the five-county region. It is a not-for-profit teaching and referral center with 517 beds. This facility is a leader in compassionate, quality care and is committed to excellence. The facility supports research and clinical trials to fulfill its mission of preventing illness, restoring health, and providing comfort to the communities served. The project was conducted in the cardiac intensive care unit. It is a 26-bed intensive care unit that provides care for a multitude of cardiac illnesses, chest trauma, and cardiovascular surgeries.
Population

The primary population is the direct care staff in the cardiac intensive care. This includes registered nurses and nursing assistants. These participants were selected based on their affiliation with the unit and direct care with the patient population and their environment.

The secondary population included the patients that occupied the rooms during the time of the intervention. The patient population included adults aged 18 and older. The patient population included those pre- and post-cardiovascular surgery and patients with chronic cardiac disease, acute renal failure, cardiothoracic trauma, and cardiac arrest. The patient population in the unit is critically ill and requires multiple interactions with the direct care staff and medical equipment.

Ethical Considerations

This quality improvement project had a minimal risk to human subjects. The primary population risk was a possible breach in data and possible added stress or anxiety for incorporating the intervention in daily practice. The project maintained the rights of the patient as outlined in the facility’s patient handbook. Data collection for this project did not include identification of individual patients or the cardiac intensive care staff members. The surveys were anonymous and administered through SurveyMonkey via the facility’s email.

The participants were recruited through email, one-on-one interactions, and shift staffing huddles. Participation and education were voluntary, and staff members’ decision of whether to participate did not affect position. Consents were dispersed via email with the project packet. The consents were returned to the project leader’s mailbox. A copy of the consent can be viewed in the Appendix I. The project leader obtained approval from the university’s and facility’s
institutional review boards. The project leader completed all necessary Collaborative
Institutional Training Initiatives modules, and the certificate is provided in Appendix B.

**Data Collection**

Data collection began with the project leader assessing the knowledge of the staff
regarding high-touch surface areas, environmental cleanliness, and its effect on HAI rates. This
was completed by constructing a pre-survey.

**Presurvey.** The presurvey was constructed by the project leader and administered to the
staff via SurveyMonkey. The survey was anonymous. It was used to rate the cleanliness of the
patient’s environment in the acute care setting. The participants were asked how likely they
were to clean the patient’s high-touch surfaces during their shift and how important high-touch
surface cleaning is in preventing the transmission of HAI-causing pathogens. The participants
were asked to rate the level of difficulty in implementing the high-touch surface cleaning
protocol in their daily nursing practice.

**Staff education.** The project leader provided an educational poster in the break room in
the cardiac intensive care to educate the staff to the high-touch surface cleaning intervention,
participation consent, and daily checklist. A project packet was emailed to each direct care staff
member.

**The high-touch surface cleaning intervention.** The pilot intervention was implemented
on July 1, 2019 and was completed on July 31, 2019. The staff used the environmental checklist
that lists the high-touch surfaces to be cleaned each shift or every 12 hours. The staff placed a
check mark for each surface that was cleaned. There was an area on the checklist to denote areas
that were not cleaned or not present in the patient’s environment.
Postsurvey. After the pilot, a post survey was administered; it assessed how the participants rated the effectiveness of the high-touch surface cleaning protocol in improving environmental hygiene for the patients in the cardiac intensive care unit. It also assessed how likely the participants would continue to use the protocol in their nursing practice and how important environmental hygiene is in preventing the transmission of pathogens that cause HAIs. The post survey assessed feasibility by having the participants rate the level of difficulty for implementation of the high-touch surface cleaning protocol in their daily nursing practice.

HAI data collection. An assessment of the number of HAIs before and after the implementation of the pilot intervention was completed to determine if the intervention reduced the number of HAIs. The organization’s data analyst provided the HAI data before and after the intervention.

Tools

The CDC’s environmental cleaning toolkit was used to demonstrate the areas defined as high-touch surfaces. Permission to use this toolkit is not needed for the CDC is a public organization and their tools and sources can be used freely. Modifications to the environmental checklist were made in regard to the high-touch surfaces that were commonly cleaned in the setting. Permission to modify the CDC’s tools is not needed; however, the CDC states that if the tools and resources provided by the CDC are modified, the logo should be removed. Monitoring of environmental hygiene was completed using direct observation and visual inspection. The tools used for the project are noted in Appendix E and Appendix F.

SurveyMonkey was used to administer the pre and post survey to the staff. The survey is provided in Appendix H. These surveys were delivered via email. The surveys were anonymous, therefore protecting the identity of the staff.
Intervention

I. Recruitment
   a. Level III registered nurses to assist with implementing the high-touch cleaning protocol.
   b. Recruit participants that are direct care staff in the cardiac intensive care unit.
   c. Obtain participant consent.

II. Presurvey
   a. Administer preintervention survey via SurveyMonkey
   b. Evaluate the data
   c. Provide an educational poster board for high-touch surface cleaning and place it in the unit break room.

III. High-Touch Surface Area Cleaning Protocol
   a. The go-live date was July 1, 2019. The intervention was conducted for four weeks and concluded on July 31, 2019.
   b. Participants completed an overall assessment of the environmental cleanliness of each patient room that they were assigned during their shift. They rated the cleanliness on a scale from very soiled to very clean. Cleanliness was rated using visual observation. This observation was documented on the cleaning protocol flow sheet.
   c. The participants performed cleaning with the hypochlorite solution known as the purple-top Sani Cloth that is used on any patient room other than those infected with C. diff. The isopropyl alcohol wipe known as the orange-top
Sani Cloth (bleach wipes) was used for rooms isolated for C. diff. Cleaning solutions are noted in Appendix G.

d. Cleaning was conducted by the participant at the end of each shift so that the incoming participant would have clean surfaces before initial contact with the patient and the patient’s environment. This cleaning protocol did not interfere with the other infection-prevention bundles that were in place (e.g., handwashing). The purple-top Sani Cloth has a two-minute drying time, and the orange-top Sani Cloth has a four-minute drying time. The surfaces were left to dry for the entire recommended drying time. Gloves were used when cleaning the surfaces. Steady friction was applied while wiping the high-touch surfaces.

e. Flowsheets (Appendix E) were provided for documenting cleaning intervention and observational rating. High-touch surfaces that were monitored and cleaned included:

i. Bed rails/bed controls

ii. Tray table

iii. Handheld call button

iv. Telephone (if present in the room)

v. IV pump and pole

vi. Monitoring wires on the patient (EKG cables, pulse ox cable, blood pressure cable)

vii. Cardiac monitor

viii. COW and scanner
ix. Ventilator surface and control panel.

x. Patient bathroom door knob/light switch

xi. Patient handrails by toilet

xii. Room sink/faucet handles

xiii. Other medical devices present in the patient’s room, attached to the patient, or in use by the patient (temporary pacer box, intra-aortic balloon pump, continuous renal replacement therapy device, etc.).

IV. Postsurvey

   a. Post survey was conducted via SurveyMonkey.

V. Data Collection and Disbursement

   a. After four weeks, all data were collected and analyzed. The cleaning flowsheet was entered in Microsoft Excel to assess the frequency the surfaces were cleaned.

VI. Dissemination of Findings

   **Feasibility analysis.** The personnel necessary to complete the project included the unit’s direct care nursing staff, the unit director, HAI data analyst, project leader, project chair. The resources used to complete the project included the use of the organization’s purple-top Sani Cloths and the orange-top Sani Cloths. The unit uses a total of 53 containers of the purple-top Sani Cloths per month, costing the unit $205.64 per month. The unit uses 13 containers of the orange-top Sani Cloths per month, costing $68.64 per month. Images of the Sani Cloths are found in Appendix G.
Data Analysis

SurveyMonkey and the DEHC was used to perform the data analysis. The presurvey and postsurvey used Likert-type scales for rating the cleanliness of the high-touch surfaces before the pilot intervention, then daily before performing intervention, and then at the end of the pilot intervention. Participants rated the patient’s inanimate surfaces on a scale of very soiled to very clean.

The Likert-type scale was used to evaluate the perspective of the clinical staff on the importance of high-touch surface area cleaning in preventing the transmission of pathogens that can cause HAIs. This rating was completed before the pilot study and at the end of the pilot study. This rating scale was measured from extremely important to not at all important.

The survey assessed the view of the participants on the level of difficulty of implementing the high-touch surface area cleaning protocol. This was rated before the pilot intervention and again postintervention. This rating was scaled from very difficult to very easy.

Lastly, the HAI data were compared to the month of July for the fiscal year 2018 to the month of July for the fiscal year 2019. These data included the number of events, number of days, and the rate for CAUTI, CLABSI, and MRSA. These data were obtained from the organization’s HAI data analyst.

Measurable outcome I: Environmental cleanliness rating before pilot intervention, with daily observation, and post pilot intervention. Improvement in environmental hygiene was evident through a comparison of the presurvey rating, daily observation rating, and the postsurvey rating. The DEHC data were used to analyze the daily observation rating for the cleanliness of the patient’s environment. Environmental hygiene was assessed using the observational method and defined using the Likert-type rating scale defined as (1) very soiled,
(2) somewhat soiled, (3) have not noticed, (4) somewhat clean, or (5) very clean. This scale was used on the presurvey, postsurvey, and the DEHC. SurveyMonkey assisted with the analysis of the survey data. The objective was to determine if daily environmental cleaning of high-touch surfaces improved the observational cleanliness of the patient’s environment.

**Measurable Outcome II: The high-touch surface area cleaning protocol will be feasible to implement in a busy, high-acuity cardiac intensive care.** This outcome was measured by the postsurvey. The question asked participants to rate the level of difficulty in implementing the high-touch protocol in their daily nursing practice. The question used the Likert-type scale defined as (1) very difficult, (2) difficult, (3) neither easy nor difficulty, (4) easy, or (5) very easy. SurveyMonkey assisted with the analysis of the survey data. The objective of this outcome was to determine if the high-touch surface cleaning protocol would be feasible for making a practice change for the unit.

The postsurvey also asked participants to rate how likely they would be to continue using the high-touch surface cleaning protocol. The Likert-type scale was defined as (1) very likely, (2) likely, (3) neither likely nor unlikely, (4) unlikely, (5) very unlikely. The objective of this question was to determine if the participants would continue the high-touch cleaning protocol in their daily practice without a unit practice change.

**Measurable Outcome III: The high-touch surface cleaning protocol will demonstrate a 30% reduction in the number of HAIs postintervention.** HAIs are measured per event. The rates of HAIs are measured per 1,000 patient days per department every month for the fiscal year. These data were collected from the organization’s HAI data analyst. The intervention occurred in July of fiscal year 2019; therefore, the HAI data for July 2018 were
compared to the HAI data for July 2019. The HAIs that were used for comparison included MRSA, CAUTI, and CLABSI.

SECTION FOUR: RESULTS

Descriptive Statistics

The sample for this project included 20 (53%) dayshift nurses (7 a.m. to 7 p.m.) and 18 (47%) night shift nurses (7 p.m. to 7 a.m.). A total of 38 nurses out of a total of 75 nurses that work in the cardiac intensive care unit took part in this study for a participation rate of 51%. Table 1 displays the shift worked with the number of nurses and the percentage.

Measurable Outcomes

Environmental cleanliness rating. The presurvey environmental cleanliness rating demonstrated a mean of 3.68, $SD = 0.933$, $N = 38$. The most frequently chosen rating was “somewhat clean,” chosen 68% of the time. Table 1 displays the presurvey environmental cleanliness rating scale results.

Table 1

<table>
<thead>
<tr>
<th>Rating</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very soiled</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Somewhat soiled</td>
<td>8</td>
<td>21.05</td>
</tr>
<tr>
<td>Did not notice</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Somewhat clean</td>
<td>26</td>
<td>68.42</td>
</tr>
<tr>
<td>Very clean</td>
<td>4</td>
<td>10.53</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>38</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

*Note. $M = 3.68$, $SD = 0.933$*

The daily environmental cleanliness rating demonstrated a mean of 3.95, $SD = 1.143$, $N = 296$. The rating most frequently chosen was “somewhat clean,” chosen 40% of the time. Table 2 displays the daily cleanliness rating and results.
Table 2

*Daily Environmental Cleanliness Rating*

<table>
<thead>
<tr>
<th>Rating</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very soiled</td>
<td>11</td>
<td>3.72</td>
</tr>
<tr>
<td>Somewhat soiled</td>
<td>35</td>
<td>11.82</td>
</tr>
<tr>
<td>Did not notice</td>
<td>20</td>
<td>6.76</td>
</tr>
<tr>
<td>Somewhat clean</td>
<td>118</td>
<td>39.86</td>
</tr>
<tr>
<td>Very clean</td>
<td>111</td>
<td>37.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>296</strong></td>
<td><strong>99.66</strong>*</td>
</tr>
</tbody>
</table>

*Note. M = 3.95, SD = 1.143  
*Response totals do not equal 100% due to rounding.*

The postsurvey environmental cleanliness rating for the effectiveness for the protocol demonstrated a mean of 4.0, $SD = .697$, $N = 38$. The most frequently chosen rating for the effectiveness of the protocol was “very good,” with a frequency of 23 (60%). Table 3 displays the postsurvey cleanliness effectiveness results.

Table 3

*Postsurvey Environmental Cleanliness Effectiveness*

<table>
<thead>
<tr>
<th>Rating</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Fair</td>
<td>1</td>
<td>2.63</td>
</tr>
<tr>
<td>Good</td>
<td>6</td>
<td>15.79</td>
</tr>
<tr>
<td>Very good</td>
<td>23</td>
<td>60.53</td>
</tr>
<tr>
<td>Excellent</td>
<td>8</td>
<td>21.01</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>38</strong></td>
<td><strong>99.96</strong>*</td>
</tr>
</tbody>
</table>

*Note. M = 4.0, SD = 0.697  
*Response totals do not equal 100% due to rounding.*

Feasibility of implementing the HTS cleaning protocol in daily practice. The postsurvey measured the feasibility of implementing the high-touch cleaning protocol by rating the difficulty of implementing the protocol and assessing how likely the participants would be to continue the protocol. Table 4 demonstrates the results of the survey on the feasibility of implementation of the high-touch surface cleaning protocol.
Table 4

Feasibility for Implementation of High-Touch Surface Cleaning Protocol

<table>
<thead>
<tr>
<th>Rating</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very likely</td>
<td>18</td>
<td>47.37</td>
</tr>
<tr>
<td>Likely</td>
<td>14</td>
<td>36.84</td>
</tr>
<tr>
<td>Neither likely nor unlikely</td>
<td>3</td>
<td>7.89</td>
</tr>
<tr>
<td>Unlikely</td>
<td>3</td>
<td>7.89</td>
</tr>
<tr>
<td>Very Unlikely</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>99.99*</td>
</tr>
</tbody>
</table>

*M = 1.76, SD = .913

*Response totals do not equal 100% due to rounding.

Reduction of HAIs. The HAI data for July 2018 indicated zero events for MRSA, CAUTI, and CLABSI. The HAI data for July 2019 also indicated zero events for MRSA, CAUTI, and CLABSI. Table 5 represents the HAI data from July 2018 and July 2019.

Table 5

<table>
<thead>
<tr>
<th>HAI Data</th>
<th>2018</th>
<th></th>
<th></th>
<th>2019</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Days</td>
<td>Rate</td>
<td>Events</td>
<td>Days</td>
<td>Rate</td>
</tr>
<tr>
<td>CAUTI</td>
<td>0</td>
<td>312</td>
<td>0</td>
<td>0</td>
<td>302</td>
<td>0</td>
</tr>
<tr>
<td>CLABSI</td>
<td>0</td>
<td>377</td>
<td>0</td>
<td>0</td>
<td>309</td>
<td>0</td>
</tr>
<tr>
<td>MRSA</td>
<td>0</td>
<td>649</td>
<td>0</td>
<td>0</td>
<td>582</td>
<td>0</td>
</tr>
</tbody>
</table>

SECTIONS: DISCUSSION

Implication for Practice

The hospital environment contains multiple types of pathogens that can be harmful to patients and families. The critically ill patient is at greater risk for developing an infection from pathogens that are transmitted from environmental surfaces to the hands of health care workers, family members, and visitors. These pathogens can cause serious infections in the critically ill patient. These infections can lead to an increase in morbidity, mortality, and health care
Implementing a daily high-touch surface cleaning protocol can assist with decreasing the bioburden on high-touch surfaces within the patient’s environment.

Implementing a high-touch surface cleaning protocol demonstrated an overall improvement in the cleanliness of the patient’s environment with the daily observational rating. The high-touch surface protocol was rated as “easy to implement” into daily practice. However, a reduction in HAI rates was not observed based on the bias of historical data, present data, and the inability to monitor the HAI rates postintervention. The documented HAI rates for the month of July 2018 was zero; therefore, demonstrating no improvement or regression.

Other limitations of the study included the use of direct observation. Individuals may have a varying definition of what is clean or soiled. Therefore, the use of ATP luminescence technology to assess the concentration of bioburden on the surfaces before and after the intervention would give a standard for defining if a surface is clean or soiled. Using this technology would be more effective for demonstrating an improvement in bioburden post intervention.

Another limitation to the study was lack of 100% participation of the unit staff. Participation was voluntary; therefore, there was inconsistency in high-touch surface cleaning every day and every shift. Had the pilot been a mandatory practice change, a significant improvement in observation of environmental hygiene may have been observed. Lastly, the bias of attrition must be concluded with the presurvey completed by 38 participants and the postsurvey completed by 37 participants.

**Sustainability**

Sustainability for the high-touch surface cleaning protocol will be challenging with the current rate of HAIs in the cardiac intensive care unit are at the benchmark goal of zero, and the
new additions to the HAI prevention bundles that are currently in place. However, the project was rated as feasible and easily implemented into daily practice by the participants, and there is documented supporting literature, data, and recommended guidelines that support the practice change. It is recommended to complete further scientific findings such as ATP testing of bioburden on environmental surfaces to provide a better standard definition for the terms “soiled” and “clean”. This testing will be able to demonstrate and define the amount of bioburden present on high-touch surfaces; therefore, further supporting the need for the nurse driven high-touch surface cleaning protocol. The cardiac intensive care unit director and the infection prevention director have agreed to support the recommendation for bioburden testing on high-touch surfaces in order to demonstrate the sustainability for the high-touch surface cleaning protocol. The Infection Prevention Department has this technology available for use; and it would not cost the organization or the cardiac intensive care unit any further expenditure for use of the technology.

**Dissemination Plan**

The CDC recommends high-touch surface cleaning and environmental hygiene practices. The evidence-based protocol supported the scholarly project and the outcomes of the project. The staff was educated on the importance of high-touch surface cleaning in decreasing the bioburden on the patient’s immediate surfaces. The project leader provided the results and the outcomes of the quality improvement project to the director of the cardiac intensive care unit, and the nursing research practice council within the organization. The data demonstrated an improved awareness of environmental hygiene within the acute care setting and demonstrated feasibility for implementation into daily nursing practice. Further testing with ATP technology has been requested by the Director of Infection Prevention and the Director of the Cardiac
Intensive Care Unit before implementing the Environmental Hygiene Protocol into daily nursing practice.
References


doi:10.1177/1757177416645342

### Appendix A

#### Evidence Table

<table>
<thead>
<tr>
<th>Article</th>
<th>Study Purpose</th>
<th>Sample</th>
<th>Methods</th>
<th>Study Results</th>
<th>Level of Evidence (Use Melnyk Framework)</th>
<th>Study Limitations</th>
<th>Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen, M., Hall, L., Halton, K., &amp; Graves, N. (2018). Improving hospital environmental hygiene with the use of a targeted multi-modal bundle strategy. <em>Infection, Disease &amp; Health</em>, 23(2018), 107-113. doi:10.1016/j.idh.2018.01.003</td>
<td>To assess the effectiveness of an environmental hygiene bundle in terms of changes to HAI rates, cleaning performance and environmental service workers knowledge and attitudes.</td>
<td>8 units in a 400-bed metropolitan teaching hospital. Does not mention # of patients</td>
<td>Before and after study design. Three-month pre-intervention phase and six-month intervention phase.</td>
<td>No statistically significant change in infection rates in the 6-month period. Cleaning and disinfectant performance indicated significant improvement (p&gt;0.001). Improvements in knowledge and attitudes of ESW was demonstrated with 100% of respondents identifying 8 out of 10 FTP (p&gt;0.001). Correct</td>
<td>Level III</td>
<td>6-month intervention period is unable to demonstrate long term impact on cross transmission, infection rates, or program</td>
<td>Yes, This study provides support for improving overall environmental cleanliness with a multi-modal bundle. This study also demonstrated improvement in job satisfaction.</td>
</tr>
<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melnyk Framework)</td>
<td>Study Limitations</td>
<td>Would Use as Evidence to Support a Change? (Yes or No)</td>
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<tr>
<td>Casini, B., Righi, A., De Feo, N., Totaro, M., Giorgi, S., Zezza, L., . . Privitera, G. P. (2018). Improving cleaning and</td>
<td>Evaluate effectiveness of pre-impregnated wipes to reduce</td>
<td>12 bed ICU,</td>
<td>5 high touch surfaces were</td>
<td>On high touch surfaces, the use of disposable wipes by in house</td>
<td>Level III</td>
<td>Inadequate environmental</td>
<td>Yes,</td>
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<tr>
<td></td>
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<td>90 patients</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>Product use significantly improved post intervention. No change was observed with attitude questions relating to environmental service team culture. 20% increase in job satisfaction. 77% of respondents indicated improved relationships in daily communication on the units post intervention</td>
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<td>Sustainability. The intervention was completed by environmental workers and not bedside nurses.</td>
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<td>Study Limitations</td>
<td>Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.</td>
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<tr>
<td>disinfection of high-touch surfaces in intensive care during carbapenem-resistant acinetobacter baumannii endoemo-epidemic situations. <em>International Journal of Environmental Research and Public Health, 15</em>(2305), 1-9. doi:10.3390/ijerph15102305</td>
<td>environmental bacterial burden and to maintain a disinfection activity on high-touch surfaces.</td>
<td>cleaned with either the SOP protocol or MOP protocol. Sampling was performed before each procedure and at scheduled times. Cleaning performed by in house nursing staff compared to outsourced.</td>
<td>nurses represented a more effective alternative to standard cleaning and disinfection.</td>
<td>cleaning by individual regardless of product used. Questionable compliance with protocol with outsourced cleaning services.</td>
<td>This study demonstrates relevant data that supports high-touch surface cleaning with disposable wipes used by nursing staff in the ICU with significant reduction in bioburden.</td>
<td></td>
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<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
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<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melnyk Framework)</td>
<td>Study Limitations</td>
<td>Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.</td>
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<tr>
<td>Doll, M., Stevens, M. &amp; Bearman, G. (2018). Environmental cleaning and disinfection of patient areas. <em>International Journal of</em></td>
<td>Discuss approaches to environmental cleaning, assessment, and 7000 articles (did not give final # of articles used after</td>
<td>were assessed.</td>
<td>Narrative Literature review of observati</td>
<td>Multiple strategies for improving environmental</td>
<td>Level V</td>
<td>Domain VI: 64%  Overall score= 6, the guideline meets the criteria. This guideline will be used for support of surface cleaning to reduce HAIs in the CVICU.</td>
<td>Yes,</td>
</tr>
<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melnyk Framework)</td>
<td>Study Limitations</td>
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<tr>
<td>Han, J. H., Sullivan, N., Leas, B. F., Pegues, D. A., Kaczmarek, J. L., &amp; Umscheid, C. A. (2015). Cleaning hospital room surfaces to prevent health care-associated infections: A technical brief. <em>Annal of Internal Medicine, 163</em>(8), 598-607. doi:10.7326/M15-1192</td>
<td>To examine evidence and current methods of cleaning, disinfecting, and monitoring cleanliness of patient rooms as well as factors that may affect implementation and effectiveness.</td>
<td>80 studies (49 examined cleaning methods, 14 evaluated monitoring strategies, 17 addressed challenges to implementation).</td>
<td>Systematic Review of Literature</td>
<td>Contamination of high touch environmental surfaces plays a role in transmission of pathogens in the acute care setting. Increasing attention is directed toward the importance of environmental</td>
<td>Level V</td>
<td></td>
<td>Yes, Provides support for surface cleaning and strategies for cleaning.</td>
</tr>
<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melnyk Framework)</td>
<td>Study Limitations</td>
<td>Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.</td>
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<tr>
<td>Jinadatha, C., Villamaria, F. C., Coppin, J. D., Dale, C. R., Williams, M. D., Whitworth, R., &amp; Stibich, M. (2017). Interaction of healthcare worker hands and portable medical equipment: a sequence analysis to show potential transmission opportunities. <em>BMC Infectious</em></td>
<td>Investigate the patterns and sequence of contact events among health care workers, patients, surfaces, and medical equipment in a 120 bed Veterans Affairs Hospital Six inpatient units including 4 acute med/surg</td>
<td>5 studies were randomized, controlled trials.</td>
<td>Observational study. Continuous 24-hour observation was performed separately.</td>
<td>Most touched items during patient care was the patient (850), bedrail (375), bed surface (302), and bedside table (223). Most common sequence included touching PME and the patient</td>
<td>Level IV</td>
<td>Research staff did not record sequence that occurred outside the patient.</td>
<td>Yes, this study demonstrates the highest touched surfaces during patient care.</td>
</tr>
<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melnyk Framework)</td>
<td>Study Limitations</td>
<td>Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.</td>
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<td>Diseases, 17, 1-10. doi:10.1186/s12879-017-2895-6</td>
<td>To determine the prolonged 8 bedside keyboards</td>
<td>hospital environment. units and 2 ICUs.</td>
<td>y on each unit by 2 research members observing 8-hour sessions. HCW were aware of the observation and recording.</td>
<td>patient, COW-patient, patient-IV pump.</td>
<td></td>
<td>Room or in the bathroom. Modification of behavior because of observation.</td>
<td>Including the patient’s bedrails, bed surface, and bedside table, patient medical equipment, and the computer on wheels (COW). The proposed project will investigate these areas.</td>
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<td>Jones, R., Hutton, A., Mariyaselvam, M., Hodges, E.,</td>
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<td>Yes,</td>
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<td>Article</td>
<td>Study Purpose</td>
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<td>Study Results</td>
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<td>Wong, K., Blunt, M., &amp; Young, P. (2015). Keyboard cleanliness: A controlled study of the residual effect of chlorhexidine gluconate. <em>American Journal of Infection Control, 43</em>(2015), 289-291. doi:10.1016/j.ajic.2014.12.002</td>
<td>antimicrobial effect of chlorhexidine gluconate 2% (CHG) in 70% isopropyl alcohol spray on keyboards that are in frequent contact with health care worker’s hands.</td>
<td>from 14 ICU beds, and 24 randomly selected keyboards from 11 hospital units</td>
<td>of ICU keyboards</td>
<td>cleanliness of keyboards in the ICU (P=.0005). There was a 60-fold reduction in bacterial burden at 4-6 hours after use of CHG compared to the chlorine based cleaner and a 16-fold reduction after 24 hours.</td>
<td></td>
<td></td>
<td>Yes</td>
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<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
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<tr>
<td>Lei, H., Jones, R. M., Li, Y. (2017). Exploring surface cleaning strategies in hospital to prevent contact transmission of methicillin-resistant Staphylococcus aureus. <em>BMC</em></td>
<td>Explore cleaning strategies to control MRSA transmission to susceptible</td>
<td>2 patients, and one health care worker in a hypothetical case</td>
<td>Mathematical model based on ordinary differential equation</td>
<td>Whole room cleaning before first patient care activities of the day was more effective than individual cleaning.</td>
<td>Level VI</td>
<td>Did not consider colonization in patient</td>
<td>Yes, Supports frequent (&gt; 3 times per hour)</td>
</tr>
</tbody>
</table>

*MRSA*: Methicillin-resistant Staphylococcus aureus.
<table>
<thead>
<tr>
<th>Article</th>
<th>Study Purpose</th>
<th>Sample</th>
<th>Methods</th>
<th>Study Results</th>
<th>Level of Evidence (Use Melnyk Framework)</th>
<th>Study Limitations</th>
<th>Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Infectious Diseases, 17, 1-9. doi:10.1186/s12879-016-2120-z</em></td>
<td>patients in the ICU.</td>
<td>hospital environment.</td>
<td>al equations was construct ed to study MRSA concentration dynamics on high touch and low touch surfaces, and on hands and noses of 2 patients and a health care worker. 2 cleaning interventi</td>
<td>whole room cleaning at other times. 100% of whole room cleaning reduced the number of MRSA transmitted to 54%. Frequent wipe cleaning of touched surfaces was shown to be more effective than whole room cleaning because rapidly re-contaminated with MRSA after cleaning.</td>
<td>or HCW.</td>
<td>cleaning of high touch surface areas to decrease transmission of MRSA. Supports theory that room cleaning before patient care activities of the day is more effective. This study will support</td>
<td></td>
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<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
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<td>Mulvey, D., Redding, P., Robertson, C., Woodall, C., Kingsmore, P., Bedwell, D., &amp; Dancer, S. J. (2010). Finding a benchmark for monitoring hospital cleanliness. <em>Journal of Hospital Infection</em>, 77(2011), 25-30. doi:10.1016/j.jhin.2010.08.006</td>
<td>To find a benchmark that could indicate risk to patients from a contaminated environment by bringing together visual, microbiological and ATP bioluminescence</td>
<td>Selected one medical and one surgical unit in a teaching hospital.</td>
<td>Cohort study 3-4 times a week, for 4 weeks, an assessment of the area of study</td>
<td>Cleaning with detergent based cleaner reduced levels of organic soil by 32% but did not eliminate staphylococci. Microbiological and ATP monitoring confirmed environmental</td>
<td>Level IV</td>
<td>Not randomized. Generalizability of the study.</td>
<td>Yes, ATP monitoring provides better information for determining benchmark for the use of surface cleaning before patient care activities (before the start of the nurse/patient interaction).</td>
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<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
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<td>methods for assessing cleanliness of a hospital unit to determine if these methods can be used as future screening mechanisms for assessing hospital cleanliness.</td>
<td></td>
<td>was assessed by visual, ATP bioluminescence, and microbiological assessment. It was assessed before and after daily detergent cleaning. Overall score of 1-10 was given with 10 being clean. This scale was contamination, persistence of hospital pathogens and measured the effect on the environment from current cleaning practices.</td>
<td>cleaned surfaces than the observational method.</td>
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<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
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<td>Ramphal, L., Suzuki, S., McCracken, I. M., &amp; Addai, A. (2014). Improving hospital staff</td>
<td>Increase hospital room cleanliness with repeated</td>
<td>Trial 1 1,747 rooms sampled, trial</td>
<td>Quality improve</td>
<td>The percentage of cleaned surfaces improved</td>
<td>Level VI</td>
<td>Other intense strategies</td>
<td>Yes, helpful in demonstrating</td>
</tr>
<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
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<td>compliance with environmental cleaning behavior. <em>Baylor University Medical Center Proceedings</em>, 27(2), 88-91.</td>
<td>education and training of nursing staff.</td>
<td>21322 rooms sampled, and trial 3 2188 rooms sampled.</td>
<td>ment project Blinded room selection for testing of adequate cleaning after patient discharge.</td>
<td>incrementally between the three trials with values of 20, 49, and 82 percent. Demonstrating that repeated education lead to favorably changed behavior in the staff. A reduction in HAIs was substantial but was not the premise of the study.</td>
<td>s were being used during the study period, therefore, it is difficult to determine if the reduction in HAIs is because of the study intervention.</td>
<td></td>
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<tr>
<td>Sharpe, P., &amp; Schmidt, M. (2011). Control and mitigation of healthcare-acquired infections: Designing clinical</td>
<td>Evaluate the extent to which an intervention with copper-based environments</td>
<td>Copper based surfaces have potential to decrease</td>
<td></td>
<td>Level V</td>
<td></td>
<td>Not a study, a proposal based</td>
<td>Yes, This article</td>
</tr>
<tr>
<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melnyk Framework)</td>
<td>Study Limitations</td>
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<td>trails to evaluate new materials and technologies. <em>Health Environments Research &amp; Design Journal (HERD)</em>, 5(1), 94-115.</td>
<td>based materials in a randomized clinical trial affects the level of contamination and correlate how the levels of macrobacteria affect the incidence of infections acquired during hospital stays.</td>
<td>presents research methodology to develop evidence in antimicrobial surfaces.</td>
<td>contamination of pathogens.</td>
<td></td>
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<tr>
<td>Watson, P. A., Watson, L. R., &amp; Torress-Cook, A. (2016). Efficacy of a hospital-wide environmental cleaning protocol on hospital-acquired methicillin-resistant <em>Staphylococcus aureus</em> rates. <em>Journal of Infection Prevention</em>, 17(4), 171–176. doi:10.1177/1757177416645342</td>
<td>Evaluates the impact of implementing a hospital wide environmental and patient cleaning protocol on the rate of MRSA infection and the potential</td>
<td>Time frame Jan 1, 2005 to Sept 30, 2009.</td>
<td>Pre-post interventional study design used to review the hospital’s infection control</td>
<td>MRSA rates decreased by 96% from 3.04 per 1000 pd to 0.11 per 1000 pd. This avoided an estimate $1,655,143 in healthcare costs.</td>
<td>Level III</td>
<td>Non-randomized, limited to one hospital.</td>
<td>Yes, Impressive reduction in MRSA with interventions.</td>
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<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melnyk Framework)</td>
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<td>cost benefit of the intervention.</td>
<td>database for all hospital acquired invasive MRSA infections from Jan 1, 2005 to Sept 30, 2009.</td>
<td>Intervention comprise combination of enhanced environmental cleaning of high touch</td>
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<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melynk Framework)</td>
<td>Study Limitations</td>
<td>Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.</td>
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<td>Wong, S. S., Huang, C. H., Yang, C. C., Hsieh, Y. P., Kuo, C. N., Chen, Y. R., &amp; Chen, L. C. (2018). Reducing health care-associated infections by implementing separated environmental cleaning management measures by using disposable wipes of four colors. <em>Antimicrobial Resistance and Infection Control, 7</em>(34), 1-6. doi:10.1186/s13756-018-0320-6</td>
<td>Determine environmental cleaning measures to reduce HAI</td>
<td>13-bed MICU, 635 admissions-96-98 percent per month with mean duration of stay 6.1-8.4 days.</td>
<td>4-month prospective cohort study. Cleaning of 15 high touch surface areas, ATP measurements before cleaning</td>
<td>Total number of high touch surface area cleaning increased from 13 percent to 53 percent. HAI density was significant reduction during the late period to 9 percent.</td>
<td>Level IV</td>
<td>Single unit observation, no culture for multidrug resistant organisms, did not evaluate hand hygiene adherence</td>
<td>Yes, this study demonstrates features of the proposed project and demonstrates a reduction in HAIs with environmental hygiene adherence</td>
</tr>
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<td>Article</td>
<td>Study Purpose</td>
<td>Sample</td>
<td>Methods</td>
<td>Study Results</td>
<td>Level of Evidence (Use Melnyk Framework)</td>
<td>Study Limitations</td>
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<td>and after cleaning</td>
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Appendix B

Collaborative Institutional Training Initiative Training Certification

This is to certify that:

Shanna Stowe

Has completed the following CITI Program course:

Social & Behavioral Research - Basic/Refresher (Curriculum Group)
Social & Behavioral Researchers (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Liberty University

Verify at www.citiprogram.org/verify/?w4fc5de39-5f49-460b-a268-b6214983104f-21123762
Appendix C

Permission for Use: Iowa Model

11/8/2018

Mail: Stow, Shanna - Outlook

Permission to Use The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care

Kimberly Jordan - University of Iowa Hospitals and Clinics <moreply@qualtrics-survey.com>
Mon 10/28/2018, 10:00 AM
To: Stow, Shanna

You have permission, as requested today, to review and/or reproduce The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care. Click the link below to open.

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care

Copyright is retained by University of Iowa Hospitals and Clinics. Permission is not granted for placing on the internet.


In written material, please add the following statement:

Used/reprinted with permission from the University of Iowa Hospitals and Clinics, copyright 2015. For permission to use or reproduce, please contact the University of Iowa Hospitals and Clinics at 316-384-9098.

Please contact [Redacted] or [Redacted] with questions.
Appendix D

Letter of Support

October 23, 2018

Attention: IRB
Liberty University
Lynchburg, Virginia

IRB Members:

Mrs. Shanna Stowe, BSN, RN, Liberty University Doctor of Nursing Practice Student (Principal Investigator) and Dr. Dorothy Murphy, DNP, FNP-BC, Associate Professor of Nursing, and DNP Scholarly Project Chair (Faculty Chair) have proposed to conduct Mrs. Shanna Stowe’s Doctor of Nursing Practice Scholarly Project: Getting Back to the Basics.

Infection Prevention at [REDACTED] is committed to providing excellent, comprehensive care for our patients, facilitated by the pursuit of quality improvement. Mrs. Shanna Stowe’s, Doctor of Nursing Practice Scholarly Project reflects our commitment that every patient receives optimal quality health care.

Infection Prevention is pleased to support Mrs. Shanna Stowe’s Scholarly project: “Back to the Basics”.

Feel free to contact me if I can be of further assistance.

Respectfully,

[REDACTED]
MSN, RN, CIC, CSPDT, FAPIC
Senior System wide Director
Appendix E

Daily Environmental Checklist for Monitoring High-Touch Surface Cleaning

<table>
<thead>
<tr>
<th>Date:</th>
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<tbody>
<tr>
<td>Shift:</td>
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<tr>
<td>Room Number:</td>
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</table>

Evaluate the following priority sites for each patient room:

<table>
<thead>
<tr>
<th>High-touch Room Surfaces</th>
<th>Cleaned</th>
<th>Not Cleaned</th>
<th>Not Present in Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed rails / controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tray table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Call box / button</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedside table handle</td>
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<td></td>
</tr>
<tr>
<td>Room sink</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom inner door knob / plate</td>
<td></td>
<td></td>
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<tr>
<td>Bathroom light switch</td>
<td></td>
<td></td>
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<tr>
<td>Bathroom handrails by toilet</td>
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<tr>
<td>Toilet flush handle</td>
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</table>

<table>
<thead>
<tr>
<th>High-touch Room Surfaces</th>
<th>Cleaned</th>
<th>Not Cleaned</th>
<th>Not Present in Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV pump and pole</td>
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<td></td>
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<tr>
<td>Multi-module monitor controls</td>
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<tr>
<td>Multi-module monitor touch screen</td>
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<td></td>
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<tr>
<td>Multi-module monitor cables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilator control panel</td>
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<tr>
<td>Other medical devices present in room, attached to patient, in use by patient.</td>
<td></td>
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</tbody>
</table>

Rate the overall Cleanliness of the patient’s room before the intervention using direct observation.

- [ ] Very Soiled
- [ ] Did not notice
- [ ] Somewhat soiled
- [ ] Somewhat clean
- [ ] Very Clean

Any PRN cleaning providing during shift?  
- [ ] Yes  
- [ ] No

What areas where cleaned PRN, and why?

____________________________________________________________________________________

____________________________________________________________________________________
Appendix F

High-Touch Cleaning Protocol

I. High-Touch Surface Cleaning Protocol
   a. Go live date will be July 1, 2019 and will end July 31, 2019. Intervention will be conducted for four weeks.
   b. Participants will complete an overall assessment of the environmental cleanliness of each patient room that they are assigned during their shift. They will rate the cleanliness on a scale from very soiled to very clean. Cleanliness will be rated using visual observation. This observation will be documented on the cleaning protocol flowsheet.
   c. The participants will then perform cleaning with the hypochlorite solution or known as the purple top Sani Cloth that is used on any patient room other than those infected with C. diff. The Isopropyl Alcohol wipe known as the yellow top Sani cloth (bleach wipes) will be used for rooms isolated for C. diff. Cleaning solutions are noted in Appendix G.
   d. Cleaning will be conducted by the participant at the end of each shift so that the oncoming participant will have clean surfaces before their initial contact with the patient and the patient’s environment. This cleaning protocol will not interfere with the other infection prevention bundles that are in place (ie. Handwashing). The purple top Sani Cloth has a two-minute drying time, and the yellow top Sani Cloth has a 4-minute drying time. The surfaces should be left to dry for the entire recommended drying time. Gloves will be used when cleaning the surfaces. Steady friction will be applied during wiping the high-touch surfaces.
   e. Flowsheet will be provided for documenting cleaning intervention and observational rating. Flowsheet can be noted in Appendix E. High touch surfaces that will be monitored and cleaned include:
      i. Bed rails/bed controls
      ii. Tray table
      iii. Hand held call button
      iv. Telephone (if present in room)
      v. IV pump and pole
      vi. Monitoring wires on the patient (EKG cables, pulse ox cable, BP cable)
      vii. Cardiac monitor
      viii. Computer on Wheels and Scanner
      ix. Ventilator surface and control panel.
      x. Patient Bathroom door knob/light switch
      xi. Patient handrails by toilet
      xii. Room Sink/facet handles
      xiii. Other medical devices that are present in the patient’s room, attached to the patient, or in use by the patient. (temp pacer box, IABP, CRRT, etc.).
Appendix G

Cleaning Solution Images
Appendix H

Pre-Survey and Post Survey

High-Touch Surface Area Cleaning Pre-Survey

1. How would you rate the cleanliness of high-touch surfaces in the patient’s immediate environment?
   a) Very soiled
   b) Somewhat Soiled
   c) I have not noticed
   d) Somewhat Clean
   e) Very Clean

2. During your shift, how likely are you to clean the patient’s high-touch surfaces?
   a) Very likely
   b) Likely
   c) Neither likely nor unlikely
   d) Unlikely
   e) Very Unlikely

3. How important is high-touch surface area cleaning in preventing the transmission of pathogens that lead to healthcare associated infections (HAIs)?
   a) Extremely important
   b) Very important
   c) Somewhat important
   d) Not so important
   e) Not at all important

4. How would you rate the level of difficulty in implementing a high-touch surface area cleaning protocol in your daily practice?
   a) Very difficult
   b) Difficult
   c) Neither easy nor difficult
   d) Easy
   e) Very easy

5. What shift do you work?
   a) Dayshift (7a-7p)
   b) Evening Shift (11a-11p)
   c) Night Shift (7p-7a)
   d) Do not wish to answer
Post Survey

How would you rate the effectiveness of the high-touch surface area cleaning protocol for improving environmental hygiene for the patients in the CVICU?

Excellent
Very Good
Good
Fair
Poor

How likely are you to continue using the high touch surface cleaning protocol?

Very likely
Likely
Neither likely nor unlikely
Unlikely
Very unlikely

How would you rate the importance of high touch surface cleaning in preventing the transmission of HAI causing pathogens?

Extremely important
Very important
Somewhat important
Not so important
Not at all important

How would you rate the level of difficulty in implementing a high touch surface cleaning protocol in your daily nursing practice?

Very difficult
Difficult
Neither easy nor difficult
Easy
Very easy

What shift do you work?

Dayshift 7a-7p
Nightshift 7p-7a

During the environmental hygiene pilot, what surfaces did you find to be the most frequently soiled?
Appendix I

PARTICIPANT CONSENT FORM

Back to the Basics High-Touch Surface Cleaning
Shanna Stowe
Liberty University
Doctor of Nursing Practice and Family Nurse Practitioner

You are invited to be in a research study for the Cardiothoracic Intensive Care Unit (CVICU). This study will assist the CVICU in reducing the number of hospital acquired infections by implementing a high-touch surface cleaning protocol. You have been selected as a possible participant because you are part of the direct care staff in the CVICU and have frequent contact with the patients in the CVICU. Each participant must be a direct care employee of the CVICU. The participant must be a registered nurse or nursing assistant to participate in the study. Please read this form and ask any questions you may have before agreeing to be in the study.

Shanna Stowe, a Liberty University Doctoral student in the Doctor of Nursing Practice and Family Nurse Practitioner Program at Liberty University, is conducting this study.

Background Information: The purpose is to implement an evidence-based practice change for improving environmental hygiene in the CVICU by incorporating nursing staff in performing surface cleaning of high-touch areas within the patient’s imamate environment. This intervention will decrease the risk for transmission of pathogens that cause HAIs, thus improving morbidity, mortality, and health care expenditures.

Procedures: If you agree to be in this study, I would ask you to do the following things:

1. Complete a pre-intervention survey that will be administered via email using Survey Monkey.
2. Demonstrate understanding of the educational Poster on High-Touch Surface Cleaning that will present in the CVICU breakroom.
3. Participate in the four-week high-touch surface area cleaning protocol and document participation on the flowsheet each shift.
4. Participate in the Post-intervention survey that will be administered via email using Survey Monkey.

Risks: The risks involved in this study are minimal and may include possible breach in data and possible added stress or anxiety for incorporating the intervention in daily practice. The project will maintain the rights of the patient as outlined in the facility’s patient handbook. Data collection for this project will not include identification of individual patients or CVICU staff members. The surveys will be anonymous and administered through Survey Monkey via the facility’s email. At any time during the study, the participant may discontinue their participation for any reason.

Benefits: Participants should not expect to receive a direct benefit from taking part in this study, other than learning about high-touch surface cleaning and the risk of high touch surfaces in the transmission of pathogens.
Benefits to the patient population include cleaner hospital environment and a reduction in possible transmission of hospital acquired infections. Benefits to the organization include a reduction in cost and mortality form hospital acquired infections.

**Compensation:** Participants will not be compensated for participating in this study. Email addresses will be requested for study purposes, however they will be pulled and separated from your responses by Survey Monkey to maintain anonymity.

**Confidentiality:** The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records.

- Procedures taken to protect the privacy of the participants includes anonymous survey use and anonymous flowsheet documentation
- The data/flowsheets will be stored in a folder in the RN III office behind a locked door. The data will also be password protected on the project leader’s computer once information is placed in the excel program. The information will be stored for three years per federal regulations.
- Limitations of confidentiality may be noted for those participants that agree to participate in the support of the entirety of the study (Clinical support including RN III, Department Leader, etc.)

The researcher serves as a student and project leader at [redacted]. To limit potential conflicts the student will not be working under the direct supervision of the student’s direct working supervisor. This disclosure is made so that you can decide if this relationship will affect your willingness to participate in this study. No action will be taken against an individual based on his or her decision to participate in this study.

**Financial Interest:** There is not a financial interest in the outcome of this study. The project leader is not a paid board member or the sponsoring organization and there is not a stock in sponsoring the organization. The is not funded nor sponsored. This disclosure is made so that you can decide if this relationship will affect your willingness to participate in this study.

**Voluntary Nature of the Study:** Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University [redacted]. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the pre-survey without affecting those relationships.

**How to Withdraw from the Study:** If you choose to withdraw from the study, please inform the researcher that you wish to discontinue your participation prior to submitting your study materials. Your responses will not be recorded or included in the study.

**Contacts and Questions:** The researcher conducting this study is Shanna Stowe. You may ask any questions you have now. If you have questions later, you are encouraged to contact her at [redacted] or [redacted]. You may also contact the researcher’s faculty chair, Dr. Dottie Murphy, at [redacted].
If you have any questions or concerns regarding this study and would like to talk to someone other than the researchers, you are encouraged to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information for your records.

**Statement of Consent:** I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

________________________________________
Signature of Participant Date

________________________________________
Signature of Investigator Date