Utilizing Training and Educational Materials to Increase Hand Hygiene Compliance of Healthcare Providers Participating in Cesarean Sections

Christopher Natividad

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Utilizing Training and Educational Materials to Increase Hand Hygiene Compliance of Healthcare Providers Participating in Cesarean Sections

Christopher Natividad

University of San Francisco, School of Nursing and Health Professions

NURS 653: Internship

Lisa Brozda, RN, MSN, CNS

May 11, 2022
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Abstract

Surgical site infections (SSIs) are one of the most common complications of Cesarean section (C-section) procedures. The incidence of SSIs after C-section procedures at Hospital X has increased in each of the past three years. The Labor and Delivery (L&D) unit at Hospital X performs approximately 4,500 C-sections each year. Observation of these procedures illustrated a lack of adhesion to hand hygiene policies and protocols. This quality improvement project involved informing staff members of the poor hand hygiene compliance rates, and re-educating them regarding proper hand hygiene behavior using flyers, emails, and addressing them at shift change. Data collection focused on hand hygiene compliance among staff members involved in the C-section procedure. Staff members were observed entering and exiting the operating room to determine if they performed hand hygiene upon entry or exit. Hand hygiene compliance increased by 8.8% among all staff members. Obstetric (OB) nurse hand hygiene compliance increased by 28.6%. While overall hand hygiene compliance increased, it was not statistically significant; however, the increase in OB nurse compliance is statistically significant. Implementation of educating the OB nurses proved to be successful, and future interventions were recommended to continue to monitor and improve hand hygiene compliance.

*Keywords:* hand hygiene, handwashing, infection, surgical site infection, Cesarean, C-section, compliance
Section II: Introduction

Introduction

The Labor and Delivery (L&D) unit at in-patient hospitals can be one of the most celebratory and joyous units in which to work. Healthcare staff working on this unit have the privilege of aiding the delivery of newborns into the world. They welcome the sons and daughters of excited mothers and fathers every day. Whether the child is born vaginally, or by cesarean section (C-section), the healthcare team functions cohesively to ensure the safest care is being delivered. Members across all disciplines of healthcare are involved to protect the newborn, and the mother. The C-section method is considered a surgical procedure; while both vaginal and C-sections carry their own risks, C-sections are accompanied by the additional surgical procedure risks, including surgical site infections (SSIs).

The procedural incisions of C-sections cut through multiple layers of the body, starting at the skin, and working down to the uterus. SSIs can occur at the different layers of these incisions. Surgical site infections are defined as infections that occur at the part of the body where surgery was performed (Centers for Disease Control, 2010). They can be superficial or they can involve the deeper organs under the layer of skin. Hospital X has been tracking their SSI rate of their C-sections, and has been continuously researching methods to maintain a low rate of SSIs over the past 3 years.

Reducing the rate of these infections occurring can be attained through multiple methods; however, this paper focuses on hand hygiene, which is renowned as the single most effective action that can be taken to prevent the spread of infections (World Health Organization, 2021). While the ultimate goal is the reduction in SSIs, the main goal of this quality improvement
HAND HYGIENE COMPLIANCE

project is to increase hand hygiene compliance among healthcare members who participate in C-section procedures on the L&D unit at Hospital X.

Problem Description

Keeping track of infection rates is an extremely useful statistics for hospitals to improve patient care, particularly keeping track of hospital-acquired infections (nosocomial infections/HAI). Studying and observing infection rates and trends allows for analysis to determine potential causes and solutions. The L&D unit at Hospital X tracks their SSI rates following C-section procedures in order to continuously evaluate the care being provided and the outcomes of their patients. In 2019, Hospital X experienced 16 SSIs from C-sections, 18 SSIs in 2020, and 20 SSIs in 2021 (Hospital X, 2022). They performed 1,494 C-sections in 2021, resulting in an incidence rate of 1.3% of SSIs occurring in C-section patients. While this number is still below the national benchmark of 3-15%, this significant uptick in SSIs over the past 3 years necessitates careful observation and interpretation to determine potential causes and solutions (Saeed et al., 2017).

The Infection Prevention & Control (IPC) department at Hospital X recommended three areas of focus from which to select a topic to assist in reducing the surgical site infection rate. These operating room (OR) areas were hand hygiene, attire, and traffic. These suggestions aligned with ideas suggested by the coordinators and supervisors of the quality improvement project. After discussing with project leaders and other staff members, hand hygiene became the focus of the project, due to the strong evidence found in the literature review, ease of implementation and measurability in a restricted time frame.

Hand hygiene data collected by IPC from the past 12 months indicated an 83% compliance rate on the unit, compared to the target goal of 90% at Hospital X. However, this
data cannot be used as baseline data due to its inclusion of regular patient rooms, and limited observational audits (5 audits per unit per week). This difference in data collection necessitated a period of time for gathering observations specific to this project to establish a baseline. After establishing a baseline, education would be performed, and post-education observations would be performed in comparison with the baseline. Additionally, due to the short timeline available the success would be measured by compliance and not reduced SSI rate; reducing the incidence of SSIs as the ultimate result of this project remains the same.

**Literature Review**

A literature review was conducted to help determine the potential effectiveness of hand hygiene on reducing SSI rates and the interventions that were most effective in raising hand hygiene compliance. The aim of the literature review was to determine the effectiveness and correlation of these aspects in reducing SSI rates. Several databases were accessed to secure literature for review including CINAHL, PubMed, and EBSCO Host. The following PICOT question was used to direct the literature search: Within the L&D unit at Hospital X, how does reminding healthcare professionals of proper hand hygiene increase hand hygiene compliance compared to current observed rates within three months, and ultimately reduce the number of C-section related surgical site infections? The keywords used in the literature search included, but were not limited to, the following: hand hygiene, handwashing, surgical site infections, infections, compliance, cesarean, C-section, delivery, operating room, scrubbing, and sterile. After peering through many of the articles that resulted from the search engine, eight articles were used to guide the project, and to provide insight into implementing this project in the microsystem.
Hand hygiene is one of the most elementary lessons when beginning a healthcare career. It is regarded as one of the most crucial aspects of infection prevention and control, and is considered “the single most effective action to stop the spread of infection” (WHO, 2021). Hand hygiene is most effective when performed thoroughly, and at the appropriate times. The World Health Organization (WHO) has listed these opportunities as the 5 Moments for Hand Hygiene. They include: “1) before touching a patient; 2) before clean/aseptic procedures; 3) after body fluid exposure/risk; 4) after touching a patient; 5) after touching a patient surroundings” (WHO, 2021). While this is a fundamental behavior that is taught, it often becomes overlooked. One study found that when observing hand hygiene “a breakdown in practice occurred…” when multiple tasks needed to be performed for a patient (Greggory et al., 2019). Although this study occurred during the observation of contact precaution rooms, it is evident that even when hand hygiene is more important, it is still a task that can be overlooked. It can also be observed in other units; “hand hygiene compliance is generally low in ICUs owing to difficulties linked to specific aspects of critical patient care” (Masson-Roy et al., 2018). Even in ICUs, where patients are at higher risk for developing complications, and “more than 35% of patients develop sepsis”, handwashing is not performed as it should be to prevent infection (Masson-Roy et al., 2018).

Hand hygiene compliance is a measure that describes how well staff members are adhering to proper behaviors. With a constant stream of patients in labor and delivery units, hand hygiene compliance is “pivotal to preventing infections” (Gon et al., 2020). A systematic review was conducted focusing on compliance percentage and interventions implemented to improve compliance. It was interesting that they found the quality of the studies to be generally poor, being “compromised by poorly described sampling methods and definitions” (Gon et al., 2020). Understanding why the studies were poor in quality guided project implementation. The paper
concluded that future studies should have larger sample sizes, evaluate for observer effects, improving data quality with increased observations, and also clearly defining hand hygiene. These were some of the aspects the QI team considered with the project, and how similar issues would be addressed.

Before a change can be implemented to address hand hygiene behaviors, understanding attitudes and perspectives towards current hand hygiene practices is essential. When patients, families, and visitors were surveyed, “beliefs about consequences were the main driver for hand hygiene”; however, observed rates of performing hand hygiene were still low, despite the belief that it is “important in reducing the transmission of infectious diseases (Lee et al., 2021). Even among healthcare professionals who are provided training and proper education regarding hand hygiene, many believe that it is “poorly performed and may contribute to a higher incidence of surgical site infections” (Ooi et al., 2018). While the implementation is targeted to increase hand hygiene compliance and inform staff members of the policies and procedures, these articles provided insight into the creation of engaging educational media that would be most effective. Understanding perceptions regarding the importance of hand hygiene and other policies need to be taken into consideration when designing the implementation to best address the population.

One of the studies observed an implementation similar to an educational intervention, aimed to “identify the knowledge gap, behavioral and attitudinal issues related to hand hygiene” (Allen et al., 2021). They were able to observe a statistically significant difference between their pre-intervention and post-intervention surgical infection rates using a 60 minute, online education training. Other forms of re-education are also effective, as “staff education programs and refresher courses in aseptic and scrub techniques have been shown to reduce the incidence of SSI in elective and non-elective cesarean deliveries” (Zuarez-Easton et al., 2016). There are
other factors included in preventing SSIs; many facilities institute an SSI bundle, which is a series of measures taken to prevent surgical site infections. This might also include hand hygiene procedures pertaining to surgical sites. In addition to specific skin preparation and prophylactic antibiotic administration based on the patient’s case, many places require healthcare staff to perform “a 3 to 5-minute scrub…with appropriate antiseptic…at the beginning of each shift” (Witter et al., 2014). Other aspects are utilized in conjunction with hand hygiene, but hand hygiene is still essential and critical to preventing infection.

**Theoretical Framework**

The theoretical framework that will be used to guide this project is Spradley’s change theory. Spradley’s change theory is a derivative of Lewin’s theory of change. Spradley’s change theory is an eight-step process: 1) recognizing a need for change, 2) diagnosing the problem, 3) analyzing alternative solutions, 4) selecting the implementation, 5) planning the change, 6) implementation, 7) evaluation of the change, and 8) stabilizing the change. This theory “provides for constant evaluation of the change during implementation...” and also “allows for the investigation of multiple alternatives to the problem” (Stolley, 2005).

The first steps of the theory involve a recognition of the need for change, and diagnosis of the problem. The clinical nurse leaders (CNLs) at Hospital X were observing an increased rate of SSIs in their Labor and Delivery department, and recognized the need for change. Upon recommendation from the Infection Prevention & Control department, they diagnosed a problem with operating room behaviors. They were specifically concerned about operating room data pertaining to attire, foot traffic, and hand hygiene compliance rates. After diagnosing these problems, there were several areas for improvement and ways to create solutions to these problems.
The following steps involved analyzing alternative solutions, selecting which changes to implement, and beginning to plan the change. After observing the issues of implementation difficulty, intervention timeline, and easy of measuring outcomes, alternative solutions were considered for each of these issues, and hand hygiene was determined to be the simplest and most-effective to improve. Auditing staff members, re-educating them, and reminding them about proper hand hygiene policies was selected implementation. After careful consideration, the QI team decided to present at staff meetings, change-of-shift, and to distribute e-mails to the various medical disciplines involved with the care of C-section patients. The change was planned during the auditing and data collection phase.

The final steps involve implementing the change, evaluating the effectiveness of the implementation, and stabilizing the change. After planning the education and staff reminders, the QI team was able to execute the plan and inform the various team members of the project and remind them of the policies and procedures at Hospital X. After education, 6 more post-intervention audits were conducted to observe the effectiveness of the change and if hand hygiene compliance would increase. While auditing will not be continued by the QI team, barriers were identified during the project that could guide future projects when implementing more continuous auditing measures, or potentially lead the development of a hand hygiene education program that reminds staff of its importance.

**Specific Project Aim**

The specific aim of this project is to increase hand hygiene compliance by 10% for MDs and by 5% for RNs providing care for patients undergoing C-sections through re-education of hand hygiene policies and procedures, with the goal of ultimately reducing the rate of surgical site infections.
Section III: Methods

Microsystem Assessment

The L&D unit at Hospital X has three operating rooms. These operating rooms provide areas for healthcare workers to assist in the delivery of newborns by C-section. The 3 operating rooms are accessed from the operating room hallway which has 2 entrances (back and front), known as the sterile court, where there is a surgical scrub station for staff members that need to scrub in before performing the C-section. Sanitizing stations are also implemented outside and inside the operating room, so it can be easily accessed upon entry or exit. The aseptic area of the sterile court is delineated by a red line, requiring staff to equip themselves with the proper surgical gear to enter the surgical area. This includes: surgical cap, hospital-laundered scrubs acquired on the unit that day, shoe covers or booties, and a surgical mask with eye protection.

The staff members on the unit communicated well and worked cohesively to provide excellent care to their patients. Members from all disciplines communicate well with the patient, and each other, to ensure the patient is receiving the best care possible. Staff members are not hesitant to raise concerns, request equipment, or ensure the patient’s safety. They communicate the needs of the patient, and continuously assure and inform the patient of the progress and their status.

A SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was conducted for this project, and illustrated the potential forces that could aid or hinder this project (Appendix E). Decreasing the number of surgical site infections and increased hand hygiene compliance are strengths that could result from the implementation of this intervention. Additionally, these strengths are accompanied by opportunities of having reduced hospitalization time, a lower rate
of complications following delivery, and a lower financial cost to the hospital. However, there are also forces that could impede the implementation.

Staff apathy towards implementation can make it difficult to reach the goal of increasing compliance; furthermore, the Hawthorne effect – an effect wherein observers change their behavior due to their awareness of being observed – can affect the validity of the audits. A limited time frame also affected the ability to gather a larger sample size. Threats to the project such as holding colleagues accountable and the presence of other priorities on the unit also make it difficult to achieve the goal. A prominent threat to this implementation is the physician pushback, particularly regarding their apathy towards OR attire policies and limited training to providers. Nursing staff are also resistant to adhere to the hand hygiene policies regarding removing jewelry, and performing the appropriate three minute scrub before their shift. Although the weaknesses and threats can seem extremely impactful, the strengths and opportunities are sufficiently impactful as well.

A Gantt chart – a bar chart illustrating a project timetable – was utilized for this project to guide the timeline for this implementation (Appendix C). The timeline was adjusted and altered as barriers were encountered and issues arose to fit the deadlines for this project. There was significant overlap between the Plan, Do, and Study phases, depending on the stage of implementation. The most critical steps of conducting research and scheduling with staff members occurred in weeks 1-4. The pre-implementation audits occurred in weeks 4-7. Staff members were educated during weeks 9 and 10. Post-implementation observations occurred during in weeks 11-13. After the final round of observations, the data was compiled, analyzed, and presented.
Cost-Benefit Analysis

The main cost of this implementation is the cost of the time spent presenting to staff during staff and committee meetings. Staff members are compensated for their time spent attending meetings; spending time educating staff and presenting to staff during those meetings is the most significant cost. The estimated cost for education and presenting during meetings is about $3,720 (Appendix F). The materials necessary to create flyers to post on the unit was a relatively low cost, approximately $100. The total cost of the quality improvement project implementation is approximately $3,820.

Hospital X had a total of 20 surgical site infections in 2021. The estimated cost of an SSI is about $45,000; SSIs cost hospital X $900,000 during that time period (Hospital X, 2021). If SSIs are completely eliminated, hospital X could save $900,000. Attaining complete elimination of SSIs is extremely difficult due to other various factors that could be causing SSIs. If one SSI is prevented as a result of this implementation, the hospital saves $41,180. For each subsequent SSI prevented, the hospital would save an additional $45,000. Other benefits of preventing SSIs include reduced readmissions, reduced supplies and cost of staff time, and improved patient satisfaction. Additionally, mothers will have a more positive birth/surgical experience, and will have uninterrupted bonding time with their newborn postpartum.

Intervention

The intervention was presenting and educating staff about the proper hand hygiene behaviors in accordance with the policies at Hospital X since 2004. Presentations were demonstrated at staff meetings and committee meetings regarding the findings of increased SSI rates within the past fiscal year, as well as reminding staff about proper hand hygiene behaviors, particularly in the operating room on the L&D unit at the hospital. The QI team presented to
more than 120 OB nurses over the course of two weeks, and informed OB and pediatric physicians, as well as the anesthesiology team by email. The education included, but was not limited to: the appropriate instances of hand hygiene, why hand hygiene is important, and how hand hygiene can lead to devastating infections post-procedure that could negatively impact the mother’s recovery process.

In addition to presenting at staff meetings, hand hygiene flyers were created and posted in several areas around the unit. One of the flyers contained general hand hygiene information (Appendix J), while the second flyer contained more specific hand hygiene information related to the operating room (Appendix K). In conjunction with these flyers being printed and posted around the unit, two weeks were spent educating and informing staff at change of shift. A two-minute informational speech about the pre-intervention findings, the purpose of the project, and the recommendation moving forward was given at shift change (Appendix L). A total of nine change-of-shift education session were conducted; attention was also drawn to the flyers at each shift change education session. Staff were also asked to fill out a survey (Appendix H and Appendix I), to determine their understanding and attitude toward the hand hygiene policies.

Study of the Intervention

In order to evaluate the effectiveness of the intervention, compliance rates needed to be collected both before and after the intervention was implemented. Auditing was performed in the same manner both before and after the intervention. One person was stationed outside the operating room (OR) and one person was stationed inside the OR concurrently in order to observe all instances of hand hygiene. The auditors observed staff members entering and exiting the OR, and noted if proper hand hygiene was performed upon entering or exiting the room. Before implementation, six C-sections were observed during the day shift to determine hand
Hand hygiene compliance rates. During implementation, a survey was promoted to staff members to complete, in order to understand hand hygiene attitudes and perspective, as well as provide any feedback regarding implementation.

After implementation, six C-sections were observed during the day shift to determine hand hygiene compliance rates. The observation sessions were kept as similar as possible in order to limit any external factors affecting the data collection. After observation, the data was compiled and analyzed to determine the hand hygiene compliance for all individuals observed, and separated by role. A one-tail, two-sample of unequal variance t-test was performed to determine if the hand hygiene compliance was statistically significant.

Section IV: Results

In the pre-intervention auditing period, 113 staff members were observed over 6 C-sections; the average hand hygiene compliance was 57%. Hand hygiene compliance upon entering was 67%, while compliance on exiting was 47%. Pediatric nurses had the best hand hygiene behavior with a 71% compliance rate, while the anesthesia team had the worst with a 54% compliance rate. In the post-intervention auditing period, 120 staff members were observed over six C-sections; the average hand hygiene compliance was 66%. Average compliance upon entering was 70.8% and average compliance upon exiting was 61%. Obstetric (OB) nurses had the highest compliance at 87%, while OB physicians had the lowest compliance at 49%. Average hand hygiene compliance increased by nearly 9%. 
Section V: Discussion

Summary

After reviewing and analyzing the data, the QI team determined that the implementation of the project was able to increase hand hygiene compliance among staff members overall. However, when evaluating the effectiveness by role, compliance by physicians slightly decreased; compliance by OB nurses and pediatric nurses increased to 87% and 85% respectively. With the re-education and reinforcement of appropriate hand hygiene policies and procedures, the quality improvement project was effective in raising hand hygiene compliance. A one-tail t-test of unequal variance was used to determine the statistical significance of the findings. A p-value of less than 0.05 (p<0.05) is considered statistically significant. When considering the observation of all staff members, a p-value of 0.055 was calculated, indicating that the 9% increase in compliance is not statistically significant.

When evaluating the effectiveness of the project implementation, it’s important to consider the types of interventions that occurred. The education and interaction with the OB nurses was significantly higher than interaction with any other group of healthcare team members. While the physicians, pediatric nurses, and anesthesiology team only received e-mails regarding the project and education, there was much more engaging education with OB nurses. They received a total of 9 change of shift education speeches, and were also receiving the information at staff meetings directly from the students. OB nurse hand hygiene compliance increased from 58% to 87% (nearly 30% increase), with a p-value of 0.015. This increase in observed compliance is statistically significant. This can be attributed to the increased exposure to the materials that the nurses received. It may also be attributed to their increased awareness of the project, and the Hawthorne effect during auditing.
The Hawthorne effect is a sociological principle that states individuals will alter or modify their behavior due to their awareness of being observed. Concerning the implementation, staff members are aware of the project and auditing process. When they see auditors inside the operating room (OR), or in the sterile court, they may be reminded to sanitize because they are aware they are being observed. One possible solution that can be used to combat the Hawthorne effect is to utilize a micro-camera similar to the one used in the paper by Ooi et al. in 2018, which costs ~$30. In the study by Ooi et al. in 2018, surgeons were notified that a camera was being utilized, but were not informed when recording would be taking place. This could be utilized in Hospital X to increase hand hygiene compliance, and also reduce the Hawthorne effect, leading to more representative data. Utilizing one camera at each OR entrance, and one camera at the scrub sink would be a total of four cameras, leading to an estimated increased cost of ~$120 for implementation.

The main barriers that were encountered with implementing this project were the limited time frame, the difficulty in reaching several other disciplines, and occasional difficulty determining people’s roles. Ideally, more C-sections would be observed, in addition to observing night-shift C-sections to gather a more comprehensive data set. Unfortunately, due to the limited timeline of the project being due in early May, only six C-sections were observed both before and after the intervention. When attempting to educate staff members, the OB nursing team was the easiest to educate and interact with. When attempting to educate OB physicians, pediatric physicians, and the anesthesiology team, e-mails regarding the project and recommendations were the limit of the interaction. Pediatric nurses were also limited to e-mails; however, there was a staff member from OB that was able to attend a pediatric staff meeting and encourage
increased hand hygiene, so the project was able to achieve increased exposure with those healthcare members.

Lastly, it was sometimes difficult to identify people’s roles. When entering the operating room, the outside auditor is only able to take a quick glance at the ID badge while the staff member is passing by. The inside auditor is careful not to impede or distract the healthcare members from performing their duties, so they maintain a professional distance to ensure best care is still being provided. Additionally, many of the staff members were wearing gowns, which covered their badges. These barriers made it difficult to efficiently implement and evaluate the project, but these difficulties were adapted to and overcome by communicating and asking staff members about their role, as well as verifying names and roles using the EPIC electronic health record system.

Moving forward, utilizing a camera like the implementation in Ooi et al., 2018 would allow for ongoing monitoring and reduce the influence of the Hawthorne effect. It is a relatively cheap cost of implementation in comparison to the financial burden of a surgical site infection. Additionally, investigating the physician onboarding modules and ensuring hand hygiene is emphasized during their onboarding might increase hand hygiene compliance. Short, monthly in-service trainings and reminders regarding the hospital’s policies and procedures, as well as the opportunities for hand hygiene could lead to increased compliance.

Conclusion

Hand hygiene is an important part in preventing the spread of infection. Lack of proper adherence to hand hygiene behavior can lead to surgical site infections, impaired recovery for patients, and increased cost to hospitals. After re-educating staff members about the importance of hand hygiene, a 9% overall increase in hand hygiene compliance was observed. While
auditing is important, it might be more efficient to investigate alternatives to in-person auditing that would be more efficient. This would allow a more comprehensive auditing process, and can lead to a study that spans a longer period of time. Understanding the correlation between hand hygiene compliance and surgical site infection rate will help drive resources into other quality improvement projects to continuously investigate the best patient outcomes.
Section VI: References


Hospital X. (2022). *C-section Reports*. [Data set]


Hospital X. (2022). *Back to Basics*. [Powerpoint slides]


Section VII: Appendices

Appendix A: IRB Non-Research Determination Form

**EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST** *

Instructions: Answer YES or NO to each of the following statements:

<table>
<thead>
<tr>
<th>Project Title: OR Best Practices to Increase Hand Hygiene Compliance to Ultimately Decrease C-Section SSIs</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The specific aim is to improve performance on a specific service or program and is a part of usual care. ALL participants will receive standard of care.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does NOT follow a protocol that overrides clinical decision-making.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does NOT develop paradigms or untested methods or new untested standards.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does NOT seek to test an intervention that is beyond current science and experience.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/or patients.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: “This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”

**ANSWER KEY:** If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does **NOT** meet the definition of research. **IRB review is not required.** Keep a copy of this checklist in your files. If the answer to any of these questions is **NO**, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

**STUDENT NAME (Please print):**

______________________________
Christopher Natividad

Signature of Student:

__________________________________________ DATE 5/14/2022

**SUPERVISING FACULTY MEMBER NAME (Please print):**

______________________________
Lisa Brozda, RN, MSN, CNS

Signature of Supervising Faculty Member

__________________________________________ DATE 5/14/2022
Appendix B: Statement of Determination

Statement of Determination

The labor and delivery unit at Hospital X has experienced an increased number of surgical site infections (SSIs) among patients who underwent C-section deliveries. Hand hygiene compliance within the labor and delivery unit has not reached Hospital X target goals based on previous IPC auditing data. The aim is to increase hand hygiene compliance among healthcare professionals caring for the patient undergoing a C-section. The process begins with observations and audits of healthcare workers’ hand hygiene behaviors, and ends with observing hand hygiene behaviors after educating and reminding staff of proper hand hygiene. By working on the process, hand hygiene compliance is expected increase by 10% among MDs and by 5% among nurses by the end of May, and ultimately, the rate of surgical site infections should decrease. It is important to work on this now because the number of infections is increasing, and it impairs patient recovery, bonding with newborns, and hospital costs.
## Appendix C: Gantt Chart

<table>
<thead>
<tr>
<th>TASK</th>
<th>START</th>
<th>END</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meetings with Supervisors</td>
<td>Week 1</td>
<td>Week 6</td>
</tr>
<tr>
<td>Interview IPC Audit Process</td>
<td>Week 2</td>
<td>Week 2</td>
</tr>
<tr>
<td>Research and Literature Review</td>
<td>Week 1</td>
<td>Week 4</td>
</tr>
<tr>
<td><strong>Do</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Educational Material</td>
<td>Week 4</td>
<td>Week 6</td>
</tr>
<tr>
<td>Pre-Education Audits</td>
<td>Week 5</td>
<td>Week 7</td>
</tr>
<tr>
<td>Educate Staff</td>
<td>Week 9</td>
<td>Week 11</td>
</tr>
<tr>
<td>Post-Education Audits</td>
<td>Week 11</td>
<td>Week 13</td>
</tr>
<tr>
<td><strong>Study</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Education Data Analysis</td>
<td>Week 8</td>
<td>Week 9</td>
</tr>
<tr>
<td>Post-Education Data Analysis</td>
<td>Week 13</td>
<td>Week 14</td>
</tr>
<tr>
<td><strong>Act</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation</td>
<td>Week 15</td>
<td>Week 15</td>
</tr>
</tbody>
</table>
Appendix D: Fishbone Diagram

[Diagram showing the relationship between process, attitude, environment, and management factors affecting hand hygiene compliance.]

- **Process**
  - No time for 3 minute scrub
  - Not educated regarding WHO's 5 moments of hand hygiene
  - Hands full when entering or exiting
  - Unaware of IPC auditing standards and techniques
  - Scub-suits located in the middle of all three operating rooms
  - Inaccessible hand sanitizer stations in OR A
  - No Avagard stations near OR doors
  - Fast-paced environment with periodic emergencies

- **Attitude**
  - Staff Apathy
  - Nurse's decline to follow policy
  - Anesthesia not touching patients
  - Providers lack of interest

- **Environment**
  - Hawthorne bias & ambiguity of staff identities due to same uniform
  - Lack of accountability of staff members
  - New education or routine updates regarding compliance
  - Different hand hygiene educational standards based on role (no Healthstream modules for providers)
  - Lack of buy-in and communication with providers

- **Management**
  - Staff Apathy
  - Nurse's decline to follow policy
  - Anesthesia not touching patients
  - Providers lack of interest

**Non-compliance of Hand Hygiene**
### Appendix E: SWOT Analysis

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Decreased number of SSIs</td>
<td>• Staff apathy</td>
</tr>
<tr>
<td>• Improved hand hygiene compliance</td>
<td>• Lack of acknowledgement of poor hand hygiene</td>
</tr>
<tr>
<td>• Staff properly educated about importance of hand hygiene</td>
<td>• Ability to spread importance of hand hygiene to staff</td>
</tr>
<tr>
<td>• Staff knows when to do proper hand hygiene</td>
<td>• Hawthorne effect during audits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduced hospitalization time</td>
<td>• Not holding colleagues accountable</td>
</tr>
<tr>
<td>• Improved mother-newborn bonding</td>
<td>• Presence of other priorities on the unit</td>
</tr>
<tr>
<td>• Reduced financial cost of caring for patient’</td>
<td>• Unit environment can affect adherence</td>
</tr>
<tr>
<td>• Lower rate of complications following delivery</td>
<td>(higher OR compliance other units)</td>
</tr>
<tr>
<td>• Higher patient satisfaction</td>
<td></td>
</tr>
</tbody>
</table>
Appendix F: Cost-Benefit Analysis (CBA)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials (posters, paper, etc.)</td>
<td>$100</td>
</tr>
<tr>
<td>Staff Presentation</td>
<td>$2,790</td>
</tr>
<tr>
<td>Committee Presentation</td>
<td>$930</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$3,820</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Site Infection Cost</td>
<td>$45,000</td>
</tr>
<tr>
<td>First SSI Prevented</td>
<td>$41,180</td>
</tr>
<tr>
<td>Each Subsequent SSI Prevented</td>
<td>$45,000</td>
</tr>
</tbody>
</table>

~$93/hour

15 minute presentation (staff meeting ~120 people)

15 minute presentation (committee ~40 people)

Calculation: \((15 \text{ minutes}) \times \frac{1 \text{ hour}}{60 \text{ minutes}} \times \frac{\$93}{1 \text{ hour per person}} \times 160 \text{ people} = \$3,720\)
### Appendix G: Auditing Tool

<table>
<thead>
<tr>
<th>What is your role?</th>
<th>What is your role?</th>
<th>What is your role?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name/initials?</td>
<td>Name/initials?</td>
<td>Name/initials?</td>
</tr>
<tr>
<td>Which unit/department are you observing hand hygiene compliance?</td>
<td>Which unit/department are you observing hand hygiene compliance?</td>
<td>Which unit/department are you observing hand hygiene compliance?</td>
</tr>
<tr>
<td><strong>Inside OR</strong></td>
<td><strong>Outside OR</strong></td>
<td><strong>Inside OR</strong></td>
</tr>
<tr>
<td><strong>Outside OR</strong></td>
<td></td>
<td><strong>Outside OR</strong></td>
</tr>
</tbody>
</table>

#### What is the role of the person you're observing?
- OB Tech
- Peds Tech
- OB Nurse
- Peds Nurse
- OB Physician
- Peds Physician
- Anesthesiologist
- Med Student
- Other

#### Time:
- Person # Description
  - Female
  - Male
- Hair:
- Scrub cap:
- Shoes:
- Ht: Short, Avg, Tall
- Skin: light, med, dark
- Other

#### Was hand hygiene performed upon entering the patient space?
- Yes
- No
- N/A

#### Was hand hygiene performed upon exiting the patient space?
- Yes
- No
- N/A

#### What are barriers to performing hand hygiene?
- Forgot (side tracked, distracted)
- Hands full (holding supplies)
- Inconvenient (takes too long)
- Lack of knowledge (not trained)
- Skin irritation
- Unplanned patient contact (was not planning to provide patient care)
- Urgent patient need (code)
- Other

#### Was hand hygiene performed upon exiting the patient space?
- Yes
- No
- N/A

#### What are barriers to performing hand hygiene?
- Forgot (side tracked, distracted)
- Hands full (holding supplies)
- Inconvenient (takes too long)
- Lack of knowledge (not trained)
- Skin irritation
- Unplanned patient contact (was not planning to provide patient care)
- Urgent patient need (code)
- Other
Appendix H: Staff Survey Form

Staff Survey on Hand Hygiene Compliance

USF CNL students are completing a quality improvement project to ultimately decrease surgical site infections and promote OR best practices. Thank you for taking the short time to fill out this survey to assess hand hygiene compliance within the Labor and Delivery unit of LPCH. Please leave any feedback in this survey.

* Required

Please select your role at LPCH:

☐ Registered Nurse OB
☐ Anesthesia Tech
☐ OB Tech
☐ OB Provider
☐ Anesthesia Provider

I am confident that I know the hand hygiene protocol for

☐ 1 Strongly Disagree
☐ 2 Disagree
☐ 3 Neither Agree/Disagree
☐ 4 Agree
☐ 5 Strongly Agree

I wash my hands thoroughly for 3 minutes at the start of shift using the proper technique.

☐ 1 Strongly Disagree
☐ 2 Disagree
☐ 3 Neither agree/disagree
☐ 4 Agree
☐ 5 Strongly Agree

I practice hand hygiene both before and after having contact with patients and their surroundings.

☐ 1 Strongly Disagree
☐ 2 Disagree
☐ 3 Neither agree/disagree
☐ 4 Agree
☐ 5 Strongly Agree

I have enough time to perform hand hygiene throughout my shift.

☐ 1 Strongly Disagree
☐ 2 Disagree
☐ 3 Neither Agree/Disagree
☐ 4 Agree
☐ 5 Strongly Agree

I often forget to perform hand hygiene.

☐ 1 Strongly Disagree
☐ 2 Disagree
☐ 3 Neither Agree/Disagree
☐ 4 Agree
☐ 5 Strongly Agree

I use Avagard or perform a surgical scrub prior to entering the OR.

☐ 1 Strongly Disagree
☐ 2 Disagree
☐ 3 Neither Agree/Disagree
☐ 4 Agree
☐ 5 Strongly Agree
☐ N/A

I believe proper hand hygiene prevents surgical site infections.

☐ 1 Strongly Disagree
☑ 2 Disagree
☐ 3 Neither Agree/Disagree
☐ 4 Agree
☐ 5 Strongly Agree

Do you have any feedback for USF Students working on hand hygiene compliance in L&D unit at LPCH? Please provide answer below. Thank you for your time.

Your answer
Appendix I: Staff Survey Results

Please select your role at
63 responses

I have enough time to perform hand hygiene throughout my shift.
63 responses

I am confident that I know the hand hygiene protocol for
63 responses

I often forget to perform hand hygiene.
63 responses

I wash my hands thoroughly for 3 minutes at the start of shift using the proper technique.
62 responses

I use Avagard or perform a surgical scrub prior to entering the OR.
62 responses

I practice hand hygiene both before and after having contact with patients and their surroundings.
63 responses

I believe proper hand hygiene prevents surgical site infections.
63 responses
Do you have any feedback for USF Students working on hand hygiene compliance in L&D unit at?

Please provide answer below. Thank you for your time.

8 responses

nice work!

Try to collect data from inside the room too—sometimes that’s where hand hygiene is done, since we’re supposed to do it in front of patients. If you don’t have these data, be careful with conclusions. Glad you’re doing this!

No

Last question should say “I believe proper hand hygiene REDUCES surgical site infections”, not “prevents”. Many other factors involved.

There’s not enough accessible hand sanitizer stations in the OR

N/A

Look at placements of purell in the OR, often not accessible for staff and the crowded space. Same in the L&D rooms

I see doctors all the time not using hand hygiene.
Appendix J: General Hand Hygiene Flyer

SAVE LIVES AND SANITIZE

Quality Improvement:
Increasing Hand Hygiene Compliance on the Labor and Delivery Unit

Presented by USF CNL Students

Hand Hygiene Importance
Single most effective step to prevent spread of germs and causes of infections

SSIs: Negative Outcomes

- Increased length of stay: average of 6.1 days from FY22 data
- Hospital costs: $3.3 billion annual costs nationwide
- Patient costs: $4,200–$4,500/patient in addition to C-section costs
- Compromised maternal/baby bonding
- Emotional trauma

5 Moments of Hand Hygiene

Hand Hygiene Considerations

- Review hand washing and hand sanitizer techniques
- Artificial nails, gel nail polish, and chipped nail polish are not allowed
- Maintain short, natural fingernails with tips no longer than 2 mm (0.08 inch)
- In the absence of visible soil, disinfect your hands with an alcohol-based hand rub
- Remove jewelry from hands and wrists while performing hand hygiene
Appendix K: OR Hand Hygiene Flyer

Save Lives and Sanitize: OR Hand Hygiene

Hand Hygiene Importance:
Single most effective step to prevent spread of germs and cause of infection

Nails
Artificial nails, gel nail polish, and chipped nail polish not allowed
Maintain short, natural fingernails with tips no longer than 2 mm (0.08 inch)

Unsoiled Hands
In the absence of visible soil, disinfect your hands with an alcohol-based hand rub

Jewelry
Remove jewelry from hands and wrists while performing hand hygiene

SSI: Financial Cost
Increased length of stay (average of 6.1 days)
$3.3 billion annual hospital cost nationwide
Patient cost: $4500/patient in addition to C-section

SSI: Emotional Toll
Compromised maternal/baby bonding
Emotional Trauma

Avagard Application
Three pump application

Surgical Scrub Technique

Pump 1
Dispense one pump (2 ml) into the palm of one hand. Dip fingertip of the opposite hand into the hand prep and work under fingernails. Spread remaining hand prep over the hand and up to just above the elbow.

Pump 2
Dispense one pump (2 ml) and repeat procedure with opposite hand.

Pump 3
Dispense final pump (2 ml) of hand prep into either hand and reapply to all aspects of both hands up to the wrists. Allow to dry. Do not use towels!

References:

Hand Hygiene Survey
Appendix L: Education Speech

We are USF CNL Students in our last semester of our Master of Nursing program. We have been working with staff on a QI improvement project for the past two months. It was found that 16 SSIs occurred from July to November 2021, which is an increase from the past 4 fiscal years. Based on IPC’s recommendations to reduce SSI rates, we have chosen to focus on hand hygiene compliance on the L&D unit.

Our audits have found 57% hand hygiene compliance, compared to Hospital X’s target goal of 90%. We are focusing only on the OR, with one person stationed inside the OR and one outside to catch ALL instances of hand hygiene.

This is different from IPC’s auditing process as they only perform a minimum of 5 hand hygiene audits per unit per week. Additionally, IPC does not separate OR data from patient room data, and is not permitted to enter the OR rooms. Lastly, IPC has not performed audits since December due to COVID-19 rates.

Moving forward our recommendations for improved hand hygiene compliance would be to use hand sanitizer upon entering and exiting the OR regardless if patient contact is anticipated. The entire OR room is considered a patient zone, which requires hand hygiene to be performed per WHO’s 5 Moments. This is the main change we can make to improve hand hygiene compliance based on our auditing observations.

The Joint Commission requires hand hygiene metrics for quality evaluation. Proper hand hygiene during surgeries is vital in preventing SSIs. So please everyone do your part to save lives and sanitize.

Please let us know if you have any questions regarding the hand hygiene policy or auditing process. We will be available on the unit for a little while!
Appendix M: Education E-mail

We are USF CNI Students in our last semester of our Master of Nursing program. We have been working with [redacted] staff on a QI improvement project for the past two months. It was found that 15 SSIs occurred from July to November 2021, which is an increase from the past 4 fiscal years. Based on IPC’s recommendations to reduce SSIs, we have chosen to focus on hand hygiene compliance on the L&D unit. We have observed hand hygiene of more than 100 OR staff members from 6 C-Sections. Our audits have found only 57% hand hygiene compliance, compared to LPCH’s target goal of 82%. To catch all instances of hand hygiene we have one person stationed inside the OR and one outside the OR.

We would like to bring greater awareness to proper hand hygiene behavior to increase compliance rates and ultimately prevent SSIs. Attached is our observation data and educational materials for your review. We will be on the L&D unit for re-education throughout the next two weeks. Please let us know if you have any questions about hand hygiene policy. We encourage staff feedback through the staff questionnaire provided on the flyers.
### Appendix N: Pre-Education Auditing Results

<table>
<thead>
<tr>
<th>Role</th>
<th>Average Entering Compliance</th>
<th>Average Exiting Compliance</th>
<th>Total Average Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB MD</td>
<td>66.7%</td>
<td>41.5%</td>
<td>54.2%</td>
</tr>
<tr>
<td>All Other MD</td>
<td>60.0%</td>
<td>57.1%</td>
<td>58.6%</td>
</tr>
<tr>
<td>OB Nurse</td>
<td>72.5%</td>
<td>43.2%</td>
<td>58.4%</td>
</tr>
<tr>
<td>All Other Nurses</td>
<td>64.3%</td>
<td>75.0%</td>
<td>69.2%</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>62.3%</td>
<td>46.5%</td>
<td>53.8%</td>
</tr>
<tr>
<td>OB Tech</td>
<td>64.5%</td>
<td>44.8%</td>
<td>55.0%</td>
</tr>
<tr>
<td>Other</td>
<td>77.8%</td>
<td>50.0%</td>
<td>63.2%</td>
</tr>
<tr>
<td>Peds MD</td>
<td>66.7%</td>
<td>63.6%</td>
<td>65.2%</td>
</tr>
<tr>
<td>Peds Nurse</td>
<td>69.2%</td>
<td>72.7%</td>
<td>70.8%</td>
</tr>
<tr>
<td><strong>Total AVG</strong></td>
<td><strong>66.5%</strong></td>
<td><strong>47.3%</strong></td>
<td><strong>56.9%</strong></td>
</tr>
</tbody>
</table>

#### OR Hand Hygiene Compliance by Role (Pre-Intervention)

- **Total Average Compliance**
- **Target**

![Graph showing hand hygiene compliance by role](image-url)
## Appendix O: Post-Education Auditing Results

<table>
<thead>
<tr>
<th>Role</th>
<th>Average Entering Compliance</th>
<th>Average Exiting Compliance</th>
<th>Total Average Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB MD</td>
<td>60.5%</td>
<td>38.5%</td>
<td>49.4%</td>
</tr>
<tr>
<td>Peds MD</td>
<td>71.4%</td>
<td>35.7%</td>
<td>53.6%</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>68.4%</td>
<td>63.1%</td>
<td>65.6%</td>
</tr>
<tr>
<td>OB RN</td>
<td>86.5%</td>
<td>87.5%</td>
<td>87.0%</td>
</tr>
<tr>
<td>Peds RN</td>
<td>85.7%</td>
<td>84.2%</td>
<td>85.0%</td>
</tr>
<tr>
<td>OB Tech</td>
<td>58.1%</td>
<td>54.6%</td>
<td>56.3%</td>
</tr>
<tr>
<td>Other</td>
<td>71.4%</td>
<td>46.2%</td>
<td>59.3%</td>
</tr>
<tr>
<td>Overall</td>
<td>70.8%</td>
<td>61.0%</td>
<td>65.8%</td>
</tr>
</tbody>
</table>

### OR Hand Hygiene Compliance by Role (Post-Intervention)

- **Total Average Compliance**
- **Target**
Average Compliance by Role (Post-Intervention)

- OB MD: 61% Average Entering, 44% Average Exiting, 53% Total Average, 56% Target
- Peds MD: 54% Average Entering, 54% Average Exiting, 53% Total Average, 56% Target
- Anesthesia: 68% Average Entering, 54% Average Exiting, 61% Total Average, 56% Target
- OB RN: 66% Average Entering, 66% Average Exiting, 66% Total Average, 56% Target
- Peds RN: 46% Average Entering, 64% Average Exiting, 63% Total Average, 56% Target
- OB Tech: 52% Average Entering, 48% Average Exiting, 50% Total Average, 56% Target
- Other: 59% Average Entering, 41% Average Exiting, 55% Total Average, 56% Target
- Overall Average Compliance: 56%
## Appendix P: Results Summary

<table>
<thead>
<tr>
<th>Role</th>
<th>Compliance (Pre-Intervention)</th>
<th>Compliance (Post-Intervention)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB MD</td>
<td>54.2%</td>
<td>49.4%</td>
<td>-4.8%</td>
</tr>
<tr>
<td>Peds MD</td>
<td>58.6%</td>
<td>53.6%</td>
<td>-5.0%</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>53.8%</td>
<td>65.6%</td>
<td>+11.8%</td>
</tr>
<tr>
<td>OB RN</td>
<td>58.4%</td>
<td>87.0%</td>
<td>+28.6%</td>
</tr>
<tr>
<td>Peds RN</td>
<td>69.2%</td>
<td>85.0%</td>
<td>+15.8%</td>
</tr>
<tr>
<td>OB Tech</td>
<td>55.0%</td>
<td>56.3%</td>
<td>+1.3%</td>
</tr>
<tr>
<td>Other</td>
<td>63.2%</td>
<td>59.3%</td>
<td>-3.9%</td>
</tr>
<tr>
<td>Overall</td>
<td>56.9%</td>
<td>65.7%</td>
<td>8.8%</td>
</tr>
</tbody>
</table>

### Compliance (Pre-Intervention) vs Compliance (Post-Intervention) by Role

![Graph showing compliance by role](image-url)