Reducing Hospital-Acquired Clostridium Difficile

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Reducing Hospital-Acquired Clostridium Difficile

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July 12, 2023
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Abstract

**Background:** This project focused on implementation of clostridium difficile (C. diff) education sessions at Hospital A, a not-for-profit, short-term, acute care hospital serving the Greater Sacramento community. It comprises of 241 staffed beds in the medical-surgical, telemetry, and intensive care units.

**Problem:** My Clinical Nurse Leader project focused on preventing hospital-acquired C. diff. At Hospital A, there were 19 hospital-acquired C. diff cases for the 2022 performance year. Of the 19 clostridium difficile cases, 12 were related to C. diff testing criteria fall-outs.

Despite huddling with staff on opportunities and providing education through health stream modules, Hospital A continues to see fallouts in their C. diff testing criteria and an increased number of hospital-acquired C. diff cases.

**Intervention:** To reduce hospital-acquired C. diff, my project was to implement quarterly C. diff education sessions for the medical-surgical/telemetry staff on Acute Care Units 3 and 4. These education sessions aligned with quarterly staff meetings made up of nurses and patient care technicians.

**Outcome Measure:** The outcome measure for this quality improvement project was an improvement in the number of hospital-acquired C. diff cases from 19 in performance year 2022 to less than or equal to 15 by July 2023. The primary process measure was to increase C. diff testing criteria compliance from 90% to 98%.

**Results:** A total of 99 frontline staff across the medical-surgical and telemetry departments at Hospital A completed the C. diff testing criteria survey pre-project implementation. After educating staff on the C. diff testing criteria at the first round of staff meetings, highlighting the key areas of knowledge gaps identified in the C. diff testing survey, we have seen an increase in
testing criteria compliance from 96% to 98%. Additionally, hospital-acquired C. diff rates have remained below our baseline of 19 cases in performance year 2023.

**Conclusion:** The implementation of the C. diff education survey and education has shown to help improve staff knowledge of the C. diff testing criteria through frontline staff engagement and collaboration with key stakeholders. As a result, Hospital A has seen an incremental improvement in their C. diff testing criteria compliance and reduction in overall hospital-acquired C. diff rates compared to the prior performance year.

**Keywords:** Clostridium difficile, testing criteria, nursing education, hospital-acquired
Reducing Hospital-Acquired Clostridium Difficile

A nursing leader is an individual who possesses various strengths, values, and clear vision of their role within their microsystem. My strengths as a nurse leader include communication skills, strategic planning, conflict resolution, and team building skills to lead teams through change and crisis effectively. My values as a nurse leader focus on patient-centered care, compassion, integrity, and ethical behavior. My vision includes improving patient outcomes, optimizing resource utilization, developing and implementing process improvement projects that enhance patient care, and taking pride in my organization by promoting future growth. By leveraging my strengths, values, and vision, I can positively impact patient care and staff development and contribute to the overall growth of my microsystem.

My quality improvement project focuses on reducing hospital-acquired C. diff. Pokrywka et al. (2014) noted, “In the hospital setting, C. diff can increase hospital length of stays, adverse outcomes such as colectomy, transfers to higher level of care, and an estimated annual healthcare cost of more than $3.2 billion” (p. 145). As a nurse leader, my values around patient-centered care and preventing patient harm are what fuels my passion for this project. Hospital A’s mission and vision “exists to provide high-quality, affordable health care services and to improve the health of our members and the communities we serve” (Kaiser Permanente, n.d., Our Mission section) fits my values and philosophy around compassionate and patient-centered care.

Problem Description

Hospital-acquired C. diff is one of six safety priority indices measured at Hospital A. The standardized infection ratio (SIR) is the statistic used to measure healthcare-associated infections over time at a national, state, or facility level. The C. diff SIR per quarter, as obtained from the National Healthcare Safety Network, compares the number of observed hospital-acquired C. diff
infections (CDIs) over the number of expected. At Hospital A, the annual target SIR for C. diff is 0.55. There were 19 hospital-acquired C. diff events from January to December of 2022, resulting in an SIR of 0.62, which does not meet the target. In 13 of the 19 events, specimens were sent without meeting C. diff testing criteria. As evidenced by the testing fallouts, there is a clear knowledge gap among frontline nurses and physicians regarding the C. diff testing criteria, creating an opportunity to educate frontline staff.

**Specific Project Aim**

The specific project aim is to implement quarterly staff education sessions for the nursing staff at Hospital A to decrease the facility’s total hospital-acquired C. diff infections from 19 to 15 by July 31, 2023.

**Available Knowledge**

**PICOT Question**

This quality improvement project will attempt to answer the following question: For patients in the medical-surgical/telemetry nursing department (P), how does implementation and education on a C. difficile testing criterion (I), compared to no education (C), decrease hospital-acquired C. difficile rates during patient hospitalization (O)?

**Search Strategy**

A systematic electronic search was used to find articles for this research using the CINAHL database. The main topics and terms used for this search were pulled from the PICOT question. Search terms included: *Clostridium difficile, testing criteria, nursing education, hospital-acquired*. The literature was not limited to studies or publications to allow for an expanded search. Through elimination and review of the publication type, subject, and abstract, the articles were narrowed down to five. Evidence was critiqued using the Johns Hopkins
Evidence-Based Practice (JHNEBP) level and quality guide (Dang et al., 2022; see Appendix A).

**Evidence Appraisal**

In a quantitative experimental study, Parada et al. (2018) explored the impact of implementation of a C. diff algorithm and laboratory stewardship. The study was conducted during a 6-month trial by a 10-person laboratory team utilizing the algorithm guidelines for testing. A mandatory review of all C. diff testing orders was performed, and only orders that correlated with the algorithm were approved. On a review of 678 C. diff tests, 428 were approved and 250 were rejected. The study also identified opportunities for early detection of community-acquired C. diff so that isolation, diagnosis, and treatment were initiated early, also preventing diagnoses from being classified as hospital-acquired. Results of the study saved the facility $1,500 in laboratory test costs and a reduction in hospital-acquired C. diff rates, proving how application of a C. diff algorithm and testing guidelines can save money, prevent over testing, and lead to a decrease in CDIs (Parada et al., 2018). Using the JHNEBP tool, this evidence was rated as a Level III B.

In another quantitative study, a hospital implemented and reinforced C. diff testing criteria (Duncan et al., 2018). The facility also updated their documentation requirements to limit testing to patients with three or more unformed loose stools per day and excluded testing within 24 hours of laxative use. As a result, C. diff testing decreased by 47%, with less occurrence of overdiagnosis. Results helped show how implementation of C. diff testing guidelines can significantly reduce inappropriate C. diff testing and hospital-acquired C. diff rates. This evidence was rated as a Level III B.
The third article was a cross-sectional study that involved comparing three C. diff testing methods (Yoldas et al., 2016). The results showed that changes in room temperature may affect toxin stability in C. diff stool samples. Thus, it is important to employ a screening test as part of a diagnostic algorithm to increase accuracy of C. diff diagnosis. This evidence was rated as a Level III B.

The fourth article was a quantitative experimental study that demonstrated the effectiveness of implementing a C. diff algorithm (Fritsch et al., 2019). The results of the study showed an increase in compliance with CDI testing and a reduction of hospital-acquired infection by 44%. This article was rated Level II B.

Lastly, Ngam et al. (2017) conducted a qualitative study using the Systems Engineering Initiative for Patient Safety (SEIPS) framework. The study used a focus group of 10 nurses to identify barriers and facilitators to compliance with a CDI prevention bundle. The body of evidence found that the SEIPS framework was useful to evaluate infection prevention practices for CDI and to identify opportunities for improvement. This evidence was rated as a Level III C.

To summarize, the evidence indicates that implementation of a C. diff algorithm can significantly improve patient outcomes. Data show that testing guidelines can save money, prevent over testing, and lead to a decrease in hospital-acquired CDIs. Additionally, these algorithms can help detect CDIs early so that isolation and treatment can begin immediately and also prevent diagnoses from being classified as hospital-acquired, which will result in decrease hospital cost. See Appendix A for the evaluation table.

**Rationale**

When implementing quality improvement projects, considering change theories and models to support these changes and to help navigate issues that arise is important. In alignment
with the transformational leadership style, Kotter’s process change emphasizes vision and leadership (Aktas, 2021). In this process, change needs to become part of the organizational culture (Mize, 2018), which includes eight stages:

1. Creating a sense of urgency.
2. Creating a guiding coalition.
3. Developing a vision and strategy.
4. Empowering broad-based action.
5. Generating short-term wins.
7. Producing more changes.
8. Anchoring new approaches in the cultures.

This quality improvement project involves reducing hospital-acquired C. diff through staff education. Education focused on sanitary best practices, hand hygiene, and C. diff testing criteria. There must be a clear vision of the outcome/goal and a collaborative approach to meet the desired outcome, as with any process change.

Using Kotter’s approach, creating a sense of urgency for the project’s aim is critical (Aktas, 2021). It is important to gather data to help identify this as a cause for concern and to share the data with the intended audience. This starts with developing a committee of key stakeholders: physicians, nurses, quality nurse consultants, leaders, infection preventionists, pharmacy, dietary, and the environmental services department. Data help drive outcomes. At the start of each committee meeting, data, and outcome metrics were reviewed, with a target goal of 0.55 and the current metric of 0.623. The hospital-acquired C. diff cases by month were
reviewed, and a drill-down of each event completed to develop strategies for improved outcomes.

Another critical step in Kotter’s theory (Aktas, 2021) is developing a clear vision and strategy and communicating this change vision with the key stakeholders and the broader audience, including nurses, physicians, and senior leaders. Having buy-in from those involved is vital in finding success. In this case, the goal is to decrease hospital-acquired C. diff to as close to the metric target as possible. This can be tackled in several ways. First, it identifies the need for education on sanitary best practices and hand hygiene. Second, it is essential that caregivers clearly understand the C. diff testing criteria to avoid testing fallouts. Last, it is important to use a multidisciplinary approach and empower broad-based action by engaging pharmacies and physicians to review antibiotic usage for high-risk patients.

Another critical component of Kotter’s theory (Aktas, 2021) is the importance of generating short-term wins and acknowledging positive changes to sustain momentum in work. Consolidating gains and celebrating successes is likely to produce more change and anchor new approaches in the culture (Mize, 2018).

**Context**

To address the increase in hospital-acquired C. diff cases, a microsystem assessment was conducted to determine the feasibility of the quality improvement project, which included a SWOT (strengths, weaknesses, opportunities, and threats) analysis (see Appendix B), gap analysis (see Appendix C), Institute for Health Improvement (IHI) culture assessment, and a power-interest grid (see Appendix C).

To establish a baseline understanding of a unit or population to support an effective improvement project, it is key to analyze the anatomy of a clinical microsystem. The IHI (2001)
microsystem assessment was completed for the medical-surgical/telemetry departments in Hospital A, which is a 48-bed hospital. The patient population in these departments primarily consists of adults admitted for congestive heart failure, stroke, coronary heart disease, ST elevated myocardial infarction, respiratory illness, sepsis, failure to thrive, or end of life. The department staff includes a multidisciplinary team of hospital-based specialist physicians, registered nurses, respiratory therapists, nursing assistants, physical therapists, pharmacists, environmental services, dietary aids, quality nurse consultants, and nurse leaders. Nurses maintain a 1:4 nurse to patient ratio. Based on the IHI (2001) assessment, leaders in the department have established clear goals and expectations for their staff, sharing data and fostering a culture of positivity.

In the medical-surgical/telemetry departments, there is a strong focus on staff involvement in project initiatives and performance outcomes, which is key to the success of this project roll out. “Nurse leaders play a vital role in modeling and promoting culture that supports the use of collaborative evidence-based practice within the organization” (IHI, 2001, p. 9). In the medical-surgical departments, there is an emphasis on process improvement. Data are collected regularly and studied, measured, and shared with staff at daily huddles. Ensuring frontline staff and leaders have a clear understanding of the data and continuous improvement, benchmarking will be important in empowering staff to drive innovation.

The frontline staff’s engagement and input, in collaboration with key stakeholders and nurse leaders, is instrumental to the success of this project. A team made up of frontline nurses, nurse educators, quality nurse consultants, physicians, pharmacists, and nurse leaders will implement this improvement project. Thus, it will be imperative to build on the microsystem’s strengths in leadership, staff focus, and performance results.
SWOT Analysis

The SWOT analysis identified several factors within the microsystem that influence the success of this project’s implementation. Hospital A’s established culture promotes frontline staff engagement and involvement in quality improvement work. Strengths of this microsystem include strong teamwork and collaboration among frontline nurses, nurse leaders, quality nurse consultants, physicians, pharmacists, and ancillary staff as they work together to develop content for the C. diff curriculum. It will also be imperative to engage senior executives on the urgency and importance of this work, providing data to support project implementation.

Opportunities within the microsystem include potential cost-saving benefits from the reduction of hospital-acquired C. diff cases, better healthcare outcomes for patients, reduction in hospital stay, increased market share or public recognition, and improvements in patient safety. Potential weaknesses include lack of staff engagement, inability to commit time to develop education material, or operational constraints, which could impact leadership’s ability to accommodate time for frontline staff to develop curriculum. Finally, threats within the microsystem may include reduced reimbursement from payers or regulatory penalties, increased cost of C. diff lab tests with the increased frequency of testing, the potential for more significant morbidity, higher healthcare usage, and economic costs if C. diff cases rise. The patient may also seek other healthcare organizations with lower rates of patient harm events.

Gap Analysis

A gap analysis was completed comparing current C. diff performance rates to regional targets for the facility. Regional target SIR for C. diff is 0.55, resulting in an improvement gap of 0.07 for the facility. In 13 out of the 19 hospital-acquired C. diff events, stool specimens were sent without meeting testing criteria. In four cases, stool specimens were sent within 24 hours of
a laxative administration, resulting in a testing fallout. In nine cases, specimens were sent too early, before the patient had a third loose stool in 24 hours, which also resulted in a testing fallout. As evidenced by the fallouts identified, there are clear knowledge gaps and opportunities for increased staff education on the C. diff testing criteria.

**Power-Interest Grid**

The power-interest grid helps to identify the key stakeholders and their level of interest and influence in this project to reduce hospital-acquired C. diff. The key stakeholders were identified as having high power and high level of interest and include area quality leader, chief nurse executive, clinical nursing director, quality/risk management committees, and department nurse managers. High power and low interest would include physicians, nursing staff, and patients. Low power, high interest would include patient care technicians, quality nurse consultants, and pharmacists. Low power, low interest may include other support staff, such as nursing students, dietary department, or environmental services. The success of this project will take a multidisciplinary effort to identify challenges and barriers at all levels of interest.

**Communication Plan**

Communication regarding the quarterly staff meetings was done at staff huddles at least a month in advance. This allowed staff time to sign up for sessions and schedule attendance. The nurse manager posted a sign-in sheet to the huddle boards to validate staff attendance. The goal was to achieve at least 95% staff attendance. Additionally, the clinical nurse leader worked with the C. diff workgroup regularly to solicit feedback throughout the process.

**Interventions**

This performance improve project aimed to bring a focus to reducing hospital-acquired C. diff through quarterly C. diff education sessions for the medical-surgical/telemetry staff.
These education sessions aligned with quarterly staff meetings made up of nurses and patient care technicians.

Key stakeholders in the C. diff workgroup, including frontline staff, clinical nurse leaders, nurse manager, nurse educator, physicians, quality nurse consultants, pharmacists, and infection control, conducted a survey to assess current understanding of the C. diff testing criteria and identify knowledge gaps among frontline staff. Once the team collected the data, it was used to develop C. diff content for June staff meetings. The education for the June staff meetings focused on a review of the C.diff survey questions, clarifying the elements of the C. Diff testing criteria (See Appendix J. C.diff Testing Criteria). This education will be repeated on a quarterly bases to reinforce the education (see Appendix E for Project Timeline). After implementation, the team will regroup to collect and analyze data, including the number of C. diff cases and compliance to C. diff testing criteria. This allows for updates to be shared to the team collectively.

To showcase the benefits of project implementation, a return on investment was presented to project sponsors, which includes the clinical nurse executive and the area quality leader. The C. diff education project will lead to an annual cost savings benefit of $751,194 (see Appendix F for the financial analysis). Each C. diff case is estimated to be an additional 11 inpatient hospital days. The cost for each hospital day is $3,846. With 19 C. diff cases in the 2022 performance year, Hospital A spent a total of $803,814 on C. diff costs.

The projected cost of the C. diff education project is $52,620 for Year 1 and Year 2. This includes a 1-hour session for three shifts four times a year, food budget, the cost for five frontline staff RNs who would be teaching these sessions, as well as the 137 registered nurses and 18 patient care technicians attending the hour-long sessions. Using the dollar value for benefits and
resources, a cost-benefit analysis can be performed. This project yields low implementation costs, high cost-avoidance, and ultimately a high net savings, which further supports the viability of this project.

**Study of Intervention**

Project objectives were implemented utilizing the plan-do-study-act (PDSA) cycles. The first cycle (plan) utilized the C. diff survey to assess frontline staff’s knowledge of the C. diff testing criteria. Based on survey results, key stakeholders developed curriculum to highlight the biggest areas of opportunity and knowledge gaps which included education around the C. Diff testing exclusion criteria and clarification on the testing procedures (do). Frontline staff and department leaders implemented the first round of C. diff education sessions during department staff meetings and distribute the C. diff criteria algorithm among staff (study). Post-project implementation, the C. diff workgroup collected and analyzed hospital-acquired C. diff cases to assess for any C. diff testing criteria fallouts (act). In addition to this, the workgroup will implement a survey post-project implementation to assess for improvement in staff’s knowledge of the C. diff testing criteria. This process would be repeated with each quarterly staff meeting or as needed based on outcomes.

One challenge we came across during the planning phase of the PDSA was getting staff to participate and complete the C. Diff survey. In the first 2 weeks of survey implementation, only 30 staff members across the medical-surgical and telemetry departments responded to the survey. We recognized that nurses had been inundated with requests to complete other QR codes, unrelated to our project. To combat this, the C.diff workgroup members made every effort to target their circles of influence to socialize the QR code survey through Unit Practice Councils,
department huddles, and facility wide councils throughout the facility. By week 4, the group had collected over 90 survey responses.

**Family of Measures**

A family of measures were designed for this evidenced-based quality improvement project. The outcome measure was to reduce hospital-acquired C. diff to less than or equal to 15 events. The process measure was to reach a C. diff testing criteria compliance percentage of 90% or above. The data collection source was the quality C. diff report and tracked by infection control, the quality department, and the C. diff workgroup. As a balancing measure, accrued overtime from staff as a result of the mandatory C. diff education training was tracked per pay period utilizing the PRISM finance reports.

**Ethical Considerations**

This project has been approved as a quality improvement project by faculty using the quality improvement review guidelines and does not require Internal Review Board approval (see Appendix G for Statement of Determination).

Reduction in hospital-acquired C. diff aligns with University of San Francisco’s core values as it relates to *cura personalis*, caring for the whole and the belief that care for the “mind, spirit, and body deserves equal attention and consideration” (University of San Francisco, n.d., Cura Personalis section). Preventing adverse events and patient harm promotes these core values by caring for the individual and ensuring the patients wellbeing and safety is at the forefront. Hospital-acquired CDIs can often lead to longer and more costly hospital stays and can often be a burden for patients, sometimes even leading to death. Maintaining quality care in the nursing profession is not only ethical, but is in alignment with the Jesuit values.
In alignment with the Four Pillars of Jesuit Teaching, one must “strive to change the world rather than passively let things happen because ‘that’s the way they’ve always been’” (Susan, n.d., p. Slide 14). This project promotes these values by challenging current practice to identify gaps in knowledge and workflows to promote better quality outcomes. It is also imperative to work collaboratively with the multidisciplinary team to challenge the status quo and develop new strategies to prevent patient harm.

There are two provisions of the 2015 American Nurses Association (ANA) Code of Ethics that are relevant to this project. Provision 3 states that “the nurse promotes, advocates for, and protects the rights, health, and safety of the patient” (ANA, 2015, p. 9). Efforts to prevent patient harm by reducing hospital-acquired C. diff highlights patient advocacy and safety in the hospital. Provision 4 states, “The nurse has the authority, accountability, and responsibility for nursing practice; makes decisions; and takes action consistent with the obligation to promote health and to provide optimal care” (ANA, 2015, p. 15). This project fulfills the obligation to provide the best quality care to patients by identifying gaps in education to prevent patient harm and optimize care.

**Outcome Measure Results**

The outcome measure for this quality improvement project was to improve the number of hospital-acquired C. diff cases from 19 in performance year 2022 to less than or equal to 15 by July 2023. The primary process measure was to increase C. diff testing criteria compliance from 90% to 98% (See Appendix H. Project Charter).

A total of 99 frontline staff across the medical-surgical and telemetry departments at Hospital A completed the C. diff testing criteria survey pre-project implementation. After educating staff on the C. diff testing criteria at the first round of staff meetings, highlighting the
key areas of knowledge gaps identified in the C. diff testing survey, we have seen an increase in testing criteria compliance to 98% (See Appendix I. Compliance with C. diff Testing Criteria). Additionally, hospital-acquired C. diff rates have remained below our baseline of 19 cases in performance year 2022. Hospital A has a total of 16 hospital-acquired C. diff cases thus far, in performance year 2023.

Furthermore, an increase in awareness of C. diff testing criteria and frontline staff engagement has been apparent through active involvement in the facility’s C. diff workgroup. Frontline staff has helped to develop the C. diff testing criteria survey, as well as the C. diff education presented at the quarterly staff meetings.

Hospital-acquired C.diff data is reviewed and tracked monthly during the C. diff workgroup meetings. The workgroup also continues to measure compliance to the C. Diff testing criteria by measuring the number of C.diff testing fallouts, utilizing the quality C. diff report. These fallouts are discussed amongst the team, and education is developed based on these discussions.

Summary

The purpose of this quality improvement project was to improve hospital-acquired C. diff rates through adherence to the C. diff testing criteria. Since project implementation, Hospital A has made steady improvements in these metrics through frontline staff engagement and involvement. Staff meeting education focused on a review of the C. diff testing criteria survey and highlighted the key knowledge gaps identified. The educational content helped to reinforce the C. diff testing criteria and allowed staff to ask clarifying questions to help gain more clarity and understanding of the criteria.
Key lessons learned from this project included the importance of frontline staff engagement in quality improvement work. Staff engagement was a key component in the success of this project and was evident through active involvement in the facility’s C. diff workgroup. To drive changes within the department, it is imperative that the individuals doing the work are actively involved. Frontline staff helped to develop the C. diff testing criteria survey, education, and presented at quarterly staff meetings.

In addition to frontline staff, key stakeholders in this project included nurse manager, infection control leader, quality nurse consultants, physicians lead, and pharmacists. Establishing an effective team to assist with project implementation was the key to success.

**Conclusion**

C. diff is one of the most prevalent and costly infections in hospitalized patients. It is essential to recognize the role that healthcare worker play in decreasing C. diff rates and preventing their spread through education and adherence to the C. diff testing criteria. Through evidence-based practice and widespread education, research proves that these practices can improve hospital-acquired clostridium difficile rates.

The implementation of the C. diff education survey and education has shown to help improve staff knowledge of the C. diff testing criteria through frontline staff engagement and collaboration with key stakeholders. As a result, Hospital A has seen an incremental improvement in their C. diff testing criteria compliance and reduction in overall hospital-acquired C. diff rates compared to the prior performance year.

Sustainability of this project will be driven by the facility’s C. diff workgroup. Hospital-acquired C.diff data will be reviewed and tracked monthly during the C. diff workgroup meetings. The workgroup will also continue to measure compliance to the C. Diff testing criteria
by measuring the number of C.diff testing fallouts, utilizing the quality C. diff report. These fallouts will be discussed amongst the team, and education will be developed based on these discussions. Additionally, a post-project implementation survey will be distributed to staff to assess growth in knowledge. This process will be repeated with each quarterly staff meeting or as needed based on outcomes.

Given the success of this project, this PDSA cycle could potentially be adopted by other departments in the facility, such as the intensive care units.

As a nurse leader, it’s important to recognize the impact that one can have on driving positive patient outcomes. The research shows that by helping to develop a clear vision and strategy around the reduction of clostridium difficile, the goal to reduce hospital-acquired clostridium difficile can be met. This requires a multidisciplinary approach involving key stakeholders to assist in staff education. It also involves collecting data to empower broad based action and generate short term wins to drive change and positive outcomes (Mize, 2018, Evolution of change theories and models section section).
References


Appendix A. Evaluation Table

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Sample</th>
<th>Outcome/Feasibility</th>
<th>Evidence Rating</th>
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<tr>
<td>Fritsch, P. F., Sutton, J., Moody, M. B., Holder, C., &amp; Roche, E. (2019). Implementation of an algorithm decision tree increases compliance with Clostridium difficile testing. American Journal of Infection Control, 47(6), S15–S16. <a href="https://doi.org/10.1016/j.ajic.2019.04.014">https://doi.org/10.1016/j.ajic.2019.04.014</a></td>
<td>Quantitative experimental</td>
<td>During the pre-intervention period, a total of 1,873 tests were performed, and of those, 70 were hospital-acquired cases. Total tests performed reduced by 27% and overall hospital-acquired infections were reduced by 44% because of the intervention.</td>
<td>This initiative demonstrates that creating a CDI algorithm increases compliance with CDI testing.</td>
<td>Level III B</td>
</tr>
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<td>Ngam, C., Schoofs Hundt, A., Haun, N., Carayon, P., Stevens, L., &amp; Safdar, N. (2017). Barriers and facilitators to Clostridium difficile infection prevention: A nursing perspective. American Journal of Infection Control, 45(12), 1363–1368. <a href="https://doi.org/10.1016/j.ajic.2017.07.009">https://doi.org/10.1016/j.ajic.2017.07.009</a></td>
<td>Qualitative</td>
<td>Using the Systems Engineering Initiative for Patient Safety (SEIPS) framework, the study used a focus group of 10 nurses to identify barriers and facilitators to compliance with a CDI prevention bundle.</td>
<td>The SEIPS framework is useful to evaluate infection prevention practices for CDI and identify opportunities for improvement. Addressing the work system barriers and facilitators identified in this study is essential to effective implementation of infection prevention interventions, specifically for CDI.</td>
<td>Level III C</td>
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<td>Duncan, R., Eyre-Kelly, J., Cartagena, J., Gawlick, M., Delacy, R., &amp; Villanueva, A. (2018). 531. Reducing inappropriate hospital-acquired <em>Clostridium difficile</em> diagnoses. Open Forum Infectious Diseases, 5(S1), S196–S197.</td>
<td>Qualitative</td>
<td>A multidisciplinary team revised and reinforced <em>C. diff</em> testing guidelines in accordance with the IDSA/SHEA guidelines.</td>
<td>Results showed <em>C. diff</em> testing decreased by 47%, from 358 to 188 tests per month. CDI rates decreased by 39% in 1 year. Useful in justifying how implementation of <em>C. diff</em> testing guidelines can significantly reduce</td>
<td>Level III B</td>
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<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Yoldas, O., Altindis, M., Cufali, D., Asik, G., &amp; Kesli, R. (2016). A diagnostic algorithm for the detection of clostridium difficile-associated diarrhea. <em>Balkan Medical Journal</em>, 33(1), 80–86. <a href="https://doi.org/10.5152/balkanmedj.2015.15159">https://doi.org/10.5152/balkanmedj.2015.15159</a></td>
<td>Cross-sectional study</td>
<td>This study compared 3 methods used for detection of C. diff using 95 stool samples. The results showed that changes in room temperature may affect toxin stability in C. diff stool samples. Thus, it is important to employ a screening test as part of a diagnostic algorithm to increase accuracy of C. diff diagnosis. Useful in justifying the importance of developing a C. diff algorithm to validate testing accuracy.</td>
<td>Level III B</td>
<td></td>
</tr>
<tr>
<td>Parada, J. P., Wright, D., Suarez-Ponce, S., Trulis, E., Linchangco, P., Abuihmoud, A., Pua, H., Green, M., Hedlund, H., Smith, K. R., &amp; Harrington, A. (2018). Lab stewardship for <em>clostridium difficile</em> testing improves appropriate testing while decreases unnecessary testing and saves laboratory resources while dramatically helping to reduce <em>c diff</em> standardized infection ratios (sir). <em>Open Forum Infectious Diseases</em>, 5(S1), S195. <a href="https://doi.org/10.1093/ofid/ofy210.537">https://doi.org/10.1093/ofid/ofy210.537</a></td>
<td>Qualitative</td>
<td>The study was conducted during a 6-month trial by a 10-person laboratory team based on the algorithm guidelines for testing. A mandatory review of all C. diff testing orders was performed, and only orders that correlated with the algorithm were approved. Results of the study saved the facility $1,500 laboratory tests costs and a reduction in hospital-acquired C. diff rates, proving how application of a C. diff algorithm and testing guidelines can save money, prevent over testing, and decrease in C. diff infections.</td>
<td>Level III B</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix B. SWOT Analysis

<table>
<thead>
<tr>
<th>Internal</th>
<th>Favorable/Helpful</th>
<th>Unfavorable/Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>Teamwork and collaboration amongst frontline nurses, leaders, quality nurse consultants, physicians, pharmacists, and ancillary staff.</td>
<td>Lack of staff engagement or staff not attending education sessions.</td>
</tr>
<tr>
<td></td>
<td>Commitment to quality improvement and harm prevention for patients.</td>
<td>Staff unwilling or unavailable to commit time to develop education material.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Management unable to accommodate time for staff to develop education due to staffing or operational constraints.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External</th>
<th>Favorable/Helpful</th>
<th>Unfavorable/Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opportunities</strong></td>
<td>Potential for cost-saving benefits from reduction of C. diff cases.</td>
<td>Increased costs of C. diff lab tests with increased frequency of testing.</td>
</tr>
<tr>
<td></td>
<td>Achieving better healthcare outcomes for patients.</td>
<td>Patients may seek other healthcare organizations who have proven to have low rates of patient harm events.</td>
</tr>
<tr>
<td></td>
<td>Reduction in hospital stay.</td>
<td>Potential for greater morbidity, higher healthcare usage and economic costs if C. diff cases increase.</td>
</tr>
<tr>
<td></td>
<td>Reassure and restore communities trust in their healthcare systems.</td>
<td>Reduced reimbursement from payers or regulatory penalties.</td>
</tr>
<tr>
<td></td>
<td>Monitoring improvements in patient safety.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased market share or public recognition.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C. Gap Analysis

<table>
<thead>
<tr>
<th>Desired State</th>
<th>Current State</th>
<th>Action Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>To decrease the total facility hospital-acquired C. diff cases by 20% in PY 2023 to meet regional benchmark (SIR 0.55)</td>
<td>At Hospital A, there have been 19 C. diff events performance year to date. In 13 out of the 19 events, stool specimens were sent outside of the testing criteria (SIR 0.62)</td>
<td>Develop C. diff education sessions during quarterly staff meetings</td>
</tr>
</tbody>
</table>
## Appendix D. Level of Interest

<table>
<thead>
<tr>
<th>Level of Power</th>
<th>Keep Satisfied</th>
<th>Manage Closely</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Power, Low Interest</td>
<td>Patients, Nursing staff, Physicians</td>
<td>Senior Executives (Area Quality Leader), Unit Nurse Managers, Quality/Risk Management Committees, Clinical Nursing Director (CSD), Clinical Nurse Executive (CNE)</td>
</tr>
<tr>
<td>Monitor</td>
<td>Low Power, Low Interest</td>
<td>Keep Informed</td>
</tr>
<tr>
<td>Low Power, High Interest</td>
<td>Other staff on the units (i.e., nursing students, dietary, EVS)</td>
<td>Patient Care Technician staff, Quality Nurse Consultants, Pharmacists</td>
</tr>
</tbody>
</table>

**Level of Interest**
## Appendix E. Project Timeline

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Lead</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sept</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify team members and key stakeholders</td>
<td>CNL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>Survey staff to assess current understanding of C. diff testing criteria and determine gaps in education</td>
<td>CNL, C. diff workgroup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>Meet with team to outline implementation strategy</td>
<td>CNL, C. diff workgroup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>Finalize C. diff curriculum for quarterly staff meetings</td>
<td>CNL, C. diff workgroup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>First C. diff education session</td>
<td>CNL, Team</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>Second C. diff education session</td>
<td>CNL, C. diff workgroup</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>Third C. diff education session</td>
<td>CNL, C. diff workgroup</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>Collect and analyze data including number of C. diff cases with nursing fallouts</td>
<td>CNL, C. diff workgroup</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Update team and stakeholders with results</td>
<td>CNL</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
## Appendix F. Cost Analysis

<table>
<thead>
<tr>
<th>Improvement Revenue (Cost Avoidance)</th>
<th>Cost/Additional Hospital Day</th>
<th>Days per each C. Diff case</th>
<th># C. Diff cases/year</th>
<th>Cost/C. Diff case</th>
<th>Cost per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased length of stay due to hospital acquired c. diff</td>
<td>$3,846</td>
<td>11 days</td>
<td>19</td>
<td>$42,316</td>
<td>$803,814</td>
</tr>
<tr>
<td><strong>Total Cost:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$803,814</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Improvement Costs (Quarterly c. diff education sessions (1 hr. x 3 shifts))</th>
<th>Cost per month</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Budget (pastries, drinks, snacks)</td>
<td>$1500</td>
<td>$6,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>RNs assigned to provide education (RN average - $85/hr. x 5 RN’s x 3 shifts)</td>
<td>$1,275</td>
<td>$5,100</td>
<td>$5,100</td>
</tr>
<tr>
<td>RN’s attending cdiff meetings (RN average - $85/hr. x 137 RN’s)</td>
<td>$11,645</td>
<td>$46,580</td>
<td>$46,580</td>
</tr>
<tr>
<td>Additional staff attending (PCT average - $32.50/hr. x 18 PCT’s)</td>
<td>$585</td>
<td>$2,340</td>
<td>$2,340</td>
</tr>
<tr>
<td><strong>Total Cost:</strong></td>
<td>$13,155</td>
<td>$52,620</td>
<td>$52,620</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Savings/Cost Avoidance (ROI)</th>
<th>Year 1 Annual Cost Savings</th>
<th>Year 2 Annual Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net savings = Cost avoidance - Improvement cost</td>
<td>$751,194</td>
<td>$751,194</td>
</tr>
</tbody>
</table>
Appendix G. Statement of Non-Research Determination

CNL Project: Statement of Non-Research Determination Form

**Student Name:** Tracy Esposo

| **Title of Project:** Reducing Hospital Acquired Clostridium Difficile |
| **Brief Description of Project:** |

**A) Aim Statement:** The specific project aim is to implement quarterly staff education sessions for the nursing staff at Hospital A to decrease the facility's total hospital-acquired C. difficult infections from 19 to 15 by July 31st, 2023.

**B) Description of Intervention:** To reduce hospital acquired clostridium difficile, my project would be to implement quarterly clostridium difficile education sessions for all Medical Surgical/Telemetry staff. These education sessions will align with quarterly staff meetings made up of nurses and patient care technicians. The goal is to reduce the number of hospital-acquired clostridium difficile cases and nursing testing fallouts.

**C) How will this intervention change practice?** At Hospital A, there have been 19 hospital-acquired C. diff events from January to December of 2022. Efforts to increase and improve c. diff education amongst hospital staff are already in place but have failed to make any significant improvements. The hope is with the engagement of frontline staff in tangent with immersive and engaging content, staff will have a greater understanding of the C. diff testing criteria, with less fallouts contributing to the increasing number of hospital-acquired C. diff cases.

**D) Outcome measurements:** The measurement strategy and success of the project will be determined by number of hospital-acquired C. diff occurrences post-project implementation. The data collection source will be the quality C.diff report, and will be tracked by infection control, the quality department, and the C.diff workgroup. The workgroup will also measure compliance to the C.diff testing criteria by measuring the number of C.diff testing fallouts, utilizing the quality C.diff report.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used: [http://answers.hhs.gov/olap/categories/1569](http://answers.hhs.gov/olap/categories/1569)

☐ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.
This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

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

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

<table>
<thead>
<tr>
<th>Project Title:</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>
<tr>
<td>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: <em>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.</em></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
**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):** Tracy Esposo

Signature of Student: **Tracy Esposo**

DATE  **4/29/23**

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

Signature of Supervising Faculty Member: **Liesel Buckner**

DATE  **4/29/23**
Appendix H. Project Charter

**Student Name:**
Tracy Esposo

**Team:**
Patient Care Services

**Project:**
To decrease the total facility hospital-acquired clostridium difficile cases by 20% in performance year 2023.

**Sponsor:**
Clinical Nurse Executive, Area Quality Leader

**Project Start Date:**
January 2023

**Last Revised:**
N/A

**What are we trying to accomplish?**

**Problem**
At Kaiser SSC, there are 19 hospital-acquired clostridium difficile cases for this performance year. Despite huddling with staff on opportunities and providing education through health stream modules, we continue to see fallouts in our clostridium difficile testing criteria and an increased number of hospital-acquired clostridium difficile cases.

**Project Description (defines what)**
To reduce hospital-acquired clostridium difficile, my project would be to implement quarterly clostridium difficile education sessions for all medical-surgical/telemetry staff, starting with the telemetry staff on 3 and 4 South nursing units. These education sessions will align with quarterly staff meetings made up of nurses and patient care technicians. The goal is to reduce the number of hospital-acquired clostridium difficile cases as a result of nursing testing fallouts.

**Rationale (defines why)**
Of the 19 clostridium difficile cases at SSC, regarding the clostridium difficile testing criteria: 3 had specimens sent within 24 hours of laxative administration with no documentation indicating why specimen was sent outside testing criteria; 5 cases had loose stools within the first three days of admission, but did not have specimen sent until day 4 or later; and 1 case did not have a specimen sent when the patient met testing criteria. In 3 cases, contact isolation was not ordered at the time the specimen was sent.
Expected Outcomes and Benefits

Clostridium difficile infection is a major public health concern in the hospital setting. It is associated with morbidity, mortality, and economic costs. Per the National Library of Medicine, the total cost of one clostridium difficile case equates to $42,316. That is $803,814 over the course of one year with the 19 cases of clostridium difficile at SSC. By reducing the amount of hospital-acquired clostridium difficile cases, we could potentially see an annual cost savings of $751,194. Outside of financial costs, by reducing the number of hospital-acquired clostridium difficile cases, we can decrease hospital length of stay and prevent patient harm.

Aim Statement

Implement quarterly staff education sessions for the nursing staff at the facility to decrease the facility’s hospital-acquired clostridium difficile cases by 20% in performance year 2023.

How will we know that a change is an improvement?

Outcome Measure(s)
List the measure(s) you ultimately want to affect as a result of this project.

- 20% decrease of clostridium difficile cases from performance year 2022 to performance year 2023. In performance year 2022, we had 19 cases of clostridium difficile at SSC. The goal of this project would be to decrease clostridium difficile cases to no more than 16 in performance year 2023.

Process Measure(s)
List the measure(s) that will tell you if the system is performing as planned to affect the outcome measure.

- Clostridium difficile testing criteria compliance.
- Reduction in the number of clostridium difficile cases.

Balancing Measure(s)
List the measures that will tell you whether you are introducing problems elsewhere in the system.

- Sepsis related to undiagnosed clostridium difficile.
- Increased costs of clostridium difficile lab tests with increased frequency of testing.
- Overtime accrued as a result of mandatory staff training.
- Impact to operational needs as staff are required to attend mandatory training, potentially leaving the unit short staffed.

I.
What changes can we make that will result in improvement?
**Initial Activities**
Consider starting by exploring the process or system you are trying to improve with tools such as interviews, direct observation, cause and effect diagrams, driver diagrams, and process maps/flowcharts.

- Survey to assess staff’s current understanding of clostridium difficile testing criteria and to determine gaps in education.
- Measure compliance of clostridium difficile education module that was assigned to all MS/Tele staff with a due date of 9/31/22.

II.

**Change Ideas**

- Work with the key stakeholders, including clinical education department, quality nurse consultants, pharmacists, physicians, and frontline staff, to develop clostridium difficile curriculum to present at quarterly staff meetings.
- Collect data to present to staff and identify biggest opportunities in testing criteria fallouts.

**Key Stakeholders**

The key stakeholders in this project will be frontline staff, nurse managers, infection control leader, quality nurse consultants, physician leads, and pharmacists. It is imperative that all parties are engaged in this work. At SSC, we have a clostridium difficile committee that already exists and meets monthly.

**Barriers**

- Lack of staff engagement or staff not attending education sessions. It will be important to complete a post-assessment of staff knowledge of the clostridium difficile testing criteria after education sessions.
- Key stakeholders unwilling or unavailable to commit time to develop education material.
- Management unable to accommodate time for staff to develop education due to staffing or operational constraints.

III.

**Boundaries**

It will be important to establish a group of frontline staff to teach the education sessions at staff meetings. We will need to establish timelines for developing a curriculum and implementing education.
Appendix I. Compliance with C. diff Testing Criteria

Appendix J. C.diff Testing Criteria