American Journal of Infection Control 47 (2019) 400–405

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major Article

# Environmental services impact on healthcare–associated *Clostridium difficile* reduction

Teresa Daniels RN, MSN, CIC, CPPS, T-CHEST [a,*], Melissa Earlywine RN, T-CHEST [b], Vicki Breeding T-CHEST [c]

[a] *Department of Infection Prevention, Clark Regional Medical Center and Bourbon Community Hospital, Winchester, KY*
[b] *Bourbon Community Hospital, Paris, KY*
[c] *Clark Regional Medical Center, Winchester, KY*

*Key Words:*
Culture of safety
Healthcare–associated infection
Healthcare cleaning audits
High-touch surfaces
Infection prevention TeamSTEPPS

A B S T R A C T

***Background:*** Healthcare–associated *Clostridium difficile* infection (CDI) can result from organisms found on hospital environmental surfaces. Without proper cleaning of hospital environmental surfaces, cross-contamination can occur, resulting in a healthcare–associated infection. In 2011, an environmental services (EVS) model was developed in Hospital A that resulted in a reduction in healthcare–associated CDI. The purpose of this study was to determine if implementing Hospital A's EVS model in Hospital B would decrease healthcare–associated CDI incidence.

***Methods:*** A quasi-experimental design was used. The study was conducted in Hospital B, a 53-bed acute care community-based hospital, between January 2013 and December 2017. A retrospective review of all CDI LabID A/B toxin enzyme immunoassay events was performed using the National Healthcare Safety Network surveillance definitions. The data were calculated based on incidence rates per 1,000 patient days and the National Healthcare Safety Network standard infection ratio formula. No new disinfectants, antibiotic restrictions, or new isolation techniques were instituted during this time period.

***Results:*** There was a 100% reduction in healthcare–associated CDI in Hospital B from 2013's baseline rate of 0.48 per 1,000 patient days to 0.00 per 1,000 patient days (0.48, 0.00, $P = 0.020$).

***Conclusions:*** This study highlights the importance of EVS education and accountability as well as recognition of the role played by EVS in reducing healthcare–associated CDI within healthcare facilities.



## BACKGROUND

The Centers for Disease Control and Prevention (CDC) reports that healthcare–acquired pathogens can be transmitted through environmental surfaces and recommends that hospital infection prevention programs adopt an environmental services (EVS) cleaning program to reduce the transmission of environmental pathogens.[1] Because of these issues, the CDC released a toolkit for EVS, consisting of what they describe as level I and II programs. The programs consist of monitoring effectiveness of environmental surface cleanliness with the use of audit tools for trending performance. Furthermore, the CDC recommends that infection prevention and EVS partner in a team effort within the hospital's EVS program.[2] Other national agencies, such as the Agency for Healthcare Research and Quality, agree that healthcare environmental cleaning is a basic part of infection prevention.[3] Although the hospital environment can be contaminated with

* Address correspondence to Teresa Daniels, MSN, Department of Infection Prevention, Clark Regional Medical Center, 175 Hospital Dr, Winchester, KY 40391.
*E-mail address:* teresa.daniels@lpnt.net (T. Daniels).

Funding/support: This study was supported by LifePoint Health. No funding was received from PerfectCLEAN, the Kentucky Hospital Improvement Innovation Network, or the Association for the Healthcare Environment.

Conflicts of interest: LifePoint Health did not exercise any editorial review with respect to development of the manuscript, had no role in the administration of the study, and did not influence the analysis of the study data. PerfectCLEAN, the Kentucky Hospital Improvement Innovation Network, and the Association for the Healthcare Environment did not exercise any editorial review with respect to development of the manuscript, had no role in the administration of the study, and did not influence the analysis of the study data.

Author contributions: T.D. was responsible for environmental services model design development, surveillance data, and statistics, and was the primary writer. M.E. was responsible for cleaning audit data collection. V.B. was responsible for environmental services model design development and cleaning audit data collection. All authors reviewed and approved the final manuscript version.

https://doi.org/10.1016/j.ajic.2018.09.016
0196-6553/

many different pathogens, a primary concern is contamination with *Clostridium difficile*. Studies have found that patients with *C difficile* may contaminate up to 49% of the room's environmental surfaces with the *C difficile* organism.[4]

*C difficile* is a spore-forming organism that can cause debilitating to life-threatening diarrhea. *C difficile* can survive on surfaces for up to 5 months if surfaces are not properly disinfected.[5] A patient who is admitted to the hospital with a diagnosis of *C difficile* infection (CDI) will contaminate hospital room surfaces. Once the patient is discharged, it is important that the hospital room is cleaned and disinfected appropriately to remove pathogens. If a room is not properly cleaned and disinfected, the next patient admitted into the room could acquire a healthcare–associated CDI from the environmental surfaces.[6] As a result, it is imperative that EVS approaches be sufficient for reducing the transmission of CDI.

Clark Regional Medical Center, Hospital A, is a 79-bed for-profit, community-based, acute care hospital located in Winchester, Kentucky. Winchester is located in central Kentucky, outside of Lexington, Kentucky, a major metropolitan area. Hospital A has a 36-bed medical/surgical floor, an 8-bed intensive care unit, a 25-bed long-term care unit, and a 10-bed postpartum unit. In 2010 and 2011, Hospital A had a healthcare–associated CDI rate of 1.07 per 1,000 patient days. Hospital A's infection prevention EVS education/recognition model was developed and implemented in 2011. The model's aim was to reduce healthcare–associated infections (HAIs), provide education, and emphasize empowerment of the EVS staff while also recognizing them as a specialty service. Hospital A was able to reduce healthcare–associated CDI to zero per 1,000 patient days by 2015. The EVS model focused on reducing healthcare–associated CDI through EVS education, certifications, and accountability. Hospital A was able to reduce episodes of healthcare–associated CDI within the first year of initiating the EVS program. The reduction of Hospital A's healthcare–associated CDI rates has shown sustainability from 2012-2017. Hospital A's results are discussed within this article for comparison purposes with Hospital B's outcome data. The purpose of this study was to implement Hospital A's EVS model to determine if the model could assist in the reduction of healthcare–associated CDI rates in a second facility.

## METHODS

### *Study design*

A quasi-experimental design was used to determine if Hospital A's EVS model would assist Hospital B in reducing its healthcare–associated CDI rate. The healthcare–associated CDI surveillance definition was based on the National Healthcare Safety Network (NHSN) LabID event definitions. The NHSN defines healthcare–onset (HO) CDI as a positive *C difficile* toxin laboratory test collected in an inpatient setting on or after day 4 of hospitalization. Community-onset (CO) CDI is defined as a positive *C difficile* toxin laboratory test collected $\leq 3$ days from admission to the facility or a positive *C difficile* toxin laboratory test collected in an outpatient location where a patient has not been discharged from an inpatient location within the same facility $\leq 28$ days prior to the date of specimen collection. The CO healthcare facility–associated (CO-HCFA) definition is a positive *C difficile* positive $\leq 4$ weeks post discharge.[7] For this study, healthcare–associated CDI was defined as a positive *C difficile* stool toxin by enzyme immunoassay meeting both CO-HCFA and HO definitions NHSN criteria.

### *Setting*

Hospital B is a for-profit, community-based, 53-bed acute care hospital. Hospital B consists of a 4-bed intensive care unit, a 16-bed medical/surgical acute care unit, and a 33-bed behavioral health unit. In 2013, Hospital B's healthcare–associated CDI rate was 0.48 per 1,000 patient days.

The facility's internal review board approved this study and publication prior to data collection. The LifePoint market president and chief executive officer approved the publication of the data and content of this article. No new disinfectants, antibiotic restrictions, or new isolation techniques were instituted during this time period.

### *Relevant variables*

**Predictor variable:** Our predictor variable was that EVS education would assist in the reduction of healthcare–associated CDI rates.

**Outcome variable:** Our primary outcome variable was the number of healthcare–associated CDIs. The healthcare–associated CDI variable was defined using the NHSN LabID event surveillance definitions for CO-HCFA and HO.

**Confounding variables:** Compliance with isolation precautions and the prescribing of antibiotics were recognized as confounding variables.

### *Quality control/data management*

Positive CDI lab results were obtained from the facility's electronic medical record lab reports. The NHSN surveillance definitions for HO, CO-HCFA, and CO LabID events were consistently used. The LabID event–positive lab results were compared with the patient's current and previous hospital admission and discharge dates.

### *Statistical analysis*

Multiple statistical formulas were utilized to obtain and compare our data.

- To obtain an incident rate for the number of healthcare–associated CDIs per 1,000 patient days, we used the following formula: number of healthcare–associated CDIs divided by the total number of patient days multiplied by 1,000.
- To compare incidence rates, the $\chi^2$ test was used. The Web site www.openepi.com was used for calculation of test statistics and corresponding *P* values. *P* values of .05 were considered statistically significant.[8]
- To compare our findings with the national benchmark, we were required to calculate the number of expected healthcare–associated CDIs to obtain a standardized infection ratio (SIR) (Appendix A). In order to calculate the SIR, we had to determine our CO CDI prevalence rate. The NHSN prevalence rate formula used (# CO LabID events/# facility admissions) $\times$ 100. Once the prevalence rate was determined, we used the NHSN negative binomial regression model to calculate the number of predicted healthcare–associated CDIs: e $(\beta 0 + \beta 1 \times 1 + \beta 2 \times 2 + \ldots) \times$ patient days.[9]

## RESULTS

In 2013, Hospital B had 4 healthcare–associated CDIs, resulting in a healthcare–associated CDI risk-adjusted rate of 0.48 per 1,000 patient days. Infection prevention EVS educational interventions, recognition, and audits used in Hospital A were implemented in Hospital B. In March 2014, Hospital B completed the EVS annual infection prevention education. The education consisted of the following objectives:

- Understand key infection prevention terms.
- Understand microorganisms and their impact on healthcare surfaces.
- Describe the importance of cleaning hospital high-touch areas.

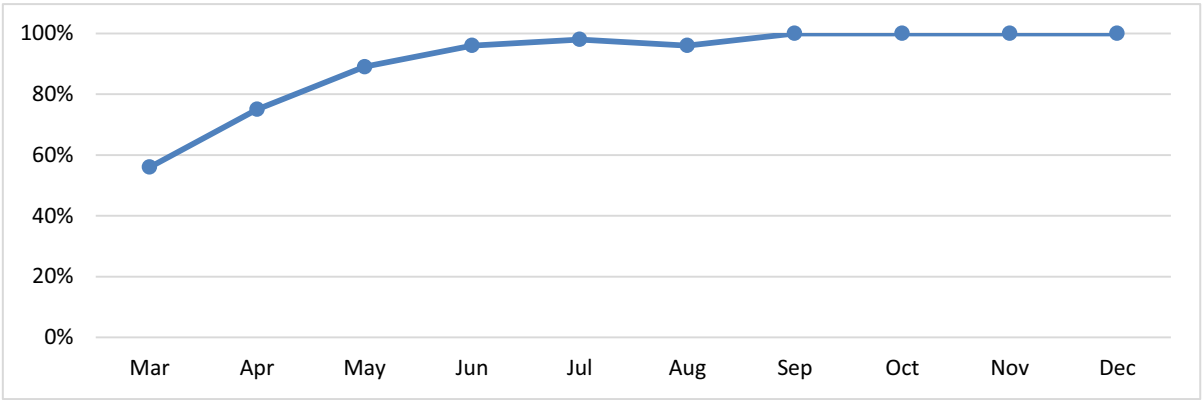


**Fig 1.** Environmental services education and high-touch surface cleaning audits began March 2014. This graph displays how Hospital B high touch surface cleaning compliance improved throughout 2014.

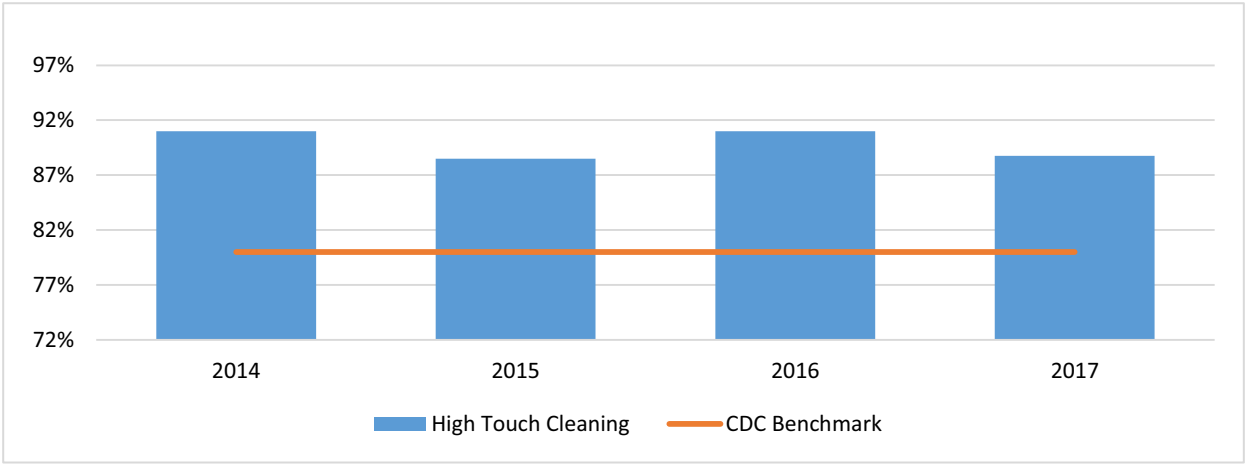


**Fig 2.** Hospital B's high-touch surface cleaning compliance trends 2014-2017 in comparison to the Centers for Disease Control and Prevention national benchmark.

- Describe the steps in cleaning patient rooms.
- Understand the impact dust has in the hospital.
- Understand the importance of terminal cleaning.
- Describe EVS' role as a patient advocate for patient safety.

After the initial education was completed, high-touch surface cleanliness audits began. The CDC high-touch assessment tool (Appendix B) was adopted, and fluorescent gel was used for auditing. Audit results were reviewed with EVS staff members using a nonpunitive approach, embracing a "just culture." High reliability organizations embrace a culture of safety with a no-blame method. Improvement opportunities should consist of collaboration of all disciplines with mutual respect.[10] EVS specialty certification classes were implemented to nurture and acknowledge specialized roles. EVS staff participated in the hygiene specialist certification program offered through PerfectCLEAN. Hospital-wide healthcare–associated data for multidrug-resistant organisms, CDI, and surgical site infections were shared with EVS staff. EVS engagement was enhanced by sharing data and trends. Hospital B ended 2014 with a significant improvement in high-touch cleaning compliance percentages.

During 2015-2017, we continued annual education and certification offerings, as well as highlighted the EVS specialty throughout the facility. We implemented TeamSTEPPS briefs, debriefs, and huddles for daily assignments, as well as cleaning checklists. TeamSTEPPS is a system used in healthcare to enhance teamwork and assist in achieving sustainability.[11] We continued to focus on our success with healthcare–associated reductions and improvement with high-touch cleaning compliance audits. We also increased awareness of the EVS specialty throughout the facility.

Hospital B's high-touch cleaning audit compliance increased from 56%-100% by the end of 2014 (Fig 1). The CDC recommends that once high-touch surface audit compliance rates are >80%, the sample size may be reduced in hospitals with >150 beds. Those hospitals with <150 beds should maintain audits of 15 rooms and all available surfaces.[1] Based on this recommendation, we have set a benchmark of 80%. High-touch cleaning audits remained >80% from 2014-2017 (Fig 2).

Over a 4-year span, a retrospective review of Hospital B's LabID events of HO, CO-HCFA, and CO CDIs was conducted. The healthcare–associated CDI numerator included positive LabID events meeting the NHSN definition for HO and CO-HCFA. In 2014, Hospital B's healthcare–associated CDI rate reduced to 0.10 per 1,000 patient days from the 2013 baseline rate of 0.48 per 1,000 patient days. At year-end 2017, Hospital B's healthcare–associated CDI rate was 0 per 1,000 patient days (Fig 3). It was found that Hospital B reduced healthcare–associated CDI to zero within 3 years of the implementation of Hospital A's EVS model. Hospital B had a 100% reduction in healthcare–associated CDI from 2013-2017, with a *P* value of .020.

Hospital A has demonstrated sustainability with healthcare –associated CDI reduction, as demonstrated by continued low rates.

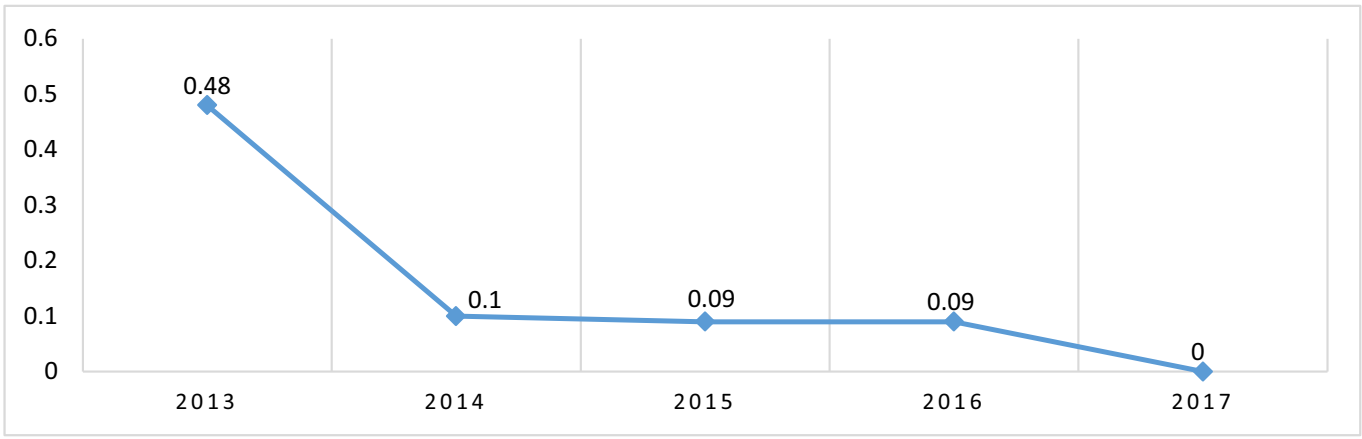


**Fig 3.** Trend pattern of Hospital B's healthcare–associated *Clostridium difficile* infection rate per 1,000 patient days over 5 years.

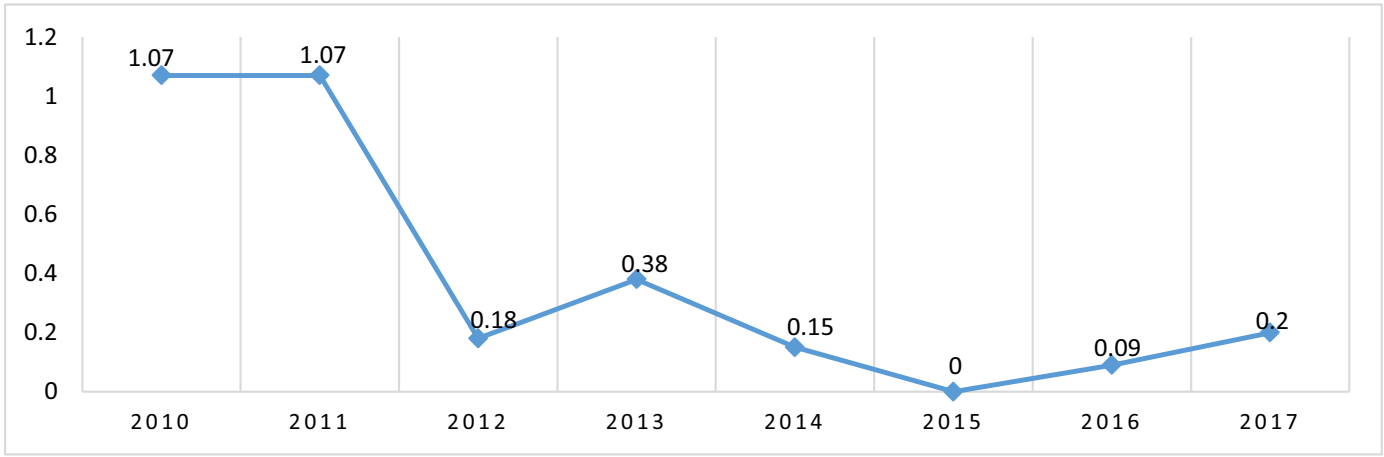


**Fig 4.** Trend pattern of Hospital A's healthcare–associated *Clostridium difficile* infection rate per 1,000 patient days over 7 years.

Hospital A's 2017 year rate was 0.2 per 1,000 patient days. Hospital A had an 81.3% healthcare–associated CDI reduction from 2010-2017 (Fig 4), with a *P* value of .019.

Hospital B reduced its healthcare–associated CDIs to below expected healthcare–associated CDIs by December 2014. By December 2017, the healthcare–associated CDI rate was 0 compared with an expected healthcare–associated CDI rate of 1.16 (Fig 5). In December 2015, Hospital B demonstrated a SIR reduced below the 2014 national benchmark of 0.92, and by 2017 Hospital B's SIR was 0 (Fig 6).

## DISCUSSION

This study suggests that the implementation of an EVS intervention consisting of education, recognition, and accountability may facilitate the sustained reduction in healthcare–associated CDI. This is sufficient to statistically establish that the change has been imparted owing to the implementation of the EVS model rather than just natural variation, based on risk-adjusted data comparable to national SIR rates.

In 2017, Hospital B reduced its healthcare–associated CDI rate to zero after adopting Hospital A's EVS model. There have been no formal studies of Hospital A's EVS model. Because of this, we believe that it is important to recognize that Hospital A has been able to sustain a CDI rate below the national benchmark. In reviewing the 2016 and 2017 healthcare–associated CDIs for Hospital A, it was found that the positive CDI patients had been prescribed fluoroquinolones prior to admission and were residents of long-term care facilities. Based on these findings, one could argue that the healthcare–associated CDI incidence resulted from antibiotic usage and not from contaminated environmental surfaces. The results of our study can be generalized to acute care hospitals with employed EVS staff members. Future research is required to determine if acute care hospitals with contracted EVS services would have the same or similar results.

Studies have shown that conducting audits of high-touch surface cleanliness in the healthcare setting can be an effective performance improvement initiative for HAI reduction. A study was performed to improve compliance with environmental cleaning behaviors within the hospital setting. The study resulted in an 81% increase in compliance of high-touch surface cleanliness after EVS education and audits during a 14-month period.[12] A cross-sectional study was completed within 11 Australian hospitals. The cross-sectional study focused on researching effective approaches to cleaning in hospitals. The researching effective approaches to cleaning in hospitals study consisted of 5 elements, with training and cleaning audits being 2 of them. The study concluded that EVS staff members have knowledge

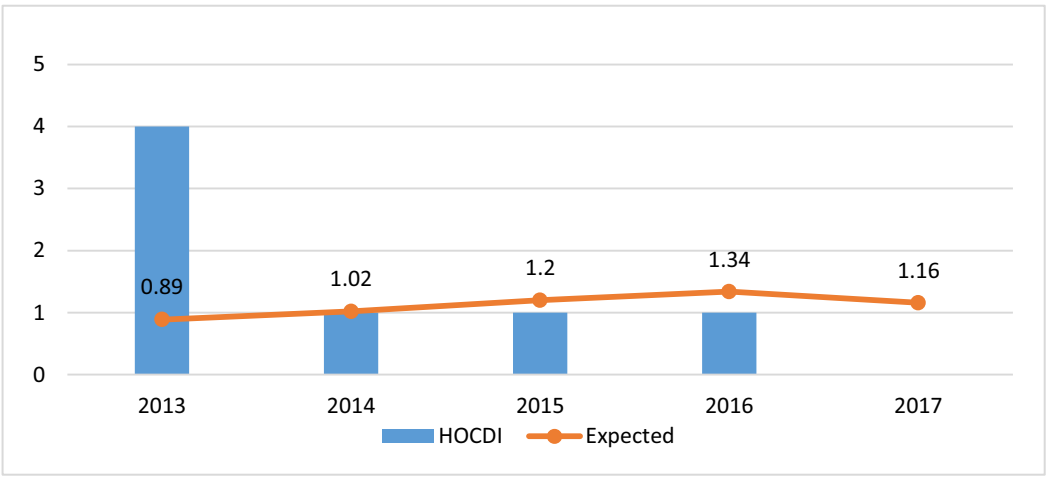


**Fig 5.** Trending data of Hospital B's healthcare–associated *Clostridium difficile* infections (CDIs) compared with the expected or predicted number of healthcare–associated CDIs. The expected or predicted number of healthcare–associated CDIs was based on the National Healthcare Safety Network negative binomial regression model.

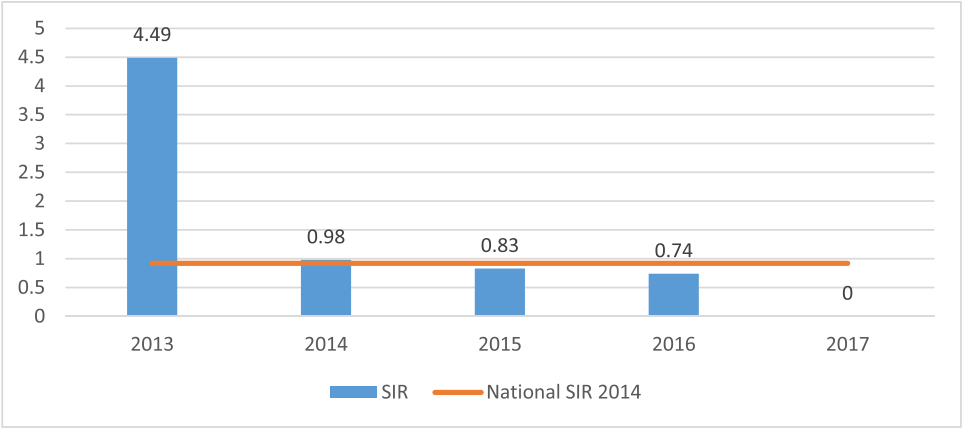


**Fig 6.** Trending data of Hospital B's healthcare–associated *Clostridium difficile* standard infection ratio (SIR) compared with the National Healthcare Safety Network 2014 SIR.

of the critical role that they play in environmental cleaning within the organization.[13]

The facility's TeamSTEPPS model assists in fostering a culture of safety, with a focus on performance improvement and patient safety. A "just culture" is instrumental in implementing change within an organization.

Because of the successful outcomes we have had with our EVS model, we continually look for ways to enhance our systems. Recently, we added an EVS ladder to our EVS model. The EVS ladder consists of 3 levels. Each level has certain requirements that must be met. EVS staff who participate in the ladder program must submit a portfolio along with an application identifying the level for which they are applying. The portfolio and application are reviewed by the EVS ladder committee. This committee consists of the EVS director, the infection preventionist, and the human resource director. Once the EVS candidate's application is approved, the candidate receives a quarterly bonus. Some of the requirements for ladder participants include certification in basic life support, preceptor class completion, high-touch audits of 90%, high dusting of 90%, cross training in specialty areas, community service, performance improvement participation, and certifications specific to EVS.

We recommend that EVS programs include the following to be successful in HAI reduction:

1. First and foremost, a strong partnership with the director of EVS and the infection preventionist is imperative. Determine your program's strengths and weaknesses.
2. Begin with gathering baseline data on high-touch cleaning compliance percentages. This data should be approached as nonpunitive.
3. Determine your HAI rates, focusing on multidrug-resistant organisms (MDROs), CDI, and surgical site infections.
4. Develop infection prevention annual education for the EVS staff. Focus on MDRO education and organism surface survival time. Educate EVS staff on complications that can occur from acquiring MDROs, CDIs, or surgical site infections. Review the chain of infection in your education session. Include the high-touch surface baseline data in your PowerPoint (Microsoft, Redmond, WA) presentation. Break down the high-touch surfaces missed and trend for focus areas.
5. Lobby Administration for EVS certification classes. This will enhance the EVS staff's knowledge as well as demonstrate Administration's support.

6. Remove the name “Housekeeping” from phone directories and replace it with “EVS.”
7. Meet with Human Resources and advocate removing the title “housekeeper” from identification badges and replacing it with “environmental services technician.” Ask Human Resources to replace job postings for housekeepers with postings for EVS technicians. This can be a hard one, but don’t give up!
8. Ask Administration to support an EVS ladder with quarterly bonuses. Include basic life support, preceptor classes, performance improvement involvement, and individual high-touch cleaning as a requirement for ladder participants.
9. Share HAI and high-touch surface data with the EVS staff.
10. Develop a quarterly electronic infection prevention newsletter with an EVS highlights section.
11. Celebrate improvements and certifications publicly within your facility.
12. Always look for improvements. For example, in May 2018, we partnered with the Kentucky Hospital Improvement Innovation Network (K-HIIN) and the Association for the Healthcare Environment (AHE). K-HIIN is a quality improvement program provided to Kentucky by the Health Research & Educational Trust, which is contracted through the Centers for Medicare & Medicaid Services. K-HIIN’s focus is assisting Kentucky hospitals with quality improvement initiatives to reduce patient harm.[14] The K-HIIN and AHE partnership allowed our facilities to host a 3-day workshop to obtain AHE-certified healthcare EVS technician trainer (T-CHEST) certification. K-HIIN provided scholarships for 30 different hospitals in the state of Kentucky. This was the first statewide certification for T-CHEST in the United States. CHEST certification is recognized by the American Hospital Association. The AHE CHEST certification curriculum has a 20% focus on infection prevention.[15]

## CONCLUSIONS

Our study highlights the importance of EVS infection prevention education, accountability, and specialty certifications, as well as recognition of the role played by EVS in a healthcare facility. This study also supports the view that adopting an EVS education model may assist in the reduction of healthcare–associated CDI rates.

Throughout the healthcare community, we focus on the reduction of patient harm through patient-centered care. Patient-centered care must include EVS to ensure patient safety and harm reduction. EVS plays an important part in achieving a safe environment for patients, families, and healthcare workers. Administrative support is essential in the acknowledgment of the role played by EVS within the healthcare facility.

## Acknowledgments

We thank our administrative teams at both facilities for fostering a culture of safety: Robert Parker, Market President and CEO; Barbara Kinder, CCO; Matt Smith, CEO; Cindy Wesley, CNO; Steven Ivy, CFO; Kelly Stratton, ACNO; and Alan Teegarden, Director of Quality. We would also like to thank Elizabeth Lovell, Pharm D, MBA, CPPS, Ken Hogan; and Tim Wiemken, PhD, MPH, CIC for the encouragement.

## References

1. Centers for Disease Control and Prevention. Options for evaluating environmental cleaning. Available from: https://www.cdc.gov/hai/pdfs/toolkits/Environ-Cleaning-Eval-Toolkit12-2-2010.pdf. Accessed September 30, 2018.
2. Centers for Disease Control and Prevention. Options for evaluating environmental cleaning. Available from: http://www.cdc.gov/hai/toolkits/evaluating-environmental-cleaning.html. Accessed September 30, 2018.
3. Agency for Healthcare Research and Quality. Environmental cleaning for the prevention of healthcare-associated infections (HAI). Retrieved from https://effectivehealthcare.ahrq.gov/topics/healthcare-infections/research-protocol/; 2014. Accessed November 12, 2018.
4. Gerding DN, Muto CA, Owens RC. Measures to control and prevent *Clostridium difficile* infection. Clin Infect Dis 2008;46:43-9.
5. Claro T, Daniels S, Humphreys H. Detecting *Clostridium difficile* spores from inanimate surfaces of the hospital environment: which method is best?. J Clin Microbiol 2014;52:3426-8.
6. Weber DJ, Anderson D, Rutala WA. The role of the surface environment in healthcare-associated infections. Curr Opin Infect Dis 2013;26:338-44.
7. National Healthcare Safety Network. Multidrug-resistant organism & *Clostridium difficile* infection module. Available from:https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=2ahUKEwjgg8mgtOPdAhUGn1MK HTjzDMIQFjABegQIBRAC&url=https%3A%2F%2Fwww.cdc.gov%2Fnhsn%2FPDFs%2 FpscManual%2F12pscMDRO_CDADcurrent.pdf&usg=AOvVaw2Al0keE5-V-Uo8X7x 2b_Lq. Accessed September 30, 2018.
8. Dean AG, Sullivan KM, Soe MM. OpenEpi: open source epidemiologic statistics for public health. Available from: http://www.OpenEpi.com. Accessed September 30, 2018.
9. National Healthcare Safety Network. Risk adjustment for healthcare facility-onset *C difficile* and MRSA bacteremia laboratory-identified event reporting in NHSN. Available from: https://www.cdc.gov/nhsn/pdfs/mrsa-cdi/riskadjustment-mrsa-cdi.pdf. Accessed September 30, 2018.
10. Agency for Healthcare Research and Quality. Culture of safety. Available from: https://psnet.ahrq.gov/primers/primer/5/culture-of-safety. Accessed September 30, 2018.
11. Agency for Healthcare Research and Quality. About TeamSTEPPS. Available from: https://www.ahrq.gov/teamstepps/about-teamstepps/index.html. Accessed September 30, 2018.
12. Ramphal L, Suzuki S, McCracken IM, Addai A. Improving hospital staff compliance with environmental cleaning behavior. Proc (Bayl Univ Med Cent) 2014;27:88-91.
13. Mitchell BG, White N, Farrington A, Allen M, Page K, Gardner A, et al. Changes in knowledge and attitudes of hospital environmental services staff: the researching effective approaches to cleaning in hospitals (REACH) study. Am J Infect Control 2018;46:980-5.
14. Kentucky Hospital Improvement Innovation Network. K-HEN to K-HIIN. Available from: http://k-hen.com/Home.aspx. Accessed September 30, 2018.
15. Association for the Healthcare Environment. CHEST. Available from: http://www.ahe.org/ahe/lead/CHEST/curriculum.shtml. Accessed September 30, 2018.

## APPENDIX A. NATIONAL HEALTHCARE SAFETY NETWORK NEGATIVE BINOMIAL REGRESSION MODEL DATA

| Year | HOCDI | COCDI | Patient days | Admissions | Community prevalence | Expected | SIR | National SIR 2014 |
|---|---|---|---|---|---|---|---|---|
| 2013 | 4 | 9 | 8,316 | 1,738 | 0.51 | 0.89 | 4.49 | 0.92 |
| 2014 | 1 | 9 | 9,626 | 2,031 | 0.44 | 1.02 | 0.98 | 0.92 |
| 2015 | 1 | 5 | 11,647 | 2,603 | 0.19 | 1.2 | 0.83 | 0.92 |
| 2016 | 1 | 12 | 11,596 | 2,652 | 0.45 | 1.34 | 0.74 | 0.92 |
| 2017 | 0 | 6 | 11,105 | 2,476 | 0.24 | 1.16 | 0 | 0.92 |

*COCDI*, community-onset *Clostridium difficile* infection; *HOCDI*, hospital-onset *Clostridium difficile* infection; *SIR*, standardized infection ratio.

## APPENDIX B. CENTERS FOR DISEASE CONTROL AND PREVENTION TERMINAL CLEANING AUDIT TOOL (1)

### CDC Environmental Checklist for Monitoring Terminal Cleaning[1]

| | |
|---|---|
| **Date:** | |
| **Unit:** | |
| **Room Number:** | |
| **Initials of ES staff (optional):**[2] | |

**Evaluate the following priority sites for each patient room:**

| High-touch Room Surfaces[3] | Cleaned | Not Cleaned | Not Present in Room |
|---|---|---|---|
| Bed rails / controls | | | |
| Tray table | | | |
| IV pole (grab area) | | | |
| Call box / button | | | |
| Telephone | | | |
| Bedside table handle | | | |
| Chair | | | |
| Room sink | | | |
| Room light switch | | | |
| Room inner door knob | | | |
| Bathroom inner door knob / plate | | | |
| Bathroom light switch | | | |
| Bathroom handrails by toilet | | | |
| Bathroom sink | | | |
| Toilet seat | | | |
| Toilet flush handle | | | |
| Toilet bedpan cleaner | | | |

**Evaluate the following additional sites if these equipment are present in the room:**

| High-touch Room Surfaces[3] | Cleaned | Not Cleaned | Not Present in Room |
|---|---|---|---|
| IV pump control | | | |
| Multi-module monitor controls | | | |
| Multi-module monitor touch screen | | | |
| Multi-module monitor cables | | | |
| Ventilator control panel | | | |

**Mark the monitoring method used:**

☐ Direct observation ☐ Fluorescent gel
☐ Swab cultures ☐ ATP system ☐ Agar slide cultures

[1]Selection of detergents and disinfectants should be according to institutional policies and procedures
[2]Hospitals may choose to include identifiers of individual environmental services staff for feedback purposes.
[3]Sites most frequently contaminated and touched by patients and/or healthcare workers

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion