

## OUTBREAK MANAGEMENT

# Improvement of hospital environmental cleaning and disinfection practices following an eight-month outbreak

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## ABSTRACT

**Background:** Following an eight-month vancomycin-resistant *Enterococcus* outbreak on an inpatient medical unit, the Environmental Services Department re-examined their cleaning and disinfection protocols.

**Methods:** Cleaning and disinfection policies and best practice recommendations were analyzed and staff and patient surveys were conducted to identify quality improvement projects.

**Results:** Four projects were implemented, including standardizing procedures, updating cleaning products, and introducing auditing and seasonal cleaning programs in patient care areas.

**Conclusions:** Engaging staff and patients and reviewing best practices resulted in the successful implementation of improvement projects to enhance cleaning and disinfection practices and improve patient safety in an acute care hospital.

## KEYWORDS

Auditing; hospital; improvement projects; seasonal cleaning

## INTRODUCTION

In 2013, a 35-bed inpatient medical unit experienced an eight-month vancomycin-resistant *Enterococcus* (VRE) outbreak. Three weeks after the outbreak was declared, 11 patients were newly identified as VRE-colonized despite the implementation of several outbreak measures, including adherence to hand hygiene and additional precautions, closure of overcapacity beds, double cleaning of patient rooms, cohorting of nursing staff and VRE-positive patients, and limiting patient movement. As there is increasing evidence that the environment may play a significant role in the transmission of healthcare-associated pathogens [1, 2], environmental sampling was conducted to

identify high-touch surfaces contaminated with VRE in both the general ward environment and VRE-positive and -negative patient rooms and bathrooms. Results of environment sampling indicated extensive VRE contamination throughout the unit, including the nursing station, cleaning storage room, hand rails, medical charts, patient kitchen, inside and outside the automated medication dispensing machine, the staff room, as well as VRE-positive and -negative patient rooms and bathrooms. In response, increased cleaning of all equipment and high-touch surfaces was conducted. Following the outbreak, the Environmental Services (EVS) Department decided to embark on a quality improvement program to

**Acknowledgements:** The authors wish to thank patients, Environmental Services staff, Support Services, Patient Flow, clinical staff, Facilities Management, Clinical Engineering, Infection Prevention and Control, and the former Regina Qu'Appelle Health Region Senior Leadership Team for their support and contributions to the improvement projects.

**Conflicts of interest:** None.

**Funding:** None.

upgrade and enhance its cleaning and disinfection practices and protocols with the goal of preventing future outbreaks within the hospital.

## METHODS

In 2014, the EVS Department, in partnership with the Infection Prevention and Control (IPAC) Department, analyzed the current state of practices, procedures, and products related to cleaning and disinfection at a 420-bed teaching affiliated hospital. In addition, an environmental cleaning document from the Provincial Infectious Diseases Advisory Committee [3] in Ontario was evaluated to determine if the hospital's procedures aligned with best practice recommendations.

To determine areas and environmental surfaces that were cleaned and disinfected and the healthcare provider responsible, a sticky note exercise was conducted. This activity involved nurses (working different shifts), personnel responsible for stocking the supply room, and EVS and unit support staff each receiving a specific colour of sticky note. Over a four-to-six-hour period, staff placed a coloured sticky note on the area or equipment they were currently responsible for cleaning.

To evaluate the engagement and performance of the EVS Department, surveys were completed by EVS staff, internal clients (e.g., department managers, clinical staff), and patients (Table 1). Surveys for EVS staff and internal clients were completed online and responses were based on a five-point

Likert scale. Patient surveys were conducted by EVS supervisors through face-to-face discussions after the patient's room was cleaned. Survey questions for patients were open-ended.

## RESULTS

Analysis of cleaning and disinfection protocols, best practices, sticky note exercises, and patient and staff surveys resulted in targeting several key areas for improvement, including standardizing procedures, replacing cleaning products, utilizing technological tools, and increasing staff accountability. Patient safety was identified as the key priority and it was decided that enhancements in cleaning and disinfection procedures should be dedicated to all patient care areas. Subsequently, four quality improvement projects were developed and implemented from 2015 to 2017.

### Project 1: Standardizing cleaning procedures

Results from the sticky note exercises identified areas and equipment that were not cleaned and/or were cleaned by multiple staff. To ensure consistency in cleaning and disinfection processes and procedures by the appropriate healthcare provider, standard work was created, including procedures for floors, bathtubs, showers, furniture, medical equipment, and patient rooms. The standard work also included a script to assist EVS staff in communicating the cleaning process of a patient's room to patients and visitors.

**TABLE 1: Survey questions for EVS staff, internal clients, and patients.**

<b>EVS Staff Engagement Questions</b>	
1.	My manager is approachable and easy to talk to.
2.	In the past six months, someone has talked to me about my progress and performance.
3.	My co-workers are committed to doing quality work.
4.	The people I work with treat each other with respect.
5.	I have the right tools and materials to do my work.
6.	I have enough time to do my work.
7.	The facility where I work provides a safe work environment.
8.	I know what is expected of me at work and understand the importance of my job.
9.	At work, my opinion counts.
10.	The clients/patients count on me and the work I do.
11.	I enjoy my job.
<b>Internal Client Questions</b>	
1.	The Environmental Services staff are courteous and collaborative.
2.	How satisfied are you with the overall service provided?
3.	The level of cleaning in your area meets your requirements.
4.	I am able to reach an Environmental Services supervisor or manager when required.
5.	Environmental Services are integral to the operations of your department.
<b>Patient Questions</b>	
1.	Do you have any comments related to the cleanliness of the room?
2.	Is there anything that you need to be cleaned?

### Project 2: Changing cleaning products

Initially, the EVS Department used cotton cloths and a quaternary ammonium compound to clean and disinfect surfaces. However, research indicates that cotton towels exposed to disinfectants containing quaternary ammonium compounds resulted in a substantial loss in disinfectant activity and concentration [4]. Based on this research and best practice recommendations [3], the EVS Department changed to an accelerated hydrogen peroxide disinfectant as well as microfibre cleaning materials, including cloths and mops.

### Project 3: Incorporating technological tools

To enhance cleaning and disinfection practices within the hospital, two technological tools were utilized by the EVS Department. The first, an auditing system utilizing fluorescent marking gel, was introduced to assist in identifying high-touch surfaces in patient rooms and bathrooms that were consistently cleaned and disinfected. Results from the auditing system were used for trending and benchmarking. Overall, results indicated that the percentage of high-touch surfaces that are regularly cleaned and disinfected in patient rooms and bathrooms steadily increased from 70% in 2015 to 90% in 2018. Despite this overall increase, results also identified specific environmental surfaces that were not routinely cleaned and disinfected. The audit results were regularly reported at departmental huddles and were used to coach and train EVS staff. Results were also posted on the hospital's intranet website for all healthcare providers to view.

The second technological tool, a portable hydrogen peroxide disinfection system, was purchased by the EVS Department. This technology was specifically utilized during outbreaks (i.e., patient rooms, staff rooms, cleaning service rooms, tub and shower rooms) or during seasonal cleaning (i.e., patient rooms).

### Project 4: Focusing cleaning and disinfection procedures in patient care areas

In 2017, a seasonal cleaning program was introduced for all inpatient units. This program was developed by internal partners during brainstorming sessions to prevent future outbreaks. The seasonal cleaning program consisted of a patient room being closed for a minimum of 24 hours. During this time, unit staff decanted the room, repairs (e.g., walls patched, puck board applied, electrical and plumbing problems repaired, walls painted) were completed by the Facilities Department, preventative maintenance of equipment (e.g., lifts, beds) was performed by the Clinical Engineering Department, and EVS staff polished the floors. Lastly, furnishings were moved back into the patient room and the room was terminally cleaned and disinfected and then fogged using the portable hydrogen peroxide disinfection system.

## DISCUSSION

Understanding the current procedures and activities of the EVS Department identified several opportunities for improving cleaning and disinfection practices as well as patient safety within an acute care hospital. Engaging patients and staff

resulted in clear and consistent cleaning and disinfection processes that were successfully implemented and maintained in patient care areas. Conducting sticky note exercises, which had high visual impact using little technology, resources, or cost, ensured equipment was cleaned by dedicated healthcare providers. Furthermore, by utilizing an audit and feedback system, cleaning and disinfection of high-touch environmental surfaces was easily monitored and addressed with EVS staff in addition to promoting and sustaining EVS staff accountability. Overall, the success of the various quality improvement projects was largely due in part to collaborations, partnerships, and communication strategies established between departments that included Nursing, Patient Flow, Facilities, Clinical Engineering, EVS, and IPAC.

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