



ELSEVIER

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Brief report

Microfiber and steam for environmental cleaning during an outbreak

Mardi Abernethy BN, CICP^a, Elizabeth Gillespie CICP, MPubHlth(Melb)^{a,*}, Kylie Snook BN, CIC^a, Rhonda L. Stuart MBBC, PhD^{a,b}^a Infection Control and Epidemiology, Southern Health, Clayton, Australia^b Department of Medicine, Monash University, Victoria, Australia

Key Words:

Environmental cleaning
 Innovative technology
 Reducing environmental contamination
 Outbreak management

We report an outbreak of norovirus gastroenteritis occurring concurrently over two wards. Environmental cleaning was managed using two different methodologies: one ward utilized the traditional 2-step method, the other using microfiber-steam technology. Environmental cleaning using the microfiber-steam technology proved to be an effective and efficient cleaning methodology, appropriate for use during an outbreak situation.

Copyright © 2013 by the Association for Professionals in Infection Control and Epidemiology, Inc.
 Published by Elsevier Inc. All rights reserved.

Gastroenteritis outbreaks are a common occurrence in acute and long-term care facilities, often with norovirus implicated.¹ Management traditionally entails isolation of affected patients, implementation of transmission-based precautions, closure of the affected area to admission and transfer of patients (to other areas), and initiation of 2-step cleaning involving detergent and water followed by disinfection with hypochlorite solution.²

METHODS

Southern Health is a tertiary referral health service, the largest metropolitan health service in Victoria. Casey hospital is a 229-bed hospital within Southern Health. Casey hospital implemented an innovative new cleaning method using microfiber-steam technology in 1 ward (ward D) during June 2011.³ To date, this methodology has only been introduced in a single ward at this facility and has continued regardless of patients admitted with *Clostridium difficile*, vancomycin-resistant *enterococcus*, or gastroenteritis. This is the first outbreak identified since the new cleaning methodology was introduced.

This outbreak occurred between the 10th and 22nd of October 2012, in 2 wards at Casey hospital. Ward C is a 32-bed acute general medicine ward, and ward D is a 32-bed acute rehabilitation, geriatric evaluation and management, and palliative care ward. On October 15, 2012, infection control staff at Casey hospital

were notified of several patients with gastroenteritis in wards C and D.

Case definition

A patient or staff member was considered a case if there was (1) at least 1 symptom consistent with gastrointestinal tract infection, ie, vomiting, diarrhea, or nausea; or (2) a stool culture positive for norovirus. Stool samples were obtained when possible from patients on each ward. Patients were isolated in single rooms or cohorted in transmission-based precautions with other patients with gastroenteritis.⁴ Patients were only allowed to leave their rooms for requested medical procedures or rehabilitation requirements. Staff entering affected rooms wore long-sleeved gowns and gloves, paid particular attention to hand hygiene requirements in accordance with the 5 moments,⁵ and wore a mask if a patient was vomiting.⁶

Traditional cleaning

On ward C, all rooms were cleaned using a 2-step process^{2,7} involving the cleaning of all surfaces and equipment within the patient bedroom and bathroom first with a detergent, followed by sodium hypochlorite solution (1,000 ppm) with 10 minutes contact time, and all patient screens and window drapes were changed.

Microfiber-steam technology

On ward D, rooms were cleaned using microfiber-steam technology. Microfiber cloths and mops were used for daily cleaning.

* Address correspondence to Elizabeth Gillespie, CICP, MPubHlth(Melb), Infection Control and Epidemiology, Southern Health, 246 Clayton Road, Clayton, Victoria 3168, Australia.

E-mail address: eegillespie@gmail.com (E. Gillespie).

Conflicts of interest: None to report.

New cloths were used for each separate patient area, and mops used on floors were replaced between patient rooms.

The steam component was used in conjunction with microfiber cloths and mops for discharge cleaning. On discharge or at 48 hours after the cessation of symptoms, patient screens were changed, and window drapes were steam cleaned in situ.

Any staff member with symptoms was told to go home and not return to work until 48 hours after the cessation of symptoms. Each affected staff member was contacted to confirm their symptoms and expected date of return to work.

RESULTS

In total, 53 patients and staff met the case definition for outbreak-specific gastroenteritis, with the first case becoming symptomatic on October 10. Forty-one (staff and patient) cases had symptom onset before or during the peak of the outbreak, and 12 cases had a later onset. The patient attack rate was 2.7% on ward C and 6.6% on ward D at the peak of the outbreak, reducing dramatically once infection control was notified.

Ward D had the largest number of affected patients with symptoms of gastroenteritis (Fig 1). The ward was closed to admissions and patient transfers from October 13 until the outbreak resolved on October 22.

During the outbreak, there was 1 patient discharged home on the October 15. No new cases were identified from this date. Within the ward, there were patient moves, but no new cases occurred in a bed area where there had previously been an affected case. Three fecal specimens confirmed norovirus as the causative agent.

Cleaning staff from both wards were identified as the health care workers most affected during this outbreak. Cleaning staff were not permitted to work between wards during the outbreak. Other staff involved included allied health, nursing, medical, and clerical.

DISCUSSION

Noroviruses are recognized for their virulence and environmental persistence.⁸ These features enable norovirus to be a common cause of outbreaks within hospitals and aged care settings.¹

Traditional cleaning methods for gastroenteritis utilize 2-step cleaning. Such methods require the use of chemicals and are time-consuming and costly. We demonstrated that microfiber-steam technology was equally effective in containing this outbreak.

More patients were affected on ward D using the microfiber-steam technology, but the number of cases quickly reduced once transmission-based precautions were implemented. This suggests a major role of transmission-based precautions to terminate outbreaks. Despite ward D having more affected patients, there were no new cases identified from areas where there were previously affected patients. Often in gastroenteritis outbreaks, there are 2 epidemic curves, and outbreak management can be a challenge until environmental contamination is controlled.¹ This was not our experience, suggesting that environmental cleaning was equivalent whether using the traditional method or the newer technology.

The advantages of this technology include a timesaving of 25% to 30% (labor), elimination of chemicals, reduction in water

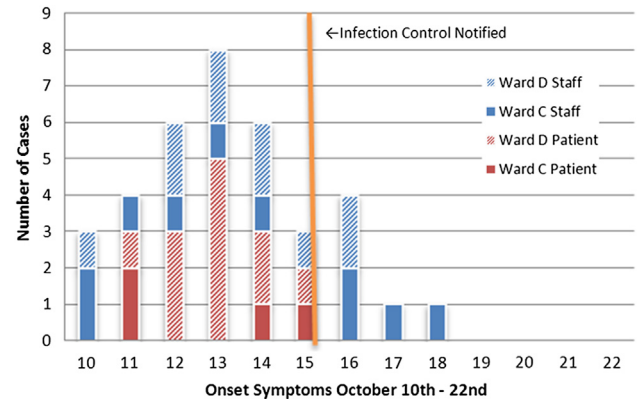


Fig 1. Onset symptoms for Ward C and D patients and staff, October 10th-22nd.

consumption (90%), and elimination of dry-cleaning costs and are visually more appealing and overwhelming accepted by cleaning staff. In our health service, an AUD \$142 cost opportunity has been identified, per single room and bathroom, when undertaking high-level environmental cleaning, ie, for gastroenteritis.³

Strengths of our study include using both methods concurrently for outbreak containment. A weakness is the single-center observation (acute care setting). Nevertheless, our findings demonstrate further studies for microfiber-steam technology in environmental cleaning are warranted.

CONCLUSION

We have found that an outbreak of norovirus-associated gastroenteritis can be effectively managed using microfiber-steam technology. Hospitals adopting this methodology can be reassured that this cleaning is effective in the presence of norovirus and that patient care will not be compromised.

References

- Wu H, Fornek M, Schwab K, Chapin A, Gibson K, Schwab E, et al. A norovirus outbreak at a long-term-care facility: the role of environmental surface contamination. *Infect Control Hosp Epidemiol* 2005;26:802-10.
- Victorian Department of Health. A guide for the management and control of gastroenteritis outbreaks in aged care, special care, health care and residential care facilities. Available from: [http://docs.health.vic.gov.au/docs/doc/3CC9BE58D774D11FCA2578A3002608E6/\\$FILE/Industry-guide-Care-web2.pdf](http://docs.health.vic.gov.au/docs/doc/3CC9BE58D774D11FCA2578A3002608E6/$FILE/Industry-guide-Care-web2.pdf). Accessed December 2012.
- Gillespie E, Wilson J, Lovegrove A, Scott C, Abernethy M, Kotsanas D, et al. Environment cleaning without chemicals in clinical settings. *Am J Infect Control* 2013;41:461-3. Available from: <http://www.ajicjournal.org>. Accessed December 2012.
- National Health and Medical Research Council. Australian guidelines for the prevention and control of infection in healthcare. 2010. Available from: <http://www.nhmrc.gov.au>. Accessed December 2012.
- World Health Organisation. WHO guidelines on hand hygiene in healthcare. Available from: http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf. Accessed December 2012.
- Marks P, Vipond I, Carlisle D, Deakin D, Fey R, Caul E. Evidence for airborne transmission of Norwalk-like virus (NLV) in a hotel restaurant. *Epidemiol Infect* 2000;124:481-7.
- Gillespie E, Scott C, Wilson J, Stuart R. Pilot study to measure cleaning effectiveness in health care. *Am J Infect Control* 2012;40:477-8.
- Barker J, Vipond I, Bloomfield S. Effects of cleaning and disinfection in reducing the spread of Norovirus contamination via environmental surfaces. *J Hosp Infect* 2004;58:42-9.