



# Enhancing Patient Safety through the Management of *Clostridium difficile* at Toronto East General Hospital

Arladeen Tomiczek, C. Stumpo and James F. Downey

## Abstract

In 2005 Toronto East General Hospital experienced a steady increase in the number of *C. difficile* cases diagnosed within the hospital. This was identified as a patient safety issue, and several areas of the hospital came together to address the problem. Pharmacy immediately started a medication review of past cases. Environmental services took the lead on the environmental cleaning, and a process was put into place with Infection Control so that housekeeping knew of every room that contained a patient with *C. difficile* and enhanced cleaning could be practised. Staff, including nursing, housekeeping and porters, were educated on *C. difficile* and the methods of transmission. A business case was developed for a disposable bedpan system, and this was approved by the senior team. A new washable product was tried out with success for the overhead patient light pulls and bathroom call bell systems. Infection rates were shared with staff through a variety of venues. As a result of the initiatives, the hospital has seen a decrease of 50% in the rates of *C. difficile*. A bonus was that our MRSA rates dropped as well.

## Introduction

In recent years, there have been multiple reports of *Clostridium difficile*-associated diarrhea (CDAD) causing severe colitis and high case fatality rates in healthcare institutions (Pepin et al. 2004; Morris et al. 2002; Dallal et al. 2002). Some of

the recent reports involve *C. difficile* strain NAP1-027, which hyper-produces toxin leading to more severe, prolonged and/or relapsing disease (Warny et al. 2005). Pepin et al. (2004) have described their experience in Sherbrooke, QC, which has highlighted the severity of disease due to the new strain. The use of fluoroquinolones in the hospital environment is an important risk factor for the development of *C. difficile* disease (Pepin et al. 2005).

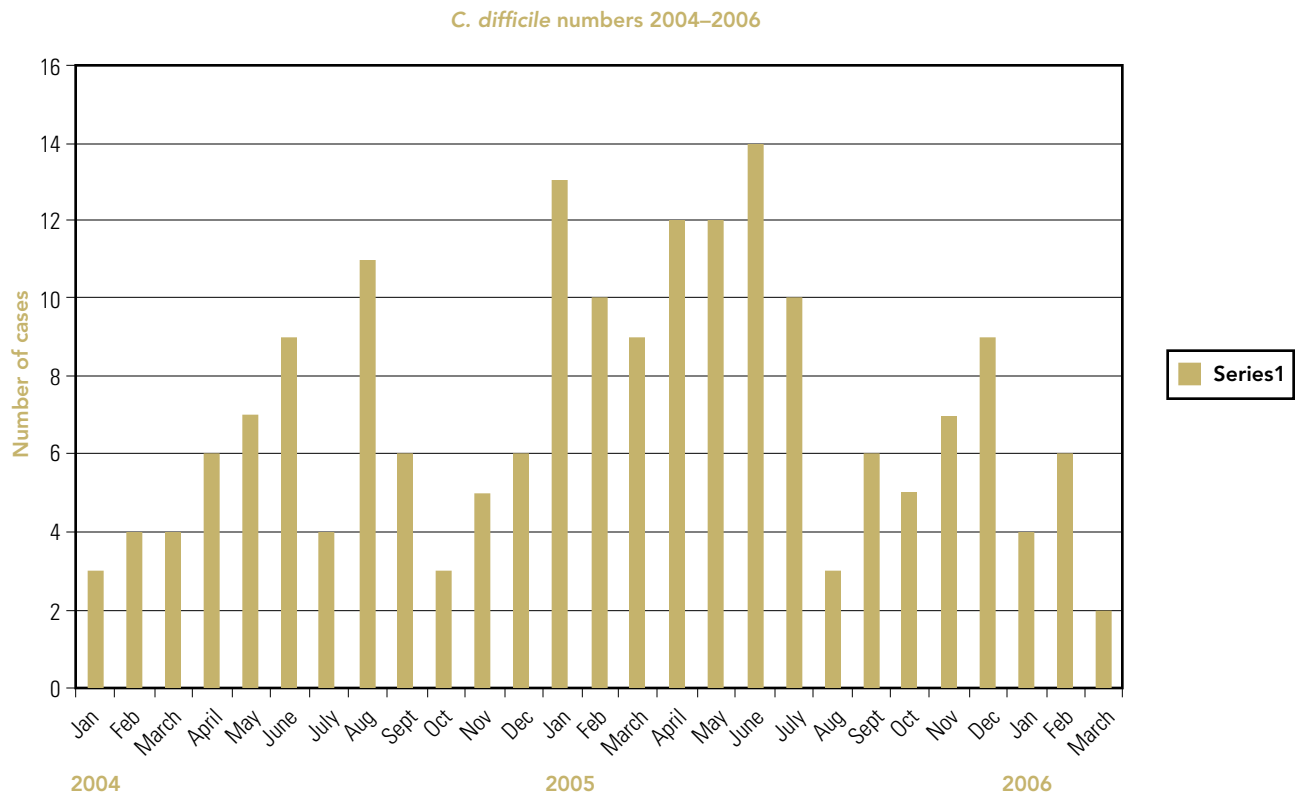
*C. difficile* is a gram-positive spore-forming bacillus that produces toxins that can cause disease in healthy patients, often following the administration of antibiotics. Some other factors that increase risk of CDAD are recent abdominal surgery, older age, chronic underlying illnesses and the use of bowel-motility-altering drugs. *C. difficile* produces spores that are difficult to eradicate and spread easily on equipment and healthcare workers' hands in the hospital environment.

Many hospitals have noticed increased numbers of cases in the past several years. This report outlines the Toronto East General Hospital experience with the management of increased numbers of cases of *C. difficile* noted between May 2004 and December 2005 in a 550-bed community teaching hospital.

## Data Collection

The Toronto East General Hospital Infection Prevention and Control Service has collected surveillance statistics on *C. diffi-*

Figure 1. *C. difficile* cases identified at Toronto East General Hospital, 2004–2006



*cile* rates. Before 2004 baseline rates were four or five cases per month. However, over the course of 2004, more and more cases were detected, scattered throughout the hospital with no obvious link between them. Between April and June 2004, the total number of cases identified doubled within our facility (Figure 1), but then numbers dropped back to baseline levels. Because of reports of increased numbers of severe cases from other local institutions (personal communication), the situation was carefully monitored.

However, from January to June 2005, the number of cases of CDAD increased further, to two to four times baseline levels (Figure 1). At this point, it became clear that intervention was necessary.

**Interventions**

The Infection Control Service convened a meeting that included various services, such as: facilities (building maintenance), housekeeping, laboratory, nursing, pharmacy and portering. A brainstorming session was held in an effort to evaluate all aspects of the issue with a particular focus on patient safety. All involved

parties felt they had contributions to make in the management and control of CDAD in our facility and eagerly responded to the challenge.

**Facilities**

The method of cleaning bedpans was a “toilet wand” spray system attached to the back of the toilets. Spray from this wand during the cleaning of bedpans resulted in splashing and aerosolization of fecal material. Also, this cleaning method uses only water and so fails to fully eliminate bacterial and spore loads. We believe this to have been a contributing factor to the development of the increased numbers of cases.

Facilities and Infection Control worked together to evaluate acceptable options for bedpan cleaning. These options included a closed-system bedpan washer and a macerator system with disposable bedpans and urinals. A decision was made to advocate for the purchase of the macerator system. A business plan was developed for the purchase and installation of this system hospital-wide. The business plan was presented to management and approved; the first unit was installed in September 2005.

## Housekeeping

Wards with the most CDAD patients were identified to the housekeeping department. Infection Control worked with housekeeping to identify high-risk/high-touch surfaces where transmission might occur, and enhanced daily cleaning of these surfaces was initiated. Terminal cleaning was done through the hospital of all medical and surgical patient care units that had had cases of CDAD.

A process was developed to notify housekeeping coordinators of any room that contained a patient diagnosed with CDAD. The identified rooms were terminally cleaned whenever an affected patient was discharged from the hospital or had recovered.

The Infection Control Service reviewed cleaning practices with all housekeeping staff. As well, education concerning CDAD, focusing on the modes of transmission and why high-quality cleaning is so critical, was developed for housekeeping personnel by the Infection Control Service.

**The Infection Control Service conducted a review of patient rooms to identify ways *C. difficile* could be harboured and transmitted from patient to patient. Light pull cords and bathroom pull cords were identified as high-touch surfaces that were not easily cleaned and through which transmission might occur.**

## Infection Control

Policies and procedures related to the care of patients diagnosed with *C. difficile* were already available both in hard copy on each nursing unit and on the hospital intranet site.

All staff were encouraged to access these policies and procedures in an effort to have consistent utilization of best-practice techniques throughout the hospital.

An information fact sheet for patient and families was also available. Staff were encouraged to distribute these to all sick patients and family members whenever CDAD was a potential concern. Public Relations assisted by having this information translated from English to the six most common non-English languages used in the local community and at the hospital (Cantonese, Greek, Italian, Tagalog, Tamil, Urdu).

The Infection Control Service conducted a review of patient rooms to identify ways *C. difficile* could be harboured and transmitted from patient to patient. Light pull cords and bathroom pull cords were identified as high-touch surfaces that were not

easily cleaned and through which transmission might occur. The overbed lights were designed with short beaded chain pull cords. These cords could not be reached by most patients, and multiple types of extender cords had been attached by nursing staff to allow patients access to their light cords. Bathroom pulls were also made from a similar cord-like material. All of these makeshift cords were nearly or totally impossible to clean, often being pieces of cloth material. The Infection Control Service championed the purchase of new light pull cords made of a vinyl material that is easily cleaned and disinfected. A business plan was developed, approval was obtained from management and the vinyl cords were installed throughout the facility.

## Laboratory

*Clostridium difficile* toxin testing is not done by the onsite TEGH microbiology laboratory. Instead, stool specimens are sent to the local Public Health Laboratory for testing. This results in longer turnaround times for testing and results. In view of this, isolation precautions were initiated for all patients at the onset of diarrhea symptoms, until the diagnosis was made.

Microbiology lab staff pointed out that a significant number of stool samples were submitted to the microbiology laboratory in inappropriate collection containers, usually making testing impossible. A reference pictorial guide, suitable for posting on patient care units, was developed and distributed throughout TEGH. This has been used by the nursing staff as a reference when they collect stool samples from patients with diarrhea.

## Nursing

The Infection Control Service developed an education package for nursing staff that focused on the chain of transmission, and the prevention of infections. Handwashing was emphasized. The use of dedicated equipment for all patients suspected or diagnosed with CDAD was implemented so as to minimize potential for spread.

Nursing staff stated that no process was in place for the routine cleaning of IV poles. A system was developed that allowed for the cleaning of IV poles whenever a pole was removed from any patient's room and before it was reassigned to a new patient. Any IV poles used for patients on isolation precautions were identified and given enhanced cleaning.

## Pharmacy Services

Pharmacy undertook a review of antibiotic exposure in all patients with a positive stool toxin assay for *C. difficile* for the six-month period of January to June 2005. Antibiotic exposure for the two months prior to a positive assay was determined for all cases in this time period. The association of each antibiotic to *C. difficile* disease was calculated as number of cases per 1,000 days of antibiotic treatment. The data was difficult to interpret, because some patients had had more than 10 anti-

otic exposures in the two months prior to the development of *C. difficile* disease, making it impossible to determine the offending agent. Overall, cephalosporins (ceftriaxone, cefazolin) and fluoroquinolones (moxifloxacin, ciprofloxacin) were most commonly associated with CDAD. However, the relative risk of using these drugs was only slightly increased, as they are commonly used antibiotics. Therefore, no formulary changes were recommended on the basis of the antibiotic review.

### Portering

Porters were given education by the Infection Control Service specific to the transport of isolation patients throughout the facility. Signage for transport of isolation patients within the facility had previously been developed so a refresher training program on best practice was developed and implemented.

The portering staff identified that wheelchairs and stretchers were not being cleaned on any routine schedule. Also, it was pointed out that there was no process to identify wheelchairs that had been used to transport isolation patients. Infection Control worked with the portering pool to develop an identification system for soiled wheelchairs and stretchers. A process was then developed that ensured regular cleaning and labelling of cleaned equipment. All such equipment is now cleaned on a rotational basis.

### Other Challenges

Most hospitals built over 15 years ago were built without significant Infection Control input and are not equipped with bedside handwashing stations. Bathrooms are usually small, and are often shared. In most hospitals, only a few private rooms with private bathrooms are available, and most of these are used to isolate patients with a communicable condition (i.e., CDAD or other conditions requiring isolation). Some hospitals have so few single rooms that patients with communicable conditions must be cohorted, making the probability of transmission higher. This makes the control of transmission of disease in older hospitals extremely difficult. At TEGH, an Infection Control representative now sits on the hospital planning and design committee and is involved with all construction and renovation.

Bleach is a well-known sporicide, and is the preferred cleaner for CDAD cases. Unfortunately, many find its odour unpleasant and irritating to the upper respiratory tract. Our initial response was to choose diluted bleach solution as our cleaning agent, but after one hour it became apparent that staff and patients were unable to tolerate the odour. We began to use an accelerated hydrogen peroxide-based cleaner, and this was better tolerated.

### Conclusion

Since Fall 2005 we have noticed fewer cases of CDAD, and since January 2006 we are back to baseline (Figure 1). The ongoing installation of the bedpan macerator system has been extremely

popular, especially with the nursing staff. Our augmented cleaning strategies for rooms with patients having CDAD, and the equipment and approach used to treat these patients, now remains as standard practice. As a bonus, our numbers for cases of methicillin-resistant *Staphylococcus aureus* have dropped by 30 to 50%. It is believed this is due to better comprehension and best practice in the care of patients with isolatable conditions.

It is clear that a multifaceted strategy involving members of multiple hospital departments has paid off in the control of CDAD cases. Staff in many different care roles have demonstrated a commitment to a safe and healthy environment for our patients. Patient safety is a priority at Toronto East General Hospital, and staff were very pleased to have had an opportunity to prove it.

### About the Authors

**Arladeen Tomiczek, RN**, is Manager of Organizational Safety (Infection Control and Occupational Health and Safety), Toronto East General Hospital.

**Dr. C. Stumpo, PharmD**, is Director of Pharmacy Services, Toronto East General Hospital.

**Dr. James F. Downey, PhD, MD, FRCPC**, is Infection Control Officer, Microbiology Consultant and Staff Internist, Toronto East General Hospital.

Please direct correspondence to: Arla Tomiczek, Manager, Organizational Safety, Toronto East General Hospital. Tel: 416-469-6580, ext. 6262. Fax: 416-469-6111. E-mail: atomi@tegh.on.ca.

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