



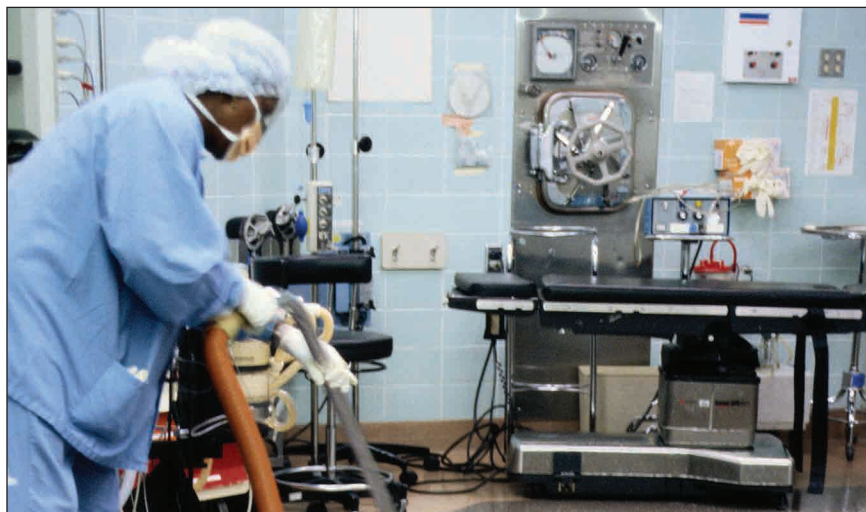
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## Improving Cleaning and Disinfection of Environmental Surfaces in Hospitals

OLIVIA LATTIMORE, CLINICAL AND TECHNICAL SERVICES SPECIALIST  
VIROX TECHNOLOGIES INC.



Experts generally agree that careful cleaning and disinfection of environmental surfaces are essential elements of effective infection prevention programs. In recent years, there has been an increasing consensus that improved cleaning and disinfection of environmental surfaces is needed in healthcare facilities. Dr. John Boyce has addressed this topic in a few different ways this year; in an APIC conference lecture, in an article (*Antimicrob Resist Infect Control*. 2016 Apr 11;5:10), and in a recent Webber Training teleclass.

In each instance, Dr. Boyce points out that there are many factors that can potentially have adverse effects on the efficacy of traditional cleaning and disinfection practices. An example of this is the type of surface being cleaned or disinfected, as it can affect the completeness with which bacteria are removed.

Disinfectants may also be applied using inadequate contact times. Failure of housekeepers to use the appropriate number of wipes per room can result in poor cleaning of surfaces. Use of wipes without sufficient antimicrobial activity against target pathogens can result in poor disinfection of surfaces and can lead to the spread of pathogens from one surface to another. Binding of quaternary ammonium disinfectants to cloths made of cotton or wipes containing substantial amounts

# Virox Update

## Monthly Education at Your Fingertips!

At Virox we are passionate about providing accessible education pertaining to cleaning and disinfection. This year we launched monthly educational campaigns providing readers with a number of engaging tools and resources. Our top three crowd pleasing campaigns were: Love Sick, Pedicure Peril, and Disinfection Dysfunction. Inspired by Valentine's Day, our Love Sick campaign provided fun resources such as germ themed Valentine's Day cards. Pedicure Peril was created for Spas to help them rejuvenate their infection prevention measures and provided resources such as training presentations and cleaning and disinfection protocols. Finally, Disinfection Dysfunction focused on the common down falls of disinfectants and provided resources to help users select the ideal disinfectant, including a fun Disinfection Dysfunction themed coloring sheet. Stay tuned for our upcoming campaigns!

## Join in the Conversation!

Virox strives to help answer some of the questions and concerns about the use of disinfectants through the "Talk Clean to Me" blog which is non-product specific and focuses on topics around the use of disinfectants for infection prevention and biosecurity. Some of our favourites from 2016 include: The Art of Topping Up, Green – the new official Olympic pool colour?, How Big are your Hands, and OMG I hate HPV! If you're not already a follower we hope you will sign up to join in on the conversation!

# Talk CLEAN to Me



blog

## 2016 IPAC-Canada Cleaning, Disinfection and Sterilization Symposium

In May, Virox sponsored the IPAC-Canada bi-annual "Cleaning, Disinfection and Sterilization Symposium" at the Niagara 2016 IPAC Canada National conference. In line with our mandate to provide educational opportunities to the infection control community, the 2016 symposium focused on Implementation Science which included a workshop designed to help put theory into practice and equip infection control professionals across Canada with the knowledge and tools they need to prevail in the battle against germs.

## Virox Speaks on Antibiotic Resistance

In September, Virox spoke at the national CIPHI (Canadian Institute of Public Health Inspectors) conference on the role surface disinfection plays in preventing the development and transmission of Antibiotic Resistance. Virox was joined by "Do Bugs Need Drugs" and DynaLIFE Dx on a panel that discussed how Environmental Public Health can be part of the solution to this global problem.

Dwell Time

Disease



Safety

Indifference  
Syndrome



Label Deficit

Disorder



Cross Contamination  
Conundrum



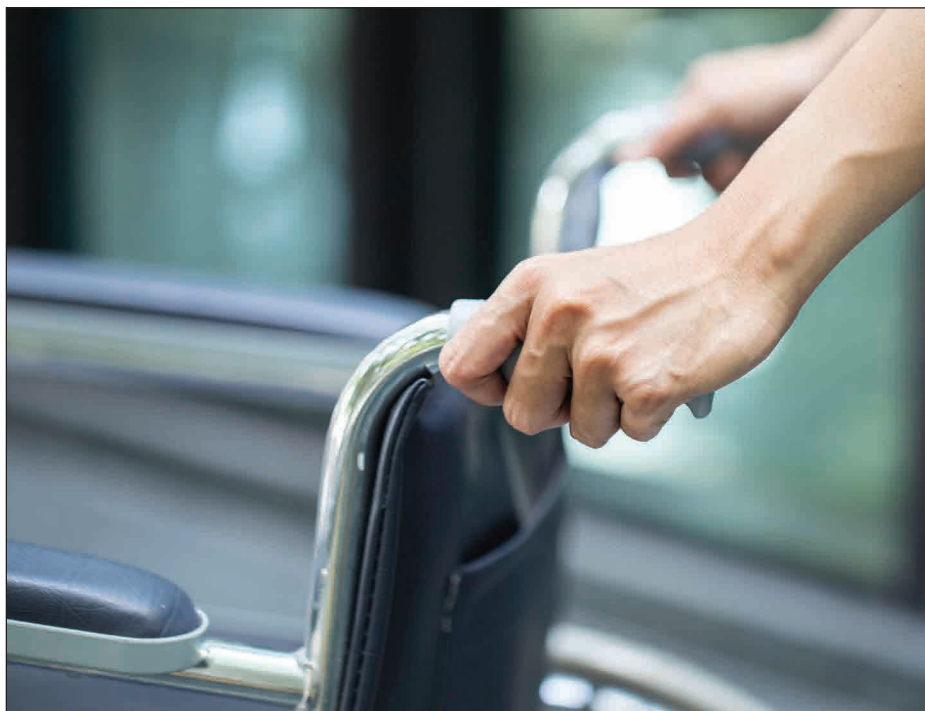


# Wheelchair Cleaning and Disinfection in Canadian Health Care Facilities

DR. PAULA GARDNER, BROCK UNIVERSITY, DEPARTMENT OF HEALTH SCIENCES

Cleaning and disinfection of all shared medical equipment prior to patient use are considered essential infection control practices, and failure to appropriately clean and disinfect such equipment contributes to the burden of preventable HAIs and has also been associated with outbreaks and transmission of antibiotic-resistant organisms (AROs). Wheelchairs are complex equipment that come into close contact with individuals at increased risk of transmitting and acquiring antibiotic-resistant organisms and health care-associated infection.

In a recent study (*American Journal of Infection Control* 42 (2014) 1173-7), we surveyed Canadian acute and chronic care hospitals and long-term care facilities (LTCFs) to identify the degree of concern at each facility with respect to the potential for wheelchairs to act as a vector for the transmission of AROs and to cause HAIs; document cleaning and disinfection practices at a wide spectrum of Canadian health care institutions; and identify both current challenges with, or barriers to, wheelchair cleaning and disinfection and potential solutions to these challenges.



A total of 54 hospitals and LTCFs were identified from Canada's western provinces, Ontario, and Quebec. Of these, 18 acute care hospitals, 16 chronic care hospitals, and 14 LTCFs agreed to participate. All respondents reported responsibility for wheelchair-specific infection control practices and included housekeeping staff and environmental services, infection control professionals, administrators, seating services staff, occupational therapists, or nurses.

## Respondents highlighted the following specific areas of concern.

- 1. Lack of a reliable system for tracking and identifying clean and dirty and soiled wheelchairs.** Specific problems identified included a system that was disorganized, confusing, unreliable (inconsistently reported), unenforced, or which did not include a schedule for cleaning. All respondents reported episodes where wheelchairs assigned to a specific patient were used by visitors, other patients and staff, or were borrowed by other patients and staff and not returned.
- 2. Failure to consistently clean and disinfect wheelchairs between patients.** Half of respondents felt that wheelchair cleaning and disinfection between use by different patients were often omitted or insufficient to reduce the risk of transmission of infection.
- 3. Difficulty with cleaning cushions.** Concerns were related to the nature of the material and its absorbency, uncertainty regarding the appropriate method of cleaning, and prolonged time required to dry cushions. Concerns were also

raised with respect to the frequency of damaged armrests and cushions, ripped or punctured cushions with exposed foam, and the impossibility of adequately cleaning cushions and armrests with this type of damage.

- 4. Lack of cleaning guidelines and protocols.** All respondents indicated that protocols that do exist were not based on any specific guidelines or best practices because they believed such guidelines do not exist.
- 5. Use of visibly soiled equipment.** Almost a third of respondents were concerned that visibly soiled wheelchairs were in use in their facility. They suggested that cleaning and disinfection processes were not appropriately applied and were insufficient to remove stains and contamination of wheelchair materials. Respondents also expressed concern that there was no formal mechanism to address who was responsible for cleaning and disinfection when visible soiling was identified, how and when to clean and disinfect when spills and contamination occurred, when materials should be discarded and replaced.
- 6. Lack of resources.** Respondents noted that even when responsibility for cleaning and disinfection was clearly designated, the individuals responsible for cleaning and disinfection often had insufficient time to clean and disinfect with the appropriate frequency because of the high volume of wheelchair use and limited number of dedicated staff.

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# Microbial Contamination of Hospital Reusable Cleaning Towels

PROF. CHARLES P GERBA, DEPARTMENT OF SOIL, WATER, AND ENVIRONMENTAL SCIENCE, UNIVERSITY OF ARIZONA, TUCSON, AZ



Hospital housekeeping staff routinely use cloth towels soaked in a hospital disinfectant to clean patient rooms (including terminal cleaning) and other areas of the hospital. These cloth towels are soaked in a bucket containing hospital disinfectants until needed, wrung out, and used to clean surfaces inside patient rooms. The towels are then either washed in-house or sent out to a central laundering facility. The clean towels are stored and then reused in the same manner. The goal of a project undertaken by our group a few years ago (*American Journal of Infection Control* 41 (2013) 912-5) was to examine the effects of laundry and cleaning practices commonly used in hospitals for washing, storing, and disinfecting cloth towels on the microbial loads in the towels.

Ten major hospitals in Arizona, selected at random, were invited and agreed to participate in the study. They were surveyed regarding their cleaning procedures and use of disinfectants for sanitizing rooms after terminal discharge. Clean

towels intended for cleaning purposes were collected in triplicate from each participating institution to evaluate both the towels' ability to harbor possible infectious agents and the effectiveness of the laundering practices in removing microorganisms. Swab samples were also collected from the inside surfaces of the buckets in which the towels were soaked in disinfectant. The towels and swabs were cultured for the presence of colony-forming units (CFU) of aerobic spore-forming bacteria, *Clostridium difficile*, molds, heterotrophic bacteria, *S aureus* (including MRSA), total coliforms, and *Escherichia coli*.

In the questionnaires on cleaning and laundry practices, 8 of the 10 hospitals reported using cotton towels, and the other 2 sites reported using microfiber towels. Two hospitals sent their linens to be laundered in a central facility, and the others laundered their towels in-house. All but 1 of the hospitals reported soaking their cleaning towels in a bucket with disinfectant.

Almost all (93%) sampled cleaning towels contained viable microorganisms even after laundering. There

were significant differences among hospitals in terms of the numbers and types of microorganisms recovered. Possible explanations for these findings include the substantial variation in laundering and cleaning practices among the hospitals, as well as variations in methods of disinfectant application, towel materials, and conditions for storage of the cleaning towels, resulting in habitats more or less conducive to microbial proliferation.

A significant difference was observed in the bacterial numbers recovered from cotton and microfiber towels. Bacteria have been shown to adhere more tenaciously to microfiber towels, allowing them to spread or transfer onto different surfaces as the towels are used. In a recent study evaluating the efficacy of reusable towels for decontamination of surfaces, microfiber towels showed superior results when used in new condition, but after reprocessing, the cotton towels more effectively removed bacteria from surfaces. The decontamination



efficacy of microfiber towels was reduced after just 20 washing cycles, contrary to the manufacturer's indications of sustained efficacy after 500 washes.

Typical hospital laundering practices are not sufficient to remove all viable microorganisms and spores from towels, regardless of whether they are sent to a central laundering facility or laundered in-house. It is unclear whether bacteria remain trapped in the towel fibers through the laundering process or are reintroduced through subsequent storage or handling. Although hospital disinfectants show efficacy against the organisms found in the towels, these findings suggest that current treatment practices should be reevaluated. Our results indicate that future studies should evaluate the potential role of cloth towels as a reservoir for nosocomial pathogens, along with their possible role in overall cleaning procedures at hospitals, clinics, and long-term care institutions. Furthermore, the development of guidelines for the reuse of cloth towels in health care environments should be considered as part of the larger picture of medical institution cleaning.



## Environmental Contamination After Daily Cleaning of Occupied Rooms

An esteemed group of researchers at Bellvitge Hospital in Barcelona, Spain, conducted an interesting study in 2015 (*American Journal of Infection Control* 43 (2015) 776-8) to analyze the environmental contamination of a patient room while an infected patient is still admitted and when cleaning is performed at least once daily.

Thirteen ICU rooms with patients infected with MRSA, multiresistant *P. aeruginosa*, or multiresistant *A. baumannii* were randomly selected for environmental screening of high-touch surfaces within an hour of routine daily cleaning. A total of 91 samples were collected in 13 rooms, and only 2 rooms showed no MDRO growth in any of the studied surfaces. This study was interesting for two reasons.

First, despite performing the correct routine daily cleaning, high-touch surfaces in ICU rooms remained heavily contaminated with the same MDRO as the occupant patient. The most contaminated surfaces were surfaces in direct contact with the patient. The percentage of contaminated surfaces significantly decreased according with the distance to the patient. This has not been reported in similar previous studies. Therefore, if terminal cleaning of the room is not correctly performed, the rapid colonization or infection can occur on the next admitted patient.

Secondly, and paradoxically, the authors identify another mechanism for the spreading of environmental contamination is the use of contaminated cleaning wipes. A single wipe was used for each room and discarded, along with the cleaning solution, between each room. It lends credence to the potential failure of the laundering process to remove contamination. This process also looks extremely wasteful of water, of the chemical detergent or disinfectant, and of the time required to empty and refill the bucket so frequently.

The authors conclude by suggesting that new cleaning technologies such as single-use disinfectant wipes may be a safer alternative to the double-bucket cleaning technique.

# Infection Control and Pet Therapy

EXCERPTS FROM A TELECLASS LECTURE PRESENTED ON SEPTEMBER 15, 2016 BY PROF. SCOTT WEESE, UNIVERSITY OF GUELPH

We have a complex and very close relationship with animals which can be both beneficial but we need to be mindful of the possible associated health risks. In children and in many populations, contact with animals is highly beneficial but we also recognize that zoonotic diseases happen. One of the challenges of talking about animals in healthcare facilities is thinking it through - if we want to absolutely minimize the risk of a zoonotic infections happening in a healthcare facility we'd ban animals. But is that what's best for the patient population overall? There's no way to make a no-risk situation when having animals in a healthcare facility, but we're trying to balance off the benefits and the risks.

How common are these programs? In a SHEA Expert Guidance Document that was published last year in the Journal of Infection Control and Hospital Epidemiology, "animal assisted activities", which include animal-assisted therapy and animal visitation rolled into one, take place in 89% of US facilities and 67% of non-US facilities that responded to a survey. It's very common and that's why we want to pay attention to it because it's so wide-spread, and it's reasonable to assume that there's a fairly massive number of human-animal exposures that take place with these programs.

Do animals involved in visitation programs carry zoonotic pathogens? The answer is yes - every animal carries something zoonotic. A lot of these might be low-risk opportunist pathogens but when you're in a high-risk population something that is low risk to the general public does become more relevant. Fifty eight percent of the visitation dogs in this study (Lefebvre et al J Hosp Infect 2006) were shedding *Clostridium difficile*, and that's a massive number for a dog. And many, if not most, of the strains that we find in dogs are the same strains that we find in people.

For MRSA, healthcare visitation and contact with kids was a risk factor, not surprisingly. For *C. difficile*, risk factors include healthcare contact, contact with kids, and antimicrobial treatment of the dogs. Furthermore, Antimicrobial treatment of someone in the household was a risk factor for *C. difficile* in the dog, and it shows this interrelationship that we have to remain mindful of.

This is the big question: do visitation animals actually cause disease? We don't know. We have anecdotes and we have theories, but there have been no outbreaks of disease attributed to visitation programs. Would the current system realistically detect animal involvement in disease?

***Want to know more about this lecture? See page 7.***

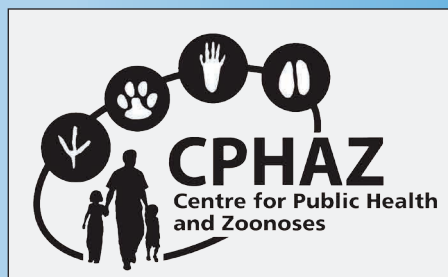




# Infection control and pet therapy



J Scott Weese DVM DVSc DipACVIM  
UNIVERSITY OF GUELPH



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CHANGING LIVES  
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## Animals in facilities

- Resident animals
- Animal assisted therapy
- Pet visitation
- Personal pet visitation
- Service animals
- Visiting programs

Types of contact

Duration of contact

Handler knowledge/skill

Number of residents exposed

Species

Legal protection

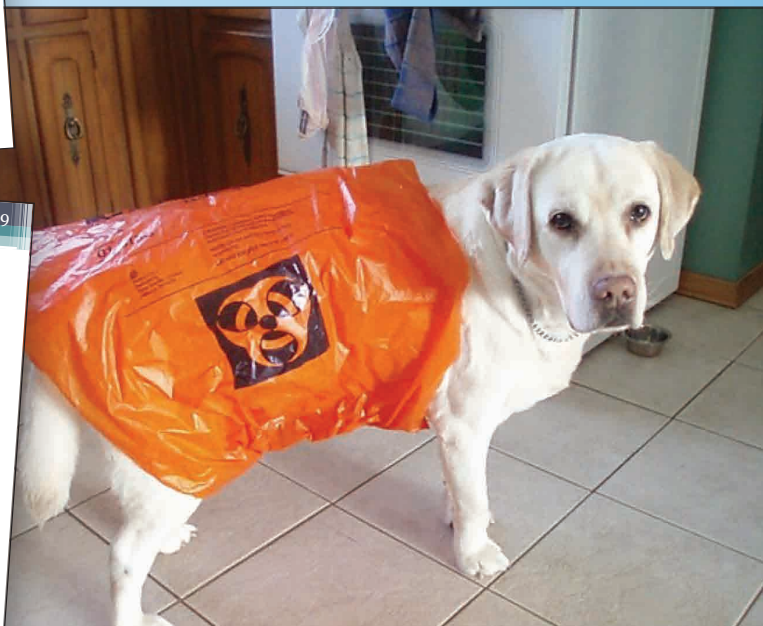
Ability to control contact/movement

Health and behaviour assessment

We at Virox Technologies Inc, were honoured to sponsor this September 15, 2016 teleclass by Prof. Scott Weese. It was an outstanding lecture and a must-hear presentation for anyone in a facility that engages a therapy animal program. Contact Olivia ([olattimore@virox.com](mailto:olattimore@virox.com)) for access to the handout and the recording.

## Results

- 9% of exposed dogs acquired MRSA
  - 1% unexposed
  - All naturally decolonized by next visit
- *C. difficile* acquisition by
  - 15 unexposed dogs
  - 28 exposed dogs ( $P=0.025$ )
- 1 exposed dog acquired VRE



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of cellulose may reduce the antimicrobial efficacy of the disinfectant. Laboratory studies have shown that detergent wipes have a varying ability to remove pathogens from surfaces, and may in fact transfer pathogens between surfaces.

In another investigation, Dr. Boyce studied automated disinfectant dispensing systems in a large teaching hospital. His audit of 33 dispensing stations that mix concentrated disinfectant with water revealed inconsistent dilution ratios. The dispensing machines were intended to yield a desired in-use quaternary ammonium concentration of 800 ppm. After testing with commercially-available test strips, the audit revealed that several dispensing stations yielded solutions with less than 200 ppm; more than 75% below recommended concentrations. Approximately 50% of stations delivered solutions with 200 to 400 ppm. An investigation uncovered several flaws in the dispensing system that would not have been detected without frequent testing.

A German study assessed the frequency of contamination of reusable buckets used to dispense disinfectant wipes used for surface disinfection in multiple hospitals. Kamf et al (MC Infect Dis. 2014;14:37) found that 28 buckets from 9 hospitals (42%) contained surface-active disinfectants (quaternary ammonium solutions) that were contaminated with *Achromobacter* or *Serratia* strain.

In studies that involved culturing high-touch surfaces in patient rooms before and after housekeepers had performed routine cleaning, the researchers regularly found cultures obtained from several surfaces in one room after cleaning yielded large numbers of *Serratia* and smaller numbers of *Achromobacter*, which were not present before cleaning. Pulsed-field gel electrophoresis demonstrated that *Serratia* isolates recovered from the diluted disinfectant solution were the same strains as those recovered from surfaces in the patient room.

Failure to adequately disinfect patient rooms at the time of hospital discharge contributes to the increased risk of acquisition of resistant pathogens among patients admitted to a room where the prior room occupant was colonized or infected with a multidrug-resistant pathogen. Numerous studies have found that standard manual cleaning or disinfection of surfaces can reduce, but often does not eliminate, important pathogens such as *C. difficile*, staphylococci including Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant *Enterococci* (VRE), and multi-drug-resistant *Acinetobacter*.

Other articles found in this issue of the *Virox Solutions Newsletter* will address the impact of cotton towels and microfiber cloths. But let me point out briefly that many articles, increasingly over the last decade, identify that cotton towels for cleaning and disinfection could cause a problem of their own. They may remain contaminated after being laundered, and they can spread *C. difficile* spores.

Thanks to researchers, whose names are well known to us (Boyce, Sattar, Mailard, Rutala, Sehulster, and others), the knowledge about the proper selection and use of hospital disinfectants is ever expanding. We at Virox would like to express our appreciation to each of them for their invaluable work.

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## Recommended solutions to identified challenges

Most respondents identified the need for a reliable and efficient system to track wheelchairs within their facility and to flag and organize dirty and clean wheelchairs. A simple but easily recognizable system for tagging chairs that have been cleaned and those that are dirty should be a component of this tracking system. As part of this approach, clearly designated and separate storage areas for clean and dirty wheelchairs were recommended as was colour coding of clean and dirty chairs or covering clean chairs with plastic (ie, bagging).

Purchase and make accessible the tools and equipment needed for effective wheelchair cleaning and disinfection. In addition to equipment, a dedicated space for cleaning, drying, and storing clean wheelchairs separate from dirty chairs is required. Assigning dedicated staff to be responsible for wheelchair cleaning was felt to be a useful approach to improve the quality of the cleaning and disinfection process.

Adopt a set of written guidelines and procedures for wheelchair cleaning and disinfection. Ensure the guidelines are known and understood by staff,

*“Even if we had someone to do it, we don’t know what we’re supposed to do.”*

manageable within the daily practice of staff, enforced and regularly evaluated, and are well-supported by the facility and administration.

Assign and tag a specific wheelchair to all patients who require one. Chairs should be well-labeled with the patient’s name and room number in addition to a warning or request that others not use it. Educational materials aimed at visitors and staff to discourage the borrowing of wheelchairs are also suggested.

Our hope is that this study will serve as a starting point for an ongoing discussion on wheelchair cleaning and disinfection. More data is clearly needed, and we believe that research should be conducted to document the frequency with which wheelchairs are contaminated after use and the extent to which cleaning and disinfection removes contamination.

Despite the lack of available research data documenting and quantifying the impact of wheelchairs on ARO and HAI transmission, first principles and best practices for other pieces of equipment suggest that wheelchair cleaning and disinfection is not being performed optimally at many Canadian health care facilities. Both individual institutions and the health care system as a whole should begin the process of creating clear guidelines on appropriate wheelchair cleaning and disinfection with input from wheelchair users, frontline health care workers, environmental services, infection control, occupational therapy, mobility services, and industry and hospital administration.