



## Major article

## Wheelchair cleaning and disinfection in Canadian health care facilities: “That’s wheelie gross!”



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### Key Words:

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**Background:** Wheelchairs are complex equipment that come in close contact with individuals at increased risk of transmitting and acquiring antibiotic-resistant organisms and health care–associated infection. The purpose of this study was to determine the status of wheelchair cleaning and disinfection in Canadian health care facilities.

**Methods:** Acute care hospitals (ACHs), chronic care hospitals (CCHs), and long-term care facilities (LTCFs) were contacted and the individual responsible for oversight of wheelchair cleaning and disinfection was identified. A structured interview was conducted that focused on current practices and concerns, barriers to effective wheelchair cleaning and disinfection, and potential solutions.

**Results:** Interviews were completed at 48 of the 54 facilities contacted (89%), including 18 ACHs, 16 CCHs, and 14 LTCFs. Most (n = 24) facilities had 50–200 in-house wheelchairs. Respondents were very concerned about wheelchair cleaning as an infection control issue. Specific concerns included the lack of reliable systems for tracking and identifying dirty and clean wheelchairs (71%, 34/48), failure to clean and disinfect wheelchairs between patients (52%, 25/48), difficulty cleaning cushions (42%, 20/48), lack of guidelines (35%, 27/48), continued use of visibly soiled wheelchairs (29%, 14/48) and lack of resources (25%, 12/48).

**Conclusion:** Our results suggest that wheelchair cleaning and disinfection is not optimally performed at many Canadian hospitals and LTCFs. Specific guidance on wheelchair cleaning and disinfection is necessary.

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Health care–associated infections (HAIs) are prevalent and affect between 1 in 10 and 1 in 25 patients in both U.S. and Canadian hospitals.<sup>1–3</sup> Most of these infections are preventable if accepted best practices are used.<sup>4</sup> 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).<sup>5,6</sup>

Current guidelines, however, do not provide specific instructions on the optimal processes for tracking, cleaning, and disinfecting more complicated hospital equipment, such as wheelchairs.<sup>5,6</sup> Wheelchairs are complex pieces of equipment both in terms of structure and function: they consist of multiple components that require different approaches to cleaning and maintenance (eg, metal frame, cushions, electronics); they may be owned by the patient or the facility; they may be used by a single individual for a prolonged period of time or many individuals in rapid sequence; and long-term users often have significant physical disabilities and chronic medical problems and are at increased risk for sacral wounds and carriage of AROs.

Despite their complexity and their potential to contribute to the spread of AROs and the incidence of HAI, we have not identified research addressing the role of wheelchairs in cross transmission of pathogens or guidelines that address the cleaning and disinfecting

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of wheelchairs specifically. To best understand the issues surrounding cleaning and disinfection of wheelchairs in the health care environment, we conducted a Canada-wide survey of infection control practices and concerns with respect to wheelchair cleaning and disinfection.

## METHODS

A survey was conducted of Canadian acute and chronic care hospitals and long-term care facilities (LTCFs). Our primary objectives were 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 HAI; 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.

The survey was designed with input from occupational therapists, clinicians from seating services (a hospital-based service for the delivery and fitting of seating equipment), and an infection prevention and control expert. A trained interviewer conducted the survey with eligible participants by telephone. The survey was administered as a semistructured interview that included open-ended and closed-ended questions to ensure that all prespecified questions were answered while allowing the participants to discuss areas of personal concern with respect to wheelchair cleaning and disinfection and to ensure that important contextual information was captured. The survey was pilot tested at 2 facilities and then revised based on feedback received.

Eligible institutions included any hospital or LTCF that provides wheelchair services and maintains a cadre of in-house wheelchairs. Eligible hospitals and LTCFs were identified by contacting professional organizations, conducting an online search, and by consulting with the study team. At each institution, the person most responsible for wheelchair-related issues was contacted. Individuals were considered eligible if they had  $\geq 5$  years of direct or indirect experience with wheelchair management. Eligible institutions and individuals were contacted, informed about the study, and asked to participate. The study was approved by the Joint Bridgepoint Health-West Park Healthcare Centre-Toronto Central Community Care Access Centre-Toronto Grace Health Centre Research Ethics Board. Informed consent was obtained from all participants.

Surveys were recorded, and detailed notes were taken during each interview. Responses to open-ended questions were coded, categorized into groups, and then analyzed to identify key themes based on the objectives of the study.

## RESULTS

### *Respondents and setting*

A total of 54 hospitals and LTCFs were identified. Of these, 48 (89%) agreed to participate. Participants represented 18 acute care hospitals, 16 chronic care hospitals, and 14 LTCFs. Participating institutions were from the Western Provinces ( $n = 16$ ), Ontario ( $n = 25$ ), and Quebec ( $n = 7$ ).

All respondents reported responsibility for wheelchair-specific infection control practices and included housekeeping staff and environmental services ( $n = 22$ ), infection control professionals ( $n = 7$ ), administrators ( $n = 6$ ), seating services staff ( $n = 5$ ), occupational therapists ( $n = 5$ ), or nurses ( $n = 3$ ).

Half ( $n = 24$ ) of the participating facilities reported having 50-200 in-house wheelchairs, 20% ( $n = 10$ ) reported having  $>200$  wheelchairs, 17% ( $n = 8$ ) reported having  $<50$  wheelchairs, and an additional 13% ( $n = 6$ ) were unsure of how many wheelchairs their

facility owned. A few facilities ( $n = 7$ ) reported having a dedicated or centralized wheelchair department or seating services department. At 85% ( $n = 41$ ) of the facilities, services related to wheelchair cleaning, tracking, maintenance, and storage were dispersed throughout the facility with responsibility shared across departments. Wheelchair cleaning was conducted entirely in-house at 85% ( $n = 41$ ) of facilities; however, 15% ( $n = 7$ ) used hybrid models where routine cleaning was performed in-house, whereas periodic deep cleaning of wheelchairs was conducted offsite by an external company. Cleaning methods included the use of disinfectant wipes alone at 52% ( $n = 25$ ) of facilities, whereas a combination of manual wiping and use of a wheelchair washer\* was used at 23% of facilities ( $n = 11$ ), and 13% of facilities used a tub or spray room ( $n = 6$ ). Of the respondents, 13% ( $n = 6$ ) were unsure how cleaning was performed at their facility.

### *Concerns with, and barriers to, appropriate wheelchair cleaning and disinfection*

Participants were asked to identify their level of concern regarding infection control issues related to wheelchairs at their facility on a 10-point Likert scale, with 10 representing the highest level of concern. The median was 8 (interquartile range, 4-9), indicating a high level of concern with this issue. Respondents highlighted the following specific areas of concern.

1. *Lack of a reliable system for tracking and identifying clean and dirty and soiled wheelchairs:* 71% ( $n = 34$ ) of respondents reported a lack of ( $n = 10$ ) or an insufficient ( $n = 24$ ) system for tracking wheelchair cleaning in their facility and regarded this as a serious problem potentially leading to transmission of AROs and HAIs through inadvertent use of wheelchairs that had not been cleaned and disinfected. Specific problems identified included a system that was disorganized, confusing, unreliable (inconsistently reported), unenforced, or which did not include a schedule for cleaning. Manual systems (eg, logbooks and checklists on the back of the wheelchair) are the most common type of tracking system; cost and availability of a reliable, easy-to-use system were identified as barriers to improving wheelchair tracking and cleaning procedures. On a related note, 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:* 52% ( $n = 25$ ) 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:* 42% ( $n = 20$ ) of respondents were specifically concerned with the cleaning of cushions and armrests. 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.

\* Wheelchair washers are automated, mechanical, cart-type pieces of equipment designed specifically for wheelchairs. According to manufacturers, wheelchair washers clean and disinfect wheelchairs using a combination of hot water, detergents, and disinfecting chemicals. Further information can be found at the Medco Equipment Web site (<http://www.medcoequipment.com>).

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