

# Hand Hygiene, Nosocomial Infection and GP Clinic Door Handle Contamination: The Results from 4 Doors

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## Introduction

Healthcare workers' hand hygiene is an established principle in preventing the spread of nosocomial infection.<sup>1,2</sup> Multiple studies suggest that among healthcare workers across the globe, hand hygiene is unacceptably poor.<sup>3,4</sup> In Australia, between 57% and 71% of healthcare workers, and 68% of 82 hospitals examined performed below the national guideline for compliance with "before touching a patient".<sup>5</sup> "Before touching a patient" is the first of the Five Moments of Hand Hygiene, an initiative of World Health Organization targeting health care workers.<sup>1</sup> Among patient and public populations, hand hygiene has been observed to be even less adequate with only 8.2% to 18% of the public using the hand sanitiser at the entrance to a hospital during a respiratory pandemic.<sup>6,7</sup> Therefore, a more reliably consistent means of infection control used in areas of high patient traffic may help reduce cross-contamination.

Contamination control aided by building design in medical facilities can be an adjunct to other means of control and may result in less reliance on chemical disinfection while also being less susceptible to human error, forgetfulness, and inconvenience.

It is hypothesised that a comparison of bacterial contamination of no-touch doors at GP clinics to doors with handles will demonstrate a difference in bacterial growth and hence indicate the potential value of this specific design-aided passive mode of contamination control.

## Materials and methods

The entrances of three GP clinics were tested. Two clinics had a standard pull/push entrance door and the third had a no-touch sliding door followed by a standard pull/push door. Swabs and cultures were obtained from the door handles of the standard doors that had to be grasped to pull open.

In addition, two cultures were obtained from the automatic sliding door which opened untouched in an arrangement such that the same patient cohort entered through two sequential doors - one untouched and one touched - allowing a direct, controlled comparison of contamination and hence the efficacy of no-touch doors in medical facility design.

In each case, an area of 12 cm<sup>2</sup> was swabbed. The sliding door samples were taken from 2 areas, each 12 cm<sup>2</sup>.

## Results

Mixed staphylococcus species grew from the three standard doors that had to be grasped to open. Swabs from the no-touch sliding door yielded no growth on either sample (see Chart 1).

	Bacterial growth	
	Standard door	No touch sliding door
Clinic 1	Positive for staphylococci: 7 colonies of mixed coagulase-negative staphylococci (CoNS) and 1 colony <i>Bacillus</i> species	No growth on either of 2 samples
Clinic 2	Positive for staphylococci: 6 colonies <i>S. epidermidis</i> (CoNS) and 2 colonies <i>S. capitis</i> (CoNS)	Not applicable
Clinic 3	Positive for staphylococci: 1 colony <i>S. capitis</i> (CoNS)	Not applicable

Chart 1. Bacterial contamination on door handles requiring hand contact and no-touch sliding door.

## Discussion

The emphasis for hand hygiene has been primarily directed at health care workers because they are in contact with patients and their surroundings and move from patient to patient, so are considered to provide the most significant mechanism for cross-contamination.<sup>8</sup> Recently, because of the costs and time involved in following strict hand hygiene protocol, there has been a call for focussing on only one moment, "before touching a patient", and only with doctors, before expanding to other moments and other healthcare workers.<sup>5</sup>

However, there is another even larger group who under certain circumstances also can easily cross-contaminate. Patients, especially, for example, during flu season, are a significant reservoir of infection and source of transmission. Patients and the public in areas of high patient traffic such as GP clinics, radiology and pathology facilities, and emergency departments are in contact with surfaces that can result in cross-contamination which corresponds to Moment 5 of the World Health Organization's Five Moments of Hand Hygiene, "contact with patients' surroundings".<sup>1</sup>

One surface that almost all patients touch in these circumstances is the door handle at the entrance to the medical facility. This surface can be a major source of patient-to-patient cross contamination because patients coughing and sneezing into their hands expel large amounts of microorganisms,<sup>9,10</sup> contaminating their hands and then the door handle.

The influenza virus can persist on nonporous surfaces and be infective for 24-48 hours.<sup>11</sup>

One study found that 14 people can be contaminated one after another by each touching a contaminated door handle, and contamination can extend 6 iterations deep by one person touching a contaminated handle then shaking hands with another person.<sup>12</sup>

## Discussion, continued

In another study using a "tracer" virus (bacteriophage MS-2) placed on a door handle of a medical facility, researchers found that the virus could be detected on 40 to 60% of the fomites (light switches, other door handles, pens) and people within 4 hours.<sup>13</sup>

Other research has reported cross-contamination by "tracer" virus (coliphage PRD-1) from a nonporous surface to the hand at 65% transfer efficiency and from the hand to the mouth via lip contact at 33%.<sup>14</sup>

Therefore, a rapid and widespread contamination sequence can be initiated by patients coughing or sneezing into their hands then contaminating the door handle. Contamination is maintained by further patients using the door and cross-contamination occurs as all patients and the public use the door as the sole means of entering and exiting the facility.

In the past, public health programs have attempted to change patient sneeze and cough etiquette by "cover your sneeze/cough" initiatives, and now health authorities are attempting to change the common practice of coughing into one's hand to coughing into a disposable tissue or into the sleeve at the elbow if a tissue is not immediately available.<sup>15,16</sup> However, this initiative has had even less compliance than the hand hygiene moments directed at medical staff. In one study, researchers found the public still used the hand to cover 64.4% of respiratory events (cough/sneeze), and only 4.7% of events were covered in compliance with the guidelines of using a tissue or the arm.<sup>17</sup> This is a much lower rate than doctors' poor compliance to hand hygiene guidelines.

Given this lack of compliance, rapid spread is possible from sneeze, to hand, to door knob, to other fomites and other people. Intact skin is a good protective barrier, however people touch their mouth/nasal mucosa with their hand approximately 3.6 times per hour<sup>18</sup> and touch food they ingest.

In addition to common cold and flu microorganisms found in the environment other organisms that cause serious disease that previously were associated with hospital acquired infection are potentially being spread by patients in the community. For example, community-acquired *Clostridium difficile* infection has increased world wide<sup>19</sup> including in Australia.<sup>20</sup> Although the cause of this increase may be multifactorial, an increase in cross-contamination occurring where patients come together, for example at GP clinics, is likely to be a significant contributor to that spread.<sup>19</sup>

In summary, a more reliably consistent means of eliminating contact with a surface that currently all patients touch would be beneficial because transfer and spread of pathological microorganisms via contact with these surfaces can be rapid and widespread.

This study lacked statistical power because of the small number of items tested, however the absence of common microorganisms on the no-touch door and their presence on all three touch doors suggests that further research in this area is indicated.

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