



# Hand Hygiene: Seeing Is Believing

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## Abstract

Hand hygiene is one of the most important measures to prevent the transmission of infections. The infection prevention and control team at Trillium Health Centre has developed an interactive visual portrayal of the efficacy of alcohol-based hand rub use. Staff participate by having fingertip bacteria colony counts determined prior to and after hand sanitizing. During the process, infection control practitioners are able to provide one-on-one coaching on proper hand sanitizing. Seeing is believing. The visible and often dramatic decreases in the fingertip bacterial colony counts after using the hand rub help convey effectiveness. Staff find this cost-effective educational exercise fun, engaging and convincing.

**T**rillium Health Centre is one of Canada's largest community hospitals, with regional programs in cardiac, stroke, neurosurgery, orthopedic and sexual assault and domestic violence services. Trillium is composed of two sites – one in west Toronto and one in south central Mississauga – with 763 beds, 4,200 staff, 748 physicians and 1,100 volunteers. Trillium serves over one million residents in Peel and West Toronto and from other communities across Ontario, registering over 750,000 patient visits annually.

Trillium has been recognized for its culture of patient safety through numerous national awards for quality and innovation, including awards recognizing the work of the infection prevention and control (IPAC) team. Trillium's IPAC team is composed of one 0.5 full-time equivalent (FTE) administrative assistant, one 0.5 FTE infectious disease physician and six FTE infection control practitioners.

### Background

In the 19th century, Dr. Ignaz Semmelweis in Vienna and Dr. Oliver Wendell Holmes in the United States recognized the importance of hand hygiene in the transmission of diseases. Both had little success in convincing the healthcare providers of the time that hand hygiene prevents the transmission of disease (Boyce and Pittet 2002). Today, a lack of hand hygiene compliance among healthcare providers still contributes significantly to disease transmission. Canadian research from 2002 estimated that 10% of admitted adult acute care patients endure hospital-acquired infections (Gravel et al. 2007). This presents additional healthcare challenges for patients as well as higher healthcare costs. The prevention of these infections is an important patient safety issue, and hand hygiene is recognized as one of the most important means to prevent their transmission.

Many patient safety initiatives have been launched recently to improve healthcare provider hand hygiene compliance, including initiatives by the World Health Organization (2005), the Canadian Patient Safety Institute (2007), the Ontario Ministry of Health and Long-Term Care (MOHLTC) (2008a) and the Ontario Hospital Association (2008). In 2002, several American organizations issued joint guidelines on hand hygiene recommending alcohol-based hand rub (ABHR) use as the preferred method of hand hygiene for healthcare providers whose hands were not visibly soiled (Boyce and Pittet 2002). In 2008, the MOHLTC Provincial Infectious Diseases Advisory Committee (2008b) issued guidelines recommending ABHR use as the preferred method of hand hygiene.

ABHRs have been available since 1997 at Trillium Health Centre. When Trillium initially introduced ABHR use, it was promoted as an alternative to handwashing when soap and water were not readily accessible and for use when caring for patients with antibiotic-resistant organisms such as methicillin-resistant *Staphylococcus aureus* and vancomycin-resistant entero-

**Table 1. Results of fingertip colony counts in ABHR Challenge**

Unique ID Number	No. of Colonies before ABHR	No. of Colonies after ABHR	Reduction (%)
6	58	6	90
12	36	0	100
15	38	12	68
25	TNTC	0	100
27	74	21	72
36	25	18	28
42	TNTC	37	63
81	19	0	100

ABHR = alcohol-based hand rub; ID = identification; TNTC = too numerous to count (assume 100 for calculating percent reduction).

**Figure 1. Before and after results of fingertip cultures for participant 25**



cocci. The release of guidelines recommending ABHR use as the preferred hand hygiene agent resulted in the infection control practitioners seeking a way to demonstrate the effectiveness of ABHRs and to facilitate the shift to their use.

## Intervention

Numerous studies have identified many barriers to traditional handwashing with soap and water, including the time it takes, access to sinks and a lack of soap or paper towels (Boyce and Pittet 2002; MOHLTC 2008b). ABHR use is more convenient, takes less time and is better for skin integrity (Boyce and Pittet 2002; MOHLTC 2008b). However, seeing is believing. So, in an effort to prove to healthcare providers that hand hygiene, specifically ABHR use, does work and is effective, the Trillium infection control practitioners developed a fun and educational exercise to increase awareness of proper hand hygiene and to improve compliance by demonstrating the convenience and effectiveness of using ABHRs. The main objective of the exercise is to demonstrate that ABHRs are effective at reducing bacteria present on the hands of healthcare providers and, thereby, to encourage appropriate hand hygiene. Surveys of participants are used by the IPAC team to identify quality improvement opportunities in ABHR hand hygiene education.

## Method

### ABHR Challenge

The exercise, called the ABHR Challenge, developed by the infection control practitioners is versatile and can be performed on nursing units via a mobile cart or at hospital-wide functions in a booth setting. To maintain anonymity, participants are provided a unique identifying number for retrieving their results. One blood agar plate, identified with the participant's unique number, is used for each participant. To make the exercise economical, expired blood agar plates the microbiology laboratory would normally discard are used whenever possible. The plate is divided in half to provide before and after sections. Participants culture their fingertips for bacteria by gently touching their fingertips to the appropriate half of the agar plate both before and after using an ABHR. The inoculated agar plates are incubated at 35°C for 24 hours. Plates are examined for the fingertip colony counts of the before and after cultures of each participant. While the participants are partaking in the challenge, infection control practitioners have the opportunity to discuss hand hygiene and ABHRs with the participants, using poster displays. Participants are often provided with a small ABHR sample as a reminder to practise appropriate hand hygiene.

### Follow-Up Survey

In an effort to determine if “seeing really is believing,” the IPAC team developed an anonymous, voluntary survey for participants of the ABHR Challenge. All Trillium staff, physicians and volunteers were invited to participate in the web-based survey on Zoomerang. The survey consisted of 10 questions and an opportunity to provide comments. Participants also had the option to provide their name and contact number for a randomly drawn small incentive prize.

**“Everyone in healthcare should have to do this.”**

## Results

### ABHR Challenge Results

The confidential results are fed back to participants either visually, by taking the plates back to participating staff, or in written format. In all cases, the colony count results and the percent reduction are posted on Trillium's IPAC intranet site. Table 1 provides a set of random samples of the ABHR Challenge results. Figure 1 illustrates before and after fingertip culture results for participant 25 (see Table 1).

The results are dependent on the participants correctly using the ABHR. If the participants do not rub their hands until the sanitizer is dry or do not use enough sanitizer to cover the surface of their hands, the results will not demonstrate ABHR efficacy. Incorrect use of ABHR is reflected in the bacterial colony counts – participants will see little or no decrease in after-ABHR colony counts. This helps reinforce that the correct technique must be used with ABHR. Participants with long or false nails often have higher before and after bacterial counts, demonstrating the need for shorter, natural nails while at work.

### Survey Results and Limitations

The follow-up survey was completed in full by 109 participants. Given the sample size, the survey may not be fully representative of healthcare providers or responses. The survey was only available in electronic format, which may have reduced the response rate. The survey results are qualitative and designed to help guide quality improvement initiatives in promoting ABHR hand hygiene education in a fun, visual manner.

### Knowledge Improvement

Ninety-seven percent (106 of 109) of participants felt that the ABHR Challenge improved their knowledge of hand sanitizing or hand hygiene. Five percent of the respondents reported little knowledge improvement, 33% thought they had some improvement of knowledge, 42% felt there was a major improvement of their knowledge and 17% reported an extensive knowledge improvement. Only 2% of the respondents reported no improvement in their knowledge of hand hygiene or hand sanitizing.

When asked what specific knowledge area regarding hand sanitizing had improved, 98% of respondents reported that their knowledge regarding when to hand sanitize and the proper technique of sanitizing had improved. Ninety-nine percent noted an improvement in their knowledge about the effectiveness of ABHRs. Only 2% of respondents stated that they had no knowledge improvement for the appropriateness and techniques for sanitizing, and only 1% reported no or little knowledge improvement regarding the effectiveness of ABHRs.

### Use of the ABHR

Participants were asked to reflect on their use of ABHRs after taking the ABHR Challenge. Of the respondents, 8% reported rubbing their hands for less than 15 seconds while sanitizing, 69% rub for 15–25 seconds and 23% rub for more than 25 seconds.

An increase in the frequency with which they use ABHRs after the challenge was reported by 71% of the participants, while 27% reported no change in the frequency and 3% reported a decrease in frequency.

The majority of participants, 66%, reported that they have not changed the amount of sanitizer used when they perform hand sanitizing. Thirty-three percent reported that they use more sanitizer, and 7% reported that they use less sanitizer.

### Confidence

When participants were asked how confident they are in the ability of ABHRs to reduce the bacteria present on their hands, 26% stated that they are extremely confident that ABHRs are effective, 57% are very confident, 16% have some confidence and 2% have no confidence in ABHRs.

### Feedback

Visual and written feedback of results was preferred by 99% of

the respondents. The exercise was thought to be fun by 97% of the participants, and 98% found it educational and engaging. Most of the participants, 83%, told someone else about the challenge. Co-workers were the most common group with whom participants shared information, followed by family members, friends and other healthcare providers. Some of the comments on the ABHR Challenge from participants follow:

“It really helps drive home the message.”

“This is a great teaching tool.”

“Good method to enhance compliance.”

“Everyone in healthcare should have to do this.”

“Evidence-based, non-judgmental – excellent.”

“Interesting to see these results – makes it real.”

### Discussion

The main objective of the ABHR Challenge is to convince healthcare providers that ABHRs are effective. Survey responses indicate that healthcare providers increased their knowledge

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about and confidence in the effectiveness of ABHRs, with 99% reporting an increase in knowledge on effectiveness and 98% reporting confidence in ABHRs. By engaging healthcare providers in a discussion while performing the exercise, the infection control practitioners provided additional educational information on hand hygiene. Ninety-eight percent of the participants reported an increase in knowledge on the techniques and timing of ABHR use.

### Ninety-eight percent of the participants reported an increase in knowledge on the techniques and timing of ABHR use.

Regarding participants' use of ABHRs after partaking in the exercise, the majority of participants reported that they have not changed the amount of ABHR that they use. This could be because participants were using the appropriate amount before taking the challenge or because they use the amount automatically dispensed, which is traditionally sufficient. It is unknown whether participants rub their hands longer than before the exercise, but 92% reported rubbing the ABHR for at least the recommended 15 seconds and 97% reported using the sanitizer more frequently. Participants reported changing the frequency of ABHR use. However, this cannot necessarily be interpreted as an increase in hand sanitizing as the increase may indicate use of ABHRs instead of handwashing. There is an opportunity in future exercises to spend more time discussing the appropriate amount of ABHR to use and the importance of a sufficient rub time. An additional metric to determine if ABHR use increases would be to monitor the amount of ABHR purchased prior to and after the exercise.

The participants often shared the experience with others and clearly enjoyed the exercise, with 97% of the participants finding the interaction fun and 98% finding it engaging and educational. Most participants, 99%, prefer to have both visual and written feedback. Currently, the feedback is often only in written format due to varying shifts in the healthcare setting and the 24-hour delay required for bacteria to grow. For future challenges, providing digital pictures of the bacterial colony counts (visual) along with the numerical count (written) would improve the feedback results to participants.

Capturing metrics, such as measuring the amount of hand sanitizer used before and after the challenge, would increase the quantitative value of the exercise. Providing one-on-one feedback would improve the educational component of the challenge and an opportunity to correct any issues regarding incorrect technique or a poor understanding of ABHR use. Offering the survey in both electronic and paper-based formats

might improve the survey response rate.

Although the material costs of performing the study are inexpensive, it is labour intensive for the infection control practitioners to conduct the challenge and compile the results.

### Conclusion

The ABHR Challenge is an economical, versatile, fun, engaging, educational activity for healthcare providers to improve their knowledge and understanding of the effectiveness of ABHRs. It does improve healthcare providers' confidence in ABHR effectiveness. Improving the feedback provided to participants by providing both visual and written feedback for all participants and ensuring additional metrics are captured would increase the value of this exercise and reinforce the concept that seeing is believing. **HQ**

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