



Brief report

Assessing the thoroughness of hand hygiene: “Seeing is believing”



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The thoroughness of hand hygiene (HH) was evaluated using a simulation method in which health care workers (HCWs) rubbed their hands with a fluorescent substance, washed with water, and placed their hands under an ultraviolet detector to identify areas missed. Most residue points were located in the tips of the nails (38.6%), followed by fingertips (17.4%). This stress-free “seeing is believing” program can encourage HCWs’ active participation in sustaining the HH culture of health care institutions.

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Hospital-associated infection (HAI) is a major threat to patient safety. In high-income countries, HAI affects roughly 5%–15% of hospitalized patients and 9%–37% of patients in intensive care settings.¹ In low-income countries, several single-hospital studies have suggested even higher prevalence rates, of 14.8%–19.1% of admitted patients.^{2–4} Thus, in 2005, the World Health Organization (WHO) launched the first global Patient Safety Challenge, “Clean Care is Safer Care.”

Despite these efforts, however, ensuring that health care workers (HCWs) perform thorough HH and evaluating HH effectiveness remain ongoing challenges. The WHO has suggested that the appropriate duration of handwashing with soap and water of 40–60 seconds⁵; however, observational studies have found that HCWs had a significantly shorter duration of HH (6.6–30 seconds)^{6,7} and often failed to wash all hand surfaces.^{7,8} Thus, even if we can improve HCWs’ HH compliance, improper HH technique can

interfere with effective HH promotion. The concept of HH thoroughness is vague and difficult to express and has rarely been discussed in WHO HH guidelines, making it difficult to provide education, evaluation, and feedback regarding proper HH technique.

National Taiwan University Hospital, a tertiary care hospital, adopted a WHO-based multimodal HH strategy in 2009. Since 2012, we have targeted the promoting proper HH procedures in conjunction with increasing HH compliance.⁹ The present study aimed to evaluate the thoroughness of HH in HCWs and to measure the effectiveness of incorporating a “seeing is believing” simulation education method for HH promotion.

METHODS

This study was approved by the Ethics Committee of National Taiwan University Hospital. Under the anonymity basis, oral informed consent was obtained from each participant.

The HH technique campaign for HCWs was conducted between May 1 and May 30, 2012. The HCWs volunteered to participate in this event. We educated the HCWs on proper HH technique using a 7-step procedure with a Chinese Kong-Fu–based slogan: interior, exterior, interlacing, bow, thumbs, fingertips, and wrists (Fig 1). During the campaign, the HCWs were instructed to rub their hands with a fluorescent substance as they would normally do with soap and water or an alcohol-based cleaner, rinse their hands with water, and then place their hands under an ultraviolet detector (Brevis, Salt Lake City, UT) to identify any areas that they might have missed.

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Fig 1. Seven-step hand hygiene technique and Chinese Kong-Fu-based slogan, 內外夾弓大立腕, indicating interior, exterior, interlacing, bow, thumbs, fingertips, and wrists, respectively.

Two infection control nurses assessed each participant's performance and graphically recorded residue points and locations for 37 parts of the hand (Fig 2A), as well as the duration of HH. Results of the activity were recorded anonymously. Participants received feedback on how they performed, and each ward received group feedback. Information on participants' sex, age, and professional category was collected before the intervention.

RESULTS

A total of 388 HCWs from 30 of the hospital's 85 wards volunteered to participate in this study, including 64 doctors, 253 nurses, and 60 other HCWs. The average age of participants was 32.1 ± 8.1 years (range, 18-60 years). The majority of participants were female (80.2%; 311 of 388).

For all participants, the duration of HH exceeded the recommended 10-15 seconds, ranging from 11 to 260 seconds (mean, 57.4 ± 38.9 seconds). Most participants could wash off the fluorescent agent, with 135 of 386 HCWs (34.8%) having zero residue points. Overall, a total of 880 residual spots were identified. The average number of residue points was 2.2 ± 2.8 per participant (Table 1). The highest percentage of residue points was under the tips of the nails (38.6%; 340 of 880), followed by the fingertips (17.4%; 153 of 880) (Fig 2B).

The number of residue points was not correlated with sex, professional category, or age. There was no statistically significant association between duration of HH and number of residue points ($P = .15$).

DISCUSSION

In this study, we have demonstrated that a stress-free, "seeing is believing" simulation program can be successfully adapted for HH education. We provided feedback to HCWs identifying the nails and fingertips as the most frequently missed spots. The integration of knowledge, practice, and visual feedback can strengthen the learning process and improve the compliance with and thoroughness of HH.

Simulation techniques have been adopted in the health care system to protect patient safety. A benefit of simulation education

is its versatility, being suitable for use in different areas of medical practice (eg, diagnostic procedures, surgical procedures, central venous catheterization).¹⁰ A fluorescent-based simulation method was developed by infection preventionists at Amager Hospital, Copenhagen, Denmark, to assess HH techniques in a timely and cost-effective manner.¹¹ This method had been used in a series of small studies examining medical students ($n = 75$),¹² nursing students ($n = 194$),¹³ and HCWs in an orthopedic department ($n = 55$).⁸ As reported here, advantages of using simulated education for HH include the opportunity to provide education throughout the hospital and immediate visual feedback on HH technique.

Even though our HCWs tried to increase the duration of HH to prevent residual spots, a total of 880 missed spots on the hands were identified. We suggest that to ensure thorough HH, correct technique is as important as adequate duration. A Chinese Kong-Fu-based slogan was used to teach HCWs the importance of washing all parts of the hand, especially 立, which means standing the fingertips on the palm of the other hand to clean the fingers and nails. The slogan is fun, short, and easy to remember. Other countries can create their own culturally relevant slogans to reinforce HH techniques and provide some enjoyment during infection control education.

In conclusion, the simulation technique can be successfully adapted for HH education. With no time constraints, most participants were willing to perform HH for longer than the recommended 10-15 seconds. This stress-free, seeing-is-believing program can encourage HCWs' active participation in HH and promote HH culture in health care settings.

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