Title

Gap between self-evaluation and actual hand hygiene compliance among health-care workers

Abstract

Hand hygiene (HH) compliance among health-care workers has not satisfactorily improved despite multiple educative approaches. Between October 2019 and February 2020, we performed a self-evaluation test and a direct-observation for the compliance of the 5 Moments for Hand Hygiene program advocated by the World Health Organization at two Japanese hospitals. Average percentages of self-evaluated HH compliance were as follows: (i) 76.9% for “Before touching a patient”, (ii) 85.8% for “Before clean/aseptic procedures”, (iii) 95.9 % for “After body fluid exposure/risk”, (iv) 84.0% for “After touching a patient”, and (v) 69.2% for “After touching patient surroundings”. On the other hand, actual HH compliance was 11.7% for “Before touching a patient” and 18.0% for “After touching a patient or patient surroundings”. The present study demonstrated a big gap between self-evaluation and actual HH compliance among nurses working at hospitals, indicating the need of further providing the education in infection prevention.

Keywords: direct observation; hand hygiene; infection control; prevention.

Word count: 1,185 words

TEXT

Introduction

Hand hygiene (HH) is a fundamental practice for health-care workers (HCWs) to prevent healthcare-associated infections. The World Health Organization (WHO) recommends HCWs to clean their hands at the following times according to the 5 Moments for Hand Hygiene approach: (i) before touching a patient, (ii) before clean/aseptic procedures, (iii) after body fluid exposure/risk, (iv) after touching a patient, and (v) after touching patient surroundings (World Health Organization, 2009). This is an evidence-based and user-oriented concept, which can be easily learned, logically performed, and is applicable in any clinical setting. A wide range of approaches has been implemented to enhance HH practice among HCWs (Kingston et al., 2016). Some of these involve incorporating bundled approaches and applying technology for monitoring HH compliance, which have promoted practical advances (Bolon, 2016). However, few have become established as a universal method to increase HH compliance level, and HH compliance among HCWs is reportedly still inadequate (Pittet, 2001; Sakihama et al., 2016).

Human behavior rarely improves in the absence of recognizing the need for change. Thus, not-enough HH practice among HCWs may be attributed to misconception of their HH compliance. In this age of antimicrobial-resistant organisms and an emerging

COVID-19 pandemic, the importance of HH compliance should be far more emphasized. Our attempt in this study is to explore a difference between self-evaluation and actual implementation of HH among HCWs.

Methods

This study targets nurses working in medical wards at two hospitals: one university hospital and one local hospital. We included all the nurses working there, without any exclusion criteria. We conducted a paper-based self-evaluation test that asks for the HH compliance rate at the 5 Moments recommended by the WHO (World Health Organization, 2009). For each Moment, nurses gave a score from 0 to 100 points, which indicated the percentage of self-evaluating compliance (**Table 1**).

Between October 2019 and February 2020, well-trained investigators who were unknown to the nurses directly checked their HH practice at “Before touching a patient” and “After touching a patient or patient surroundings”. The Moments “After touching a patient” and “After touching patient surroundings” were combined because the investigators observed the HH practice at the corridor of the ward and it was difficult for them to distinguish the 2 Moments exactly. They visited the relevant wards without prior notice and collected the data repeatedly in approximately 10 minutes. We did not evaluate

55 the two other Moments of “Before clean/aseptic procedures” and “After body fluid
56 exposure risk” due to limited opportunities of observation.
57
58 ***Results***
59 The total number of nurses who answered the self-evaluation test was 151; 17
60 from the university hospital and 134 from the local hospital. Average percentages of self-
61 evaluated HH compliance in each Moment were as follows: (i) 76.9% at “Before touching
62 a patient”, (ii) 85.8% at “Before clean/aseptic procedures”, (iii) 95.9% at “After body
63 fluid exposure/risk”, (iv) 84.0% at “After touching a patient”, and (v) 69.2% at “After
64 touching patient surroundings”. During the direct observation survey, we examined 261
65 and 228 scenes of “Before touching a patient” and “After touching a patient or patient
66 surroundings.” Of these, the actual HH compliance rates were 11.7% (30 of 257 scenes)
67 and 18.0% (39 of 217 scenes), respectively (**Fig. 1**).
68
69 ***Discussion***
70 A presence of big gap between self-evaluation and actual practice of HH among
71 nurses working at hospital wards was demonstrated. A previous report estimated that the
72 number of alcohol-based hand rubbing opportunities per patient per day were 35 in

73 medical departments, 49 in surgery departments, and over 200 in intensive care units
74 (Slekovec et al., 2013). During daily practices, HCWs, especially nurses, have frequent
75 direct contact with patients, and therefore, they must clean their hands repeatedly. As is
76 widely recognized, the numbers of nosocomial infections certainly decrease, as HH
77 compliance increases (Allegranzi and Pittet, 2009; Pittet et al., 2000). Good adherence to
78 proper HH surely pay off in the prevention of nosocomial infections and patient safety.

79 The significance of HH practices in preventing cross-infection in hospitals is
80 well established; however, adherence of HCWs has been unsatisfactory low. According
81 to a review article published in 2000, HH implementation rates averaged 40% (Pittet,
82 2001), although the compliance differed among separate studies. In Japan, Sakihama *et*
83 *al.* investigated HH practices before patient contact at four teaching hospitals, which
84 demonstrated that the HH adherence rate among nurses was 23% (Sakihama et al., 2016).
85 Preceding literature based on questionnaire reported HH implementation rate at Japanese
86 institutions was approximately 34% (Takahashi et al., 2009), and they had already pointed
87 out a discrepancy between the self-evaluation and actual HH practice (Sakihama et al.,
88 2016). Different from their investigation, the present study targeted only medical wards,
89 but not surgical, intensive-care, and emergency wards. However, our observation
90 additionally showed that actual HH compliance was less frequent in comparison to nurses'

91 self-evaluation. Thus, we herein highlight that direct observation is a gold standard for
92 evaluating the HH adherence, as have indicated by the authority (World Health
93 Organization, 2009).

94 Interestingly, self-evaluated HH compliance differed among the distinct 5
95 Moments. The Moment with the highest self-reported compliance (95.9%) was the "After
96 body fluid exposure/risk", such as when processing or possibly touching blood, urine, and
97 stool of patients. This Moment is clearly a high risk for a contagious organism to infect
98 with HCWs, and thus, this result is preferable, although actual adherence was not figured
99 out. We assume that plausible underlying reasons include (i) the contamination of their
100 hands are obviously visible, and (ii) a general feeling of being dirty prompt them to clean
101 their hands. The lowest Moment with self-reported compliance (69.2%) was "After
102 touching patient surroundings", with a considerable gap with "After touching a patient"
103 (84.0%). This could indicate a wrong perception among them that the patient environment
104 does not have the potential to contaminate their hands, as much as the patient themselves.

105 Overconfidence effects, which are divided into 3 subtypes including (i) Absolute
106 overconfidence (overestimation), (ii) Relative overconfidence (overplacement), and (iii)
107 Overprecision (Moore and Healy, 2008), are well-known heuristic errors found in various
108 social situations (Dunning et al., 2004). Previous literatures suggested that all these

overconfidence effects exist and possibly interfer with proceeding infection prevention education for HCWs (Bushuven, Juenger, et al., 2019; Bushuven, Weidenbusch, et al., 2019). Whether they are aware or not, many of HCWs have a flawed self-assessment in themselves, being better and enough educated in infection prevention knowledge and skills than others, regardless of their age, gender, profession, educational level, and working place (Bushuven, Weidenbusch, et al., 2019). This could explain the big gap observed between self-evaluation and HH compliance in the present study.

Limitations regarding this study should be also mentioned. First, the monitoring number might be insufficient to estimate HH compliance. The direct observation method takes considerable effort, though collecting more data for the analysis may have been helpful. Second, we only targeted nurses in this study. Medical doctors are reported to clean their hands less frequently (Sakihama et al., 2016), and thus, we should have targeted other HCWs as well. Third, the Moments “After touching a patient” and “After touching patient surroundings” were combined for the convenience of data collection. Thus, these Moments could not be compared with self-reported compliance. Forth, two important Moments of “Before clean/aseptic procedures” and “After body fluid exposure/risk” were not included in this study.

In summary, this study revealed a considerable gap between self-evaluation and

actual HH compliance among nurses working at medical facilities. Results can vary widely depending on the study setting and approach taken, and it is realistically very challenging to comprehend what and how actual HH compliances are. In addition, the reason why this gap exists is unclear, although we speculate that pre- and post-graduate continuous education for basic infection prevention skills are insufficient. However, knowing about this discrepancy may encourage them to improve their HH behavior. Further study to explore the potential barriers for preventing HCWs from performing HH should be implemented.

Contributor ship Statement

HH (Hagiya) was responsible for the study planning, data analysis, drafting, and manuscript submission. RT, YS, HH (Honda), YN collected data. FO supervised the study.

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Competing interests: All authors have none to declare

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References

Allegranzi B and Pittet D (2009) Role of hand hygiene in healthcare-associated infection prevention. *Journal of Hospital Infection* 73: 305–15. DOI: 10.1016/j.jhin.2009.04.019.

Bolon MK (2016) Hand Hygiene: An Update. *Infectious Disease Clinics of North America* 30: 591–607. DOI: 10.1016/j.idc.2016.04.007.

Bushuven S, Weidenbusch M, Mohr S, et al. (2019) Cognitive bias in professional hand hygiene and feedback: A national online-survey on overconfidence in Germany. *Infection Control and Hospital Epidemiology* 40: 943–946. DOI: 10.1017/ice.2019.156.

Bushuven S, Juenger J, Moeltner A, et al. (2019) Overconfidence in infection control proficiency. *American Journal of Infection Control* 47: 545–550. DOI:

163 10.1016/j.ajic.2018.10.022.

164 Dunning D, Heath C and Suls JM (2004) Flawed self-assessment implications for

165 health, education, and the workplace. *Psychological Science in the Public Interest,*

166 *Supplement* 5: 24769–106. DOI: 10.1111/j.1529-1006.2004.00018.x.

167 Kingston L, O'Connell NH and Dunne CP (2016) Hand hygiene-related clinical trials

168 reported since 2010: a systematic review. *Journal of Hospital Infection* 92: 309–

169 20. DOI: 10.1016/j.jhin.2015.11.012.

170 Moore DA and Healy PJ (2008) The Trouble With Overconfidence. *Psychological*

171 *Review* 115: :502–517. DOI: 10.1037/0033-295X.115.2.502.

172 Pittet D (2001) Improving adherence to hand hygiene practice: A multidisciplinary

173 approach. *Emerging Infectious Diseases* 7: 234–40. DOI:

174 10.3201/eid0702.010217.

175 Pittet D, Hugonnet S, Harbarth S, et al. (2000) Effectiveness of a hospital-wide

176 programme to improve compliance with hand hygiene. *Lancet* 356: 1307–12. DOI:

177 10.1016/S0140-6736(00)02814-2.

178 Sakihama T, Honda H, Saint S, et al. (2016) Hand hygiene adherence among health care

179 workers at Japanese hospitals: A multicenter observational study in Japan. *Journal*

180 *of Patient Safety* 12: 11–7. DOI: 10.1097/PTS.0000000000000108.

Slekovec C, Denizot V, Vettoretti L, et al. (2013) Evaluation of the number of opportunities for hand hygiene in hospital: A new methodological approach. *International Journal of Nursing Studies* 50: 413–8. DOI: 10.1016/j.ijnurstu.2012.09.015.

Takahashi I, Osaki Y, Okamoto M, et al. (2009) The current status of hand washing and glove use among care staff in Japan: Its association with the education, knowledge, and attitudes of staff, and infection control by facilities. *Environmental Health and Preventive Medicine* 14: 336–44. DOI: 10.1007/s12199-009-0103-z.

World Health Organization (2009) WHO guidelines on hand hygiene in health care: first global patient safety challenge clean care is safer care. DOI: 10.1086/600379.

Figure Legend

Fig 1. Gaps in Hand Hygiene between self-evaluation and direct observation.

Black and diagonal-lined boxes show the average percentages of self-evaluation and direct observation data, respectively.