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## Major Article

## Differences in psychosocial determinants of hand hygiene between health care professional groups: Insights from a mixed-methods analysis

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## Key Words:

Compliance  
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Improvements**Background:** Good hand hygiene (HH) prevents health care-associated infections. We compared psychosocial and organizational factors associated with HH compliance and perceived need for improvement among physicians, nurses, and allied health professionals (AHPs).**Methods:** We conducted a mixed-methods study in a 1,600-bed adult tertiary-care hospital in Singapore. Seven focus group discussions were conducted and data were analyzed using thematic analysis. The subsequent cross-sectional survey involved 1,064 staff members. Principal components analysis was performed to derive the latent factor structure that was applied in multivariable analyses.**Results:** All staff members acknowledged that HH was an integral part of their work, but were noncompliant due to competing priorities. Physicians were forgetful but appreciated reminders. Nurses were intrinsically motivated for HH. After adjusting for gender, staff category, seniority, and dermatitis history, having positive knowledge-attitudes-behaviors (odds ratio [OR], 1.44; 95% confidence interval [CI], 1.23-1.69), personal motivators-enablers (OR, 1.60; 95% CI, 1.38-1.86), and emotional motivators (OR, 1.62; 95% CI 1.40-1.88) were positively associated with good HH compliance. Women (OR, 3.91; 95% CI, 1.37-11.11), seniors (OR, 2.88; 95% CI, 1.08-7.68), nurses (OR, 4.05; 95% CI, 1.51-10.87), and staff with personal motivators-enablers for HH (OR, 1.60; 95% CI, 1.08-2.37) were more likely to perceive a need for improvement.**Conclusions:** Factors influencing self-reported HH differed between health care professional groups. Group-specific interventions are needed to improve compliance.

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Good hand hygiene (HH) is crucial for preventing health care-associated infections (HAIs). In 2009, the World Health Organization (WHO) published guidelines for improving HH and reducing nosocomial transmission in hospitals.<sup>1</sup> However, HH compliance rates vary widely, from 4%-100%, with an overall median compliance rate of approximately 40% across various settings and health care workers (HCWs).<sup>2,3</sup> Reasons for noncompliance are complex and few interventions seem to have a lasting effect.<sup>2,3</sup> An important reason for the short-lasting effect was that interventions tended to be

extrinsically driven. Scheithauer and Lemmen<sup>4</sup> highlighted the need for clinical teams to take ownership of HH compliance rather than rely on infection prevention and control (IPC) teams.

Intentions also do not necessarily translate to overt behaviors.<sup>5</sup> Although HCWs might have intended to adhere to HH practices, they are often influenced by various factors, resulting in nonadherence in certain situations.<sup>6-9</sup> Many studies have also looked at improving compliance to hand hygiene using concepts from behaviorism.<sup>10,11</sup> Thus, HH interventions revolved around the use of positive reinforcements, reminders, and education.<sup>10,11</sup> However, it is important to note that cognitive, social, and organizational factors play a big role in determining HH compliance. Workload, forgetfulness, perceived severity of infections, and social pressures are factors commonly associated with HH noncompliance.<sup>9-13</sup>

More importantly, studies have revealed differences in compliance rates between physicians, nurses, and allied health professionals (AHPs).<sup>14-18</sup> It is well reported that nurses tend to have higher HH

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compliance rates,<sup>14</sup> and physicians seemed less compliant with HH than nurses and AHPs.<sup>15,16</sup> There are suggestions that factors influencing HH compliance among health care professional groups differ,<sup>16,17</sup> but these differences have not been well studied. Some studies cite differences in patient loads seen by the different HCW groups,<sup>14</sup> whereas others note insufficient time being set aside by HCWs for the performance of HH during their work shift.<sup>18</sup> Thus, there is a need for better understanding of group-specific influencing factors before effective interventions can be designed and implemented.

Qualitative methods have been increasingly recognized as an important complement to quantitative methods for gaining better insights into clinical behaviors and practices.<sup>19,20</sup> Although qualitative methods are increasingly being used to study HH compliance, using them together with quantitative methods as part of a mixed-methods has not been explored. Triangulation of data from such a mixed-methods study can help deepen our understanding of the complex interplay of cognitive, social, and organizational factors on HH compliance in HCWs.<sup>21,22</sup>

We, therefore, sought to assess psychosocial and organizational factors associated with hospital staff members' reported HH compliance and their perceptions of the need to improve their HH compliance during routine patient care, comparing differences in influencing factors between health care professional groups (ie, physicians, nurses, and AHPs), using a mixed-methods study design.

## MATERIALS AND METHODS

The study was conducted in a 1,600-bed adult tertiary-care hospital in Singapore, with a qualitative phase followed by a dominant quantitative phase. Before and during the course of the study, the hospital routinely organized various HH promotion programs and activities to remind HCWs of the importance of HH. These included the hospital's HH day held annually on May 5, provision of easy access to HH guidelines and protocols via the hospital's intranet, and display of HH-focused posters around the wards. Furthermore, sinks with antiseptic soaps and alcohol handrubs are widely accessible in patient care areas.

Despite such efforts, data from HH audits in the hospital consistently show HH compliance rates averaging at 50%-60%. The data also reveal differences in compliance rates between health care professional groups such as nurses, AHPs (ie, physiotherapists, occupational therapists, speech therapists, pharmacists, and dietitians), and physicians. Physicians and AHPs seemed to lag behind nurses in adhering to the WHO Moments for HH.

Most hospitalized patients stayed in subsidized wards configured with 4-, 6- or 8-bed cohort cubicles. This configuration allows patients, their family members, and other visitors to socialize and mingle during their time in the hospital, thus increasing the risk of infections. This was especially so amongst patients who were admitted to the hospital for long periods of time. Although it was uncommon for visitors to visit more than 1 patient, visitors of a patient might help attend to the needs of another patient in the same cubicle.

Phase 1 of the study consisted of 7 focus group discussions (FGDs) that were conducted separately with purposively sampled junior and senior physicians, junior and senior nurses, and AHPs, from February-June 2013. A facilitator and a notetaker were present during each FGD.

The facilitator for each FGD was carefully selected to ensure that he/she was well known and a well-respected individual by the respective health care professional group in the hospital. It was also ensured that the facilitator was not the supervisor or coworker of any member in his or her focus group, and was not a member of

the hospital's IPC committee and did not have the responsibility of promoting HH compliance in the hospital. Facilitators were trained in focus group discussion techniques that included probing, asking open-ended questions, verifying unclear responses, and encouraging positive group dynamics. A semistructured interview guide was used by facilitators to elicit perspectives from participants on the current state of HH compliance in the hospital, and the motivators and barriers to good HH practices. Participants were also reassured before and after each FGD that their responses in the transcripts would be de-identified and kept anonymous.

A member of the study team was present as a notetaker at each session. The notetakers observed that facilitators were able to build rapport with focus group participants, who seemed forthcoming and candid with their responses. This was especially so when responding to questions regarding the challenges and barriers experienced with HH. Each FGD lasted 45-60 minutes. All discussions were audiorecorded and transcribed verbatim.

Two coders independently coded the transcripts using content coding and thematic analysis. These were subsequently reviewed for consensus to ensure intercoder reliability. Thereafter, the Social Ecological Model was used to group and explain factors that influenced HH compliance. This framework facilitates understanding of interactions between individuals and their environments and how they influence behaviors.<sup>23</sup>

Phase 2 involved a self-administered questionnaire survey conducted during July 2013. All HCWs who attended the hospital's annual town hall meetings were invited to participate in the study.

A survey instrument was developed, comprising 36 questions on attitudes toward HH, and perceived facilitators and barriers, adapted from the WHO knowledge and perception surveys on HH and also based on the themes that emerged from the focus group discussions. Additionally, the survey instrument was enhanced to incorporate 2 questions on the influence of role modeling by senior staff and reminders by peers on improving HH compliance because these subthemes emerged strongly from FGDs.

The WHO knowledge and perception surveys contain elements of sociocognitive theories applied to health-related behaviors, notably the Theory of Planned Behavior.<sup>7,12</sup> A 5-point Likert scale ranging from 1="Strongly disagree" to 5="Strongly agree" was used for each response. In addition, the survey included a question on reported compliance (0%-100%) ("On average, in what percentage of situations requiring HH did you perform HH?") and a yes or no question on the perceived need to improve one's HH compliance ("Do you think you can improve on your HH compliance?"). Participation in the survey was anonymous.

No language barriers were experienced during the FGDs and survey. English was the medium of instruction and used officially at work. All HCWs in the hospital spoke, read, and wrote fluent English. Ethical approval was obtained from the Domain Specific Research Board, National Healthcare Group, Singapore.

Means and standard deviations were computed for each question, and compared between health care professional groups. One-way ANOVA with post-hoc Tukey Honestly Significant Difference (HSD) test for pair-wise comparisons was used to compare the differences between group means. The  $\chi^2$  test was used to compare differences between group characteristics and outcomes. Good HH compliance was defined as having a reported >90% compliance. We performed principal components analysis with varimax rotation to derive the latent factor structure that was later applied in the multivariable logistic regression analyses to assess for independent factors associated with good HH compliance and perceived need for HH improvement. Reliability of the survey scales was measured using Cronbach's  $\alpha$  coefficient. All statistical analyses were conducted using SAS version 9.4 (SAS Institute Inc, Cary, NC).

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