Healthcare professionals' hand hygiene knowledge and beliefs in the United Arab Emirates

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Abstract

Background: Hand hygiene at key moments during patient care is considered an important infection prevention and control measure to reduce healthcare-associated infections. While there is extensive research in Western settings, there is little in the United Arab Emirates where particular cultural and religious customs are thought to influence hand hygiene behaviour.

Aim: To examine the hand hygiene knowledge and beliefs of health professionals at a tertiary care hospital in the United Arab Emirates.

Methods: A mixed methods design employed a survey followed by focus groups with nurses and doctors.

Findings: A total of 109 participants (13.6%) completed the survey: 96 nurses (88%) and 13 doctors (12%). Doctors' hand hygiene knowledge was slightly higher than that of nurses (78.5% versus 73.5%). There was no significant difference in scores on the hand hygiene beliefs scale between nurses ($M = 103.06$; $SD = 8.0$) and doctors ($M = 99.00$; $SD = 10.53$; $t(80) = 1.55$; $p = 0.13$, two-tailed). Seven categories emerged following transcript analysis.

Discussion: Hand hygiene knowledge scores suggest further hand hygiene education is required, especially on alcohol-based hand rub use. Addressing doctors' beliefs is particularly important given the leadership roles that doctors play in healthcare settings.

Keywords

Focus group, hand hygiene, hospital, infection, knowledge, beliefs, behaviour

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Background

Healthcare-associated infections (HAIs) affect 1.4 million people worldwide and lead to increased mortality and healthcare costs (Allegranzi et al., 2011). An estimated 20–40% of HAIs are preventable (Harbarth et al., 2003; Kampf et al., 2009; Pittet et al., 2000). Correct hand hygiene during patient care is an important infection prevention and control (IPC) measure to reduce HAIs (Allegranzi and Pittet, 2009; Shekelle et al., 2013; World Health Organization [WHO], 2009). Despite this, in one recent study conducted in the United States, hand hygiene compliance averaged 47.5% across all eight hospitals audited (Chassin et al., 2015) indicating behavioural change is a major challenge (WHO, 2009).

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Hand hygiene campaigns launched in a 371-bed tertiary care hospital in Abu Dhabi, United Arab Emirates (UAE), increased hand hygiene compliance from 22% in April 2011 to 95% in November 2011, and resulted in a corresponding decrease in HAIs (including central line-associated bloodstream infection, ventilator-associated pneumonia, and catheter-associated urinary tract infection) to zero per 1000 patient days. However, subsequently hand hygiene compliance fell to 87% and HAIs increased to 0.1 per 1000 patient days (WK Ng, personal communication, 2012). The campaign was not part of multiple parallel activities on IPC improvement within the institution, but a stand-alone campaign.

The literature suggests that enhancing compliance is not simply related to effort, but is highly dependent on altering behavioural perceptions (Whitby et al., 2006). This study examined the hand hygiene knowledge and beliefs of healthcare professionals (HCPs) at a tertiary care hospital in the UAE in an attempt to understand the motivators and barriers to change and potential reasons for non-compliance in order to enhance the development of future hand hygiene improvement strategies and therefore compliance. Based on known barriers and motivators, we set out to explore the extent to which these were reflected within our workforce and to determine whether there were other factors influencing compliance. The specific research questions were:

1. What factors influenced nurses' and doctors' hand hygiene compliance?
2. Do the hand hygiene beliefs of doctors and nurses differ significantly?

Methods

This study was conducted in 2012 and a mixed-methods design was employed. This incorporated an anonymous electronic survey of nurses ($n = 550$) and doctors ($n = 250$) working in the hospital (except those on leave) followed by qualitative focus group sessions with a subset of participants. Participants were recruited through convenience sampling. The Griffith University and Hospital Human Research Ethics Committees granted ethics approval. The purpose, benefits and risks of taking part in the study were outlined and potential participants were able to ask questions about the study and were assured of confidentiality before obtaining consent.

Data collection: survey

The survey elicited information on respondents' demographics including gender, age and discipline. The survey had five fixed response questions in section two that assessed HCPs' knowledge of hand hygiene indications, how to perform hand hygiene and the WHO Five Moments

for Hand Hygiene (Sax et al., 2007). Section three examined HCPs' beliefs about hand hygiene and HAIs utilising 24 items in a 5-point Likert scale that were based on the Theory of Planned Behaviour (O'Boyle et al., 2001). Eight items were reverse-scored to reduce response pattern bias (Carlson et al., 2011).

Content validity was ensured through evaluation by 12 multidisciplinary team members of the Hospital Infection Prevention and Control Committee (IPCC) (Merriam, 2002), who confirmed that the questions reflected the concepts being studied and that the scope of questions was appropriate (Lobiondo-Wood and Haber, 2010). The survey was piloted on 15 staff who were not included in the main sample.

The survey link was emailed to potential respondents and an explanatory letter was posted detailing the survey purpose, principal investigators' contact information and a completion deadline. Reminders were sent one week and two weeks after the survey opened.

Data collection: focus groups

All nursing and medical staff were invited to participate in the focus groups. Each group, facilitated by the principal researcher, was approximately 1 h in duration and session times were advertised as electronic wallpaper on computer desktops. The interview schedule employed a series of open-ended questions (Table 1) based on work by O'Boyle et al. (2001) to obtain rich detail on participants' views on factors influencing hand hygiene compliance (Pham et al., 2010).

Data collection and analysis occurred sequentially by analysing one focus group transcript at a time (Merriam, 2002). All focus groups were digitally recorded and transcribed verbatim, and the accuracy and consistency of the transcription was assessed through inspection of a random sample (Dahlberg et al., 2001). The transcripts were de-identified and pseudonyms were used to ensure confidentiality.

Data analysis

Descriptive statistics (range, mean and standard deviation) were calculated using the Statistical Product and Service Solutions (IBM Corp, 2013). Data were imported directly into SPSS, thus reducing the time needed and risk of error (Polit and Beck, 2008). Reverse-score items were reverse-coded. Cronbach's alpha was used to assess scale reliability. Reliability coefficients of 0.7 or above indicate acceptable internal consistency (Field, 2009; Jackson and Furnham, 2000). An independent-samples-t-test was used to compare the mean scores of hand hygiene beliefs by profession as the data were normally distributed based on the results of the Kolmogorov-Smirnov statistic and Levene's Test for Equality of Variances.

Table 1. Focus group guide.

Element	Question(s)
1 Behaviour generation	(i) Describe what you think of when you hear the term 'hand hygiene'? What behaviours do you associate with hand hygiene practice?
2 Behavioural beliefs	(i) What are the advantages in performing hand hygiene? (ii) What are the disadvantages in performing hand hygiene?
3 Normative beliefs	(i) Who are the people (or groups of people) important to you that would influence you to perform hand hygiene? (ii) Who are the people (or groups of people) important to you that would influence you to not perform hand hygiene?
4 Control beliefs	(i) What prevents or make it difficult for you to perform hand hygiene? (ii) What helps or motivates you to perform hand hygiene?
5 Importance of WHO Five Moments for Hand Hygiene	(i) Do you think the five moments for hand hygiene are all equally important or one moment is more important than the others?
6 Group norms	(i) When you think about performing hand hygiene, are there any groups of people with whom you compare yourself with? (ii) Thinking about the groups of people that you have just mentioned, is there one of those groups whose beliefs about hand hygiene would be congruent to your own? (iii) Still thinking about the groups of people that you have just mentioned, is there one of those groups whose beliefs about hand hygiene would be dissimilar to your own?
7 Hospital-approved hand hygiene policy	(i) Do you know if the hospital has an approved hand hygiene policy? (ii) Do you comply with the policy? If not, why not? (iii) Do other work colleagues comply with the policy? If not, what are the reasons? (iv) In what ways do you think that your supervisor can help to support you to perform hand hygiene? (v) In what ways do you think that the facility can help to support you to perform hand hygiene?
8 Home and other environments	(i) Do you perform hand hygiene outside of work (i.e. home, other venues)? (ii) What features of your home and other venues affect you performing hand hygiene or not?
9 Performance of non-typical hand hygiene behaviours	(i) For those of you here who perform hand hygiene at work most of the time, can you tell me about the times when you do not perform hand hygiene? (ii) For those of you here who mostly do not perform hand hygiene at work, can you tell me about the times when you do?
10 Changes in attitudes or practice over time	(i) Thinking back over your working life, are there periods in your life when you performed hand hygiene more or worried more about hand hygiene than other times? Can you tell me a bit about those times? (ii) Or times when you performed hand hygiene less or cared less about hand hygiene? Can you tell me a bit about those times? (iii) How about after the hand hygiene campaigns were introduced? Did that affect your hand hygiene awareness, attitudes and practices? (iv) Do you ever regret performing hand hygiene? (v) Do you ever regret not performing hand hygiene?
11 Additional	(i) Do you have any ideas about the things that need to be done to encourage healthcare workers to perform hand hygiene? (Prompt: on a personal level, on a unit level, on a facility level)? (ii) Finally, have we missed anything today in our discussions about hand hygiene?

Table 2. Percentage correct answers on hand hygiene knowledge questions by profession.

Item	Percentage (%) correct		
	Nursing	Medical	Total
1. Hand hygiene should be performed before direct patient contact, after direct patient contact or touching items in the immediate vicinity of the patient, before inserting an invasive device, when moving from a contaminated body site to a clean body site during an episode of patient care and after removing gloves	97.9%	100%	98.2%
2. If hands are not visibly soiled or visibly contaminated with blood or other proteinaceous material, apply alcohol-based hand rub to the hands and rub hands together until dry	77.1%	69.2%	76.1%
3. When using an alcohol-based hand rub to decontaminate hands, hands should be rubbed together until they are dry	88.5%	92.3%	89.0%
4. <i>Clostridium difficile</i> (the cause of antibiotic-associated diarrhoea) is not readily killed by alcohol-based hand rubs	84.4%	61.5%	81.7%
5. Alcohol hand rubbing is more effective against pathogens than handwashing	19.8%	69.2%	25.7%
Total mean scores	73.5%	78.5%	74.1%

Nine focus groups were conducted and emerging and recurring themes were identified. The principal researcher listened to all focus group audio recordings prior to transcription in order to identify pertinent concepts that seemed significant to the participants, but had not been included in the prepared interview schedule. These were subsequently incorporated in the interview schedule for the next focus group. Data from focus groups underwent content analysis, which enabled data to be categorized into specific themes and concepts, shifting from the general to the specific according to the range of likeness and disparities (since often a particular phrase or statement was reiterated by the participants but in an unrelated context) (Wilson et al., 2012). Content themes were confirmed by all researchers.

Results

Hand hygiene knowledge

A total of 109 participants (13.6%) responded to the survey: 96 nurses (88%) and 13 doctors (12%). Over three-quarters of respondents were women (78.9%; $n = 86$) and had three to four years' service at the hospital (range: six months to 28 years). The majority of respondents (95.4%) reported completion of the mandatory infection prevention and control training, and all reported that alcohol-based hand rubs (ABHRs) were available onsite. Ninety-eight percent of HCPs selected the correct answer in relation to hand hygiene indications in item one (Table 2), while only 19.8% of nurses recognised that ABHR is more effective against pathogens than handwashing (item five) (Table 2), compared to 69.2% of doctors. Overall, doctors scored slightly higher on hand hygiene knowledge (78.5% versus 73.5%).

Hand hygiene beliefs

While nursing staff had higher scores on the hand hygiene beliefs scale than doctors ($M = 103.06$, $SD = 8.0$ versus $M = 99.00$, $SD = 10.53$), the difference was not significant ($t(80) = 1.55$, $p = 0.13$, two-tailed) (Table 3). The magnitude of the differences in the means (mean difference = 4.06, 95% CI : -0.16 to 9.28) was small (eta squared = 0.03).

Focus groups

Thirty-one nurses (5.6% of nurses) and 18 doctors (7.2% of doctors) attended the focus groups. Group sizes ranged from four to eight participants. Following analysis of the transcripts seven categories emerged. These are discussed below.

Respect for authority: Participants considered that all elements of the WHO Five Moments carried the same weight in reducing HAIs. Most participants also agreed that complying with scientific evidence would reduce morbidity and mortality, and that the policy is important to guide hand hygiene practices. Participants perceived leaders or supervisors and consultants influenced their hand hygiene performance.

'These five moments are important to be followed when performing hand hygiene because they are from well-known guideline[s].' (FG1 PN7-P1-L28-29)

The influence of peers: Peer reminders, witnessing others' performance and making comparisons with peers and colleagues were considered triggers for HCP to perform hand hygiene. Some participants commented that peers in

Table 3. Hand hygiene beliefs scale for doctors and nurses.

	Items (Cronbach's alpha = 0.79)	Range (mean $\pm$ S.D)		
		Nursing	Medical	Total
1	Leaders at the facility support and openly promote hand hygiene (n = 107)	1–5 (4.59 $\pm$ 0.81)	3–5 (4.67 $\pm$ 0.65)	1–5 (4.60 $\pm$ 0.79)
2	Of all patient safety issues, hand hygiene is a high priority for the directorate of my facility (n = 108)	1–5 (4.48 $\pm$ 0.89)	1–5 (4.38 $\pm$ 1.12)	1–5 (4.47 $\pm$ 0.91)
3	The Hospital Hand Hygiene Program has modified my beliefs about hand hygiene performance (n = 108)	1–5 (4.12 $\pm$ 0.94)	3–5 (4.31 $\pm$ 0.75)	1–5 (4.14 $\pm$ 0.92)
4	Hand hygiene is a habit for me in my personal life (n = 106)	1–5 (4.66 $\pm$ 0.72)	4–5 (4.69 $\pm$ 0.48)	1–5 (4.66 $\pm$ 0.69)
5	Hand hygiene is effective in preventing healthcare-associated infection (n = 108)	1–5 (4.66 $\pm$ 0.78)	1–5 (4.38 $\pm$ 1.12)	1–5 (4.66 $\pm$ 0.83)
6	Healthcare-associated infection has a high impact on patient outcomes (n = 108)	1–5 (4.56 $\pm$ 0.87)	1–5 (3.92 $\pm$ 1.71)	1–5 (4.48 $\pm$ 1.02)
7	Prevention of healthcare-associated infection is an important and routine part of my role (n = 108)	1–5 (4.68 $\pm$ 0.78)	1–5 (4.38 $\pm$ 1.12)	1–5 (4.65 $\pm$ 0.82)
8	The facility makes hand hygiene products (e.g. alcohol-based hand rub) readily available at each point of care (n = 108)	1–5 (4.57 $\pm$ 0.81)	1–5 (4.31 $\pm$ 1.11)	1–5 (4.54 $\pm$ 0.85)
9	Hand hygiene posters are displayed at point of care as reminders (n = 109)	1–5 (4.58 $\pm$ 0.72)	3–5 (4.38 $\pm$ 0.65)	1–5 (4.56 $\pm$ 0.71)
10	Clear and simple instructions for hand hygiene are provided to me and other healthcare workers in my unit (n = 108)	1–5 (4.52 $\pm$ 0.83)	2–5 (4.15 $\pm$ 0.99)	1–5 (4.48 $\pm$ 0.85)
11	Healthcare workers receive feedback on their hand hygiene performance regularly (n = 108)	1–5 (4.28 $\pm$ 0.77)	2–5 (4.15 $\pm$ 0.90)	1–5 (4.27 $\pm$ 0.78)
12	I have a healthy intact skin on my hands that is free from irritation by the hand hygiene products (n = 107)	1–5 (3.77 $\pm$ 1.02)	1–5 (4.00 $\pm$ 1.29)	1–5 (3.79 $\pm$ 1.05)
13	I follow the example of senior colleagues when deciding whether or not to perform hand hygiene (n = 107)*	1–5 (2.37 $\pm$ 1.26)	1–5 (3.00 $\pm$ 1.53)	1–5 (2.45 $\pm$ 1.31)
14	It is important that my head of department is aware that I always comply with hand hygiene guidelines (n = 109)	1–5 (4.33 $\pm$ 0.76)	2–5 (4.00 $\pm$ 0.81)	1–5 (4.29 $\pm$ 0.77)
15	I always act as a role model for my colleagues or other healthcare workers with respect to hand hygiene (n = 109)	1–5 (4.43 $\pm$ 0.76)	4–5 (4.38 $\pm$ 0.51)	1–5 (4.42 $\pm$ 0.68)
16	It is important that my colleagues are aware of the fact that I perform optimal hand hygiene (n = 101).	1–5 (4.38 $\pm$ 0.72)	3–5 (3.92 $\pm$ 0.76)	1–5 (4.32 $\pm$ 0.73)
17	It is important that patients are aware that I perform optimal hand hygiene (n = 108)	1–5 (4.40 $\pm$ 0.72)	1–5 (4.00 $\pm$ 1.16)	1–5 (4.35 $\pm$ 0.79)
18	Patients do remind healthcare workers to perform hand hygiene (n = 109)*	1–5 (2.33 $\pm$ 1.11)	1–4 (2.38 $\pm$ 1.04)	1–4 (2.34 $\pm$ 1.10)
19	During emergencies (e.g. patient resuscitation), it is more important to complete my tasks/assignments than to perform hand hygiene (n = 108)*	1–5 (2.80 $\pm$ 1.23)	1–5 (3.31 $\pm$ 1.25)	1–5 (2.86 $\pm$ 1.24)
20	Generally, I do not think it is necessary to modify my routine and workplace habits based on practice guidelines (n = 107)*	1–5 (2.71 $\pm$ 1.19)	1–4 (2.08 $\pm$ 0.95)	1–5 (2.64 $\pm$ 1.18)

(Continued)

Table 3. (Continued)

Items (Cronbach's alpha = 0.79)		Range (mean $\pm$ S.D)		
		Nursing	Medical	Total
21	I never or rarely perform hand hygiene because I am not appreciated or rewarded to do so or I do not think it affects patient care (n = 107)*	1–5 (1.49 $\pm$ 0.91)	1–2 (1.46 $\pm$ 0.52)	1–5 (1.49 $\pm$ 0.87)
22	I perform hand hygiene because I am concerned about the disciplinary action that will be imposed on me if non-compliance occurs (n = 108)*	1–5 (2.03 $\pm$ 1.15)	1–4 (1.77 $\pm$ 0.93)	1–5 (2.00 $\pm$ 1.13)
23	It is hard for me to remember to perform hand hygiene in the recommended situations (n = 109)*	1–5 (1.74 $\pm$ 0.92)	1–4 (1.85 $\pm$ 0.80)	1–5 (1.75 $\pm$ 0.90)
24	I feel uncomfortable reminding a healthcare worker to perform hand hygiene (n = 109)*	1–5 (2.35 $\pm$ 1.19)	1–4 (2.00 $\pm$ 0.91)	1–5 (2.31 $\pm$ 1.16)
Total scale scores		81–118 (103.06 $\pm$ 8.0)	80–116 (99.00 $\pm$ 10.53)	80–118 (102.46 $\pm$ 8.46)
Scale: 1 = strongly disagree to 5 = strongly agree. *The item is reverse-coded.				

intensive care units had better hand hygiene compliance when compared with others.

'...Doctors and nurses in the general units do not perform hand hygiene ... as we do in the intensive care unit...' (FG3 PN2-P6-L171-172)

Tradition, personal belief and religious influences: Hand hygiene was traditionally performed at home to maintain cleanliness, protect families and for ritual reasons during religious ceremonies (e.g. the ritual washing performed by Muslims before prayer). Participants emphasised that hand hygiene practice was routine and practiced accordingly, except during emergency situations and when forgetfulness occurred. The majority of participants believed in the efficacy of hand hygiene due to their experience with ultraviolet hand scanners and knowledge obtained from established hand hygiene programs. Doctors, in particular, mentioned that visualisation of hands with scanners helped to convince them of hand hygiene efficacy.

'I truly believe in this after watching my contaminated hands under the ultraviolet hand scanner post glove removal.' (FG3 PN3-P6-L154-156)

Skin condition: Most participants indicated that dermatitis was no longer an issue following access to hospital-approved hand lotion. However, some were still unaware of hand lotion availability, had limited access to it or were not using it because they believed that sharing lotion would spread infection. Some reported developing allergies and

dermatitis due to the over-use of ABHR, handwashing with hot water, or performing handwashing and hand rubbing concurrently due to knowledge deficits.

'There are hand lotions but just not accessible everywhere. Hand lotion is only in the nurse station and coffee room. They are far from patient rooms.' (FG4 PN2-P2-L55-56)

Professional responsibility: The majority of participants believed that individuals' hand hygiene practice is affected by professionalism.

'I solely believe that hand hygiene is my responsibility as a nurse.' (FG2 PN2-P3-L85)

Personal protection: Participants felt that HCPs perform hand hygiene only when they perceive danger for themselves, instead of for patients.

'Infectious patients are dirty...I always feel dirty after handling them... that's the reason I don't like to go to them.' (FG3 PN1-P11-L318-319)

'I feel safe and protected with gloves on when handling infectious patients.' (FG6 PD2-P8-L219)

External environment: Accessibility of hand hygiene supplies and signage in appropriate places reminding staff about hand hygiene practice were considered important elements in improving hand hygiene compliance. The majority of participants revealed that hand hygiene was impractical when HCP were over-worked.

'Insufficient nursing staff is a challenge these days. I find it difficult to wash my hands properly if I have to handle three ventilated critically ill patients.' (FG5 PN3-P4-L97-98)

Participants suggested that leadership commitment and provision of consistent feedback on HAI statistics and hand hygiene performance are crucial to maintain hand hygiene compliance. Comparing hand hygiene compliance or infection statistics with other units influenced compliance.

'I compare the hand hygiene compliance rate in my unit with other units. If I see other units have higher compliance rate than my unit this month, it will motivate me and my colleagues.' (FG1 PN8-P6-L178-180)

Some participants suggested that disciplinary action for hand hygiene non-compliance demoralised them.

'I was washing my hands at all times and my name was reported just because I forgot to perform hand hygiene once. I was not praised when I was doing well but I was punished when I made a mistake only once.' (FG5 PN5-P9-L258-260)

Discussion

Hand hygiene knowledge

These results demonstrate that hand hygiene knowledge among the doctors and nurses who have direct patient care still warrants further reinforcement. Some doctors were still not sure about correct hand hygiene when hands are not visibly soiled and after exposure to spore-forming organisms (Mortell et al., 2013). Surprisingly, most nurses did not know that ABHR is more effective than soap (WHO, 2009). This could be one of the reasons leading to non-compliance as handwashing is more time-consuming than alcohol-based hand rubbing, especially in times of increased workloads and staff shortages (Karabey et al., 2002; Pittet et al., 2004). Poor hand hygiene knowledge may also lead to incorrect hand hygiene practice such as handwashing with hot water and concurrent hand hygiene with alcohol-based hand rubbing, resulting in skin damage and reducing compliance (WHO, 2009).

The majority of doctors remained sceptical that contaminated hospital surfaces are associated with HAI transmission, until particular education techniques like the glow lotion and ultraviolet hand scanner were used to demonstrate inadequate handwashing, suggesting it would be important to reinforce hand hygiene education using this hand scanner. The use of biosimulators and visual training is an important new approach for learning in the healthcare setting, which allows HCPs to see the impact of disease transmission compared to traditional didactic education (Aiello et al., 2009).

Hand hygiene beliefs

Nurses' scores on the hand hygiene beliefs scale were higher than doctors' scores, however the difference was not significant. Given that doctors had higher knowledge scores but scored lower on the beliefs scale, it appeared that knowledge did not significantly influence beliefs among the two groups and Han et al. (2011) found similarly. However, due to the small sample size, a larger sample is required to assess the relationship.

Factors impacting compliance

An established barrier to doctors' hand hygiene compliance is the lack of positive role models among physicians (Squires et al., 2013) although some suggested their hand hygiene practice was largely influenced by nurses. As doctors are leaders and role models in healthcare, addressing doctors' behaviour is crucial. A better understanding of the rationale for specific doctor behaviours related to hand hygiene will provide a more comprehensive framework on which to develop interventions that have a better chance of being successful in effecting change in this group (Muftic, 1997).

Although they were aware of hand lotion application to reduce skin irritation, these lotions were, again, not always accessible when needed. Thus, the availability and accessibility of hand hygiene infrastructure is crucial to promote hand hygiene compliance. However, the introduction of hand lotion alone is unlikely to induce a sustained increase in hand hygiene compliance, since compliance is most likely to improve when using a multimodal behavioural improvement strategy program (Whitby et al., 2006).

Personal safety was the primary reason for hand hygiene. Some doctors consistently reported being more vigilant about hand hygiene in situations considered to be either physically dirty or 'emotionally dirty', that is, moments that are described as inherent, and this is a common phenomenon (Pan et al., 2013; Whitby et al., 2006). Most participants also reported patients with infectious diseases are also seen as 'dirty' and this perhaps provides a reason why patients identified as requiring additional precautions may receive lower quality care (Pittet et al., 2004). These findings, as well as the fact that HCP admit to feeling safe while wearing gloves for prolonged periods of time, underscores the extent to which both disgust with perceived contamination and social acceptability affect hand hygiene habits (Jang et al., 2010).

Limitations

There are a number of study limitations. First, the exact response rate is unknown as the population sample size had to be approximated. Second, the convenience sampling

method may create a selection bias towards HCP with an interest in hand hygiene, which may influence the results. Third, the low response rate overall, and particularly that of the medical group, restricted the study's findings principally to nurses. Additionally, as some focus groups were composed of varying levels of trained and senior HCP, socially desirable responding is a potential limitation (Gall et al., 2003; King and Bruner, 2000). Lastly, ABHRs were readily accessible, but handwashing basins were limited and, therefore, hand rubbing was performed even though skin irritation existed.

Conclusion

This is the first study to examine hand hygiene knowledge and beliefs in the UAE. The hand hygiene knowledge scores in this study suggest further hand hygiene education is required, especially in the use of ABHR. Addressing doctors' beliefs is particularly important given leadership roles that doctors play in healthcare settings. It is important to address barriers using a well-established behavioural model when targeting strategy to promote hand hygiene behaviour. Local studies exploring hand hygiene behaviour using behavioural model are warranted to provide a more accurate picture of hand hygiene practices in specific contexts.

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