

“Did you wash your hands?”: a prospective study of patient empowerment to prompt hand washing by healthcare providers

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Abstract

Background: Hand hygiene is paramount in preventing the spread of healthcare-associated infections especially during disease epidemics. Compliance rates with hand hygiene policies remain below 50% internationally and may be lower in the outpatient care setting. This study assessed the impact of the patient empowerment model on hand hygiene compliance among healthcare providers.

Methods: From October 2016 to May 2017, patients from a large ambulatory oncology centre were prospectively enrolled. Patients were instructed to observe healthcare providers for hand hygiene compliance and to remind healthcare providers where it was not observed during at least three consecutive encounters. Healthcare provider reactions to this intervention were rated by patients. Patients' hand hygiene knowledge and beliefs were objectively elicited pre and post-study.

Results: Thirty patients with a median age of 52 years (range 5–91) completed the study for a total of 190 healthcare provider encounters. When initial hand hygiene was not observed, patients offered a reminder in 71 (37.4%) encounters, did not offer a reminder in 73 (38.4%) encounters and forgot to offer a reminder in 24 (14.2%) encounters. Patients perceived positive or neutral reactions in 76.8% of encounters and negative or surprised reactions in 23.2% of encounters. Healthcare provider compliance improved from 11.6% to 48.9% with intervention. Patient hand hygiene knowledge improved by 16% following the study.

Conclusions: Patient-empowered hand hygiene may be a useful adjunct for improving hand hygiene compliance among healthcare providers and improving patient hand hygiene knowledge, although it may confer an emotional burden on patients.

Keywords

Patient empowerment, hand hygiene, hand washing, healthcare providers

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Background

The importance of hand hygiene on preventing the spread of healthcare-associated infections (HAIs) is well documented in the healthcare field, particularly by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) hand hygiene task force, who participate in updating quality control standards (CDC, 2002; Peters et al, 2019; Pittet et al, 2009; WHO, 2009). Despite widely available information and easily accessible hand hygiene devices in healthcare settings, compliance

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rates among healthcare providers (HCPs) consistently remain below 50% (Erasmus et al, 2010; Muller et al, 2014; Vaidotas et al, 2015). Disease epidemics, including severe acute respiratory syndrome-associated coronavirus (SARS-CoV) in 2002 and influenza H1N1 in 2009, have historically renewed focus on the importance of hand hygiene among HCPs and the general public, and the ongoing 2019–2020 coronavirus disease 2019 (COVID-19) pandemic has been no different (Fung and Cairncross, 2006; Madani et al, 2014; Seto et al, 2003; Updegraff et al, 2011).

Multiple interventions have been implemented internationally to improve hand hygiene compliance rates, including the implementation of doorway signage and education programmes for HCPs and trainees, although most have reported minimal sustained success at best (Vander Weg et al, 2019; Updegraff et al, 2011; Wearn et al, 2015). One strategy that has gained popularity over the past couple of decades is the “audit and feedback” method, in which providers are observed and counselled verbally and/or in written form. A 2012 Cochrane review of randomised trials assessing this strategy reported a small improvement in hand hygiene practices when a HCP is counselled multiple times, especially by a supervisor (Ivers et al, 2012).

While reminding a fellow colleague or subordinate is an achievable task for most people, the practice of “upward feedback”, in which an actual or perceived subordinate provides feedback to the supervisor, is less comfortable due to fears of a negative reaction or repercussions (Schwappach and Gehring, 2014; van Dierendonck et al, 2007). A 2017 web-based cross-sectional survey reported only 28.7% of patients were willing to ask their HCPs to wash their hands before examination (Vijayalakshmi et al, 2017). However, several small studies have demonstrated that patients are often willing to be empowered to remind their HCPs when it is actively encouraged by the healthcare organisation (McGuckin and Govednik, 2013).

Hand hygiene is especially important among providers who interact with oncology patients, many of whom are considered immunocompromised due to their ongoing chemotherapy, radiation and surgical treatments (Morrison, 2014; Shankar et al, 2020). This study was performed just prior to the COVID-19 pandemic to contribute to the limited existing data on patient empowerment and hand hygiene compliance among oncology providers.

Methods

Setting and population

Between October 2016 and May 2017, patients undergoing cancer treatments were enrolled by the study authors at a large, ambulatory cancer treatment centre in San Antonio, Texas, USA. All patients, including children with consenting parents, seen in one of two oncology clinics were

eligible for enrollment. Informed consent was obtained by the primary HCP. Given the pilot nature of this study, a power calculation for sample size was impractical, and the authors sought to enroll as many participants as possible during the given time frame based on available funding. The study was approved by the University of Texas Hospital System at San Antonio (UTHSCSA) institutional review board (IRB) prior to implementation.

Intervention

Intervention instructions were provided verbally and in writing by the primary HCP who obtained informed consent. Participants were instructed to observe all HCPs they interacted with during at least three subsequent, consecutive clinic encounters for appropriate hand hygiene prior to initiating physical contact. When the action was not observed, patients were instructed to remind the HCP to perform the task, then document their perceptions of the providers’ reactions to the reminder, as well as their personal reactions to providing the reminder. To assess patient knowledge throughout the study time period, patients’ base hand hygiene knowledge and beliefs were acquired and compared pre and post-study using a nominal scale survey developed and published previously by the study authors (Grota et al, 2020) (see Table 1).

The primary outcomes included the frequency of patient observed provider hand hygiene, frequency of patient instigated provider hand hygiene and types of patient perceived personal and provider reactions during the interaction. Secondary outcomes included changes in patient hand hygiene knowledge and beliefs as well as factors that influenced successful intervention implementation throughout the course of the study.

Definitions

Definitions of terms utilised in this study are defined in Appendix 1. All definitions were agreed on by all study authors, and equivocal cases were reviewed by at least two authors.

Analysis

Data were analysed utilising Microsoft Excel and the statistical package SPSS (Software version 26.0 for Mac OS; IBM Corp., Armonk, NY, USA). Descriptive and frequency analysis was performed for all variables. Continuous variables are reported utilising median and range. Categorical variables are reported utilising raw numbers and percentage of the total. Due to the small population size, univariate analysis was performed over multivariate analysis including the independent *t*-test analysis for continuous variables and Pearson chi-square analysis for categorical variables. For qualitative data analysis, key words, as defined in

Table 1. Survey questions of knowledge and beliefs of hand hygiene administered to study participants pre and post-study.

| Question |
|---|
| 1 Have I ever asked my doctor or nurse to clean their hands? |
| 2 Does washing my hands stop the spread of infection? |
| 3 Does using alcohol hand sanitiser/hand rub stop the spread of infections? |
| 4 If I can see dirt on my hands, should I wash my hands with soap and water? |
| 5 Should I clean my hands after blowing my nose? |
| 6 Should I clean my hands after using the restroom? |
| 7 Should I clean my hands before I eat? |
| 8 Should my doctor or nurse clean their hands prior to touching me? |
| 9 Should my doctor or nurse clean their hands prior to doing a procedure on me? |
| 10 Do I feel comfortable asking a doctor or nurse to clean their hands? |

Source: Grota et al (2020).

Appendix 1, were identified from patient interview transcripts to categorise trends and patterns.

Results

Patient demographics

Thirty patients (29 adults, one paediatric) were enrolled between October 2016 and May 2017. The median age was 53 years (range 5–91) and 90% ($n=27$) of the patients were female. Fifty per cent of patients ($n=15$) identified as Hispanic, and the remainder identified as non-Hispanic. Most of the patients ($n=24$) preferred English as their first language, while the remaining patients preferred Spanish ($n=1$) or either English or Spanish ($n=5$). With regard to education level, 7% ($n=2$) of patients did not graduate high school, 60% ($n=18$) of patients possessed a high school degree and 33% ($n=10$) of patients possessed a college and/or other advanced degree. Fifty per cent of patients ($n=15$) were undergoing long-term treatment for endometrial cancer, with the remaining patients undergoing treatment for a variety of other cancers. All demographics are delineated in Table 2.

Hand hygiene intervention frequency

Among all 30 study participants, there was a total of 202 HCP scheduled encounters at the treatment centre. Of the 202 scheduled encounters, 12 encounters were not completed

Table 2. Patient demographics.

| Variable | N (range or %) ($n=30$) |
|--------------------------------------|---------------------------|
| Gender | |
| Female | 27 (90) |
| Male | 3 (10) |
| Average age, years | 53 (2–91) |
| Highest level of education completed | |
| <High school | 2 (6.7) |
| High school | 18 (60) |
| College or other advanced degree | 10 (33.3) |
| Preferred language | |
| English | 24 (80) |
| Spanish | 1 (3.3) |
| English or Spanish | 5 (16.7) |
| Ethnicity | |
| Hispanic | 15 (50) |
| Non-Hispanic | 15 (50) |
| Cancer subtype | |
| Endometrial | 15 (50) |
| Cervical | 5 (16.7) |
| Skin | 3 (10) |
| Brain | 2 (6.7) |
| Vulva | 2 (6.7) |
| Desmoid | 1 (3.3) |
| Ovarian | 1 (3.3) |
| Nasopharyngeal | 1 (3.3) |

All continuous variables are presented as median (range), and all categorical variables are presented as n (%).

secondary to patient cancellation or missed appointment. Of the 190 completed encounters, HCPs were noted initially to complete hand hygiene without a reminder prior to initiating physical contact in 11.6% ($n=22$) of encounters. HCPs were not observed performing hand hygiene prior to physical contact in the remaining 88.4% ($n=168$) of encounters. Of the 168 encounters in which the intervention was warranted, patients reminded the HCP in 37.4% ($n=71$) of encounters, failed to remind the HCP in 38.4% ($n=73$) of encounters and either forgot to remind or could not find the opportunity to remind the HCP in 12.6% ($n=24$) of encounters. These results are delineated in Table 3. All HCPs who received a reminder subsequently performed appropriate hand hygiene, representing an increase in the compliance rate from 11.6% to 48.9%.

The majority of patients ($n=26$; 86.7%) completed the intervention during at least one encounter and 46.7% ($n=14$) of patients completed the intervention during half or more of their scheduled encounters. Forty per cent ($n=12$) of patients forgot to complete the intervention during at

Table 3. Patient implementation of the study intervention.

| | Patient action | | | | | | Total |
|-------------------|------------------------|------------------|--|--------------------------|----------------------------------|---------------------------------|-------|
| | Did not remind the HCP | Reminded the HCP | HCP initiated appropriate hand hygiene | Forgot to remind the HCP | No opportunity to remind the HCP | Missed or cancelled appointment | |
| No. of encounters | 73 | 71 | 22 | 21 | 3 | 12 | 202 |
| Percentage | 38.4 | 37.4 | 11.6 | 11.1 | 1.6 | N/A | 100 |

HCP: healthcare provider.

least one encounter. At least seven (23.3%) patients were unsure whether to remind HCPs who were wearing gloves to perform hand hygiene and two (6.7%) patients did not realise hand sanitiser was considered appropriate hand hygiene. At least 13 (43.3%) patients felt uncomfortable reminding the HCP to perform hand hygiene. Of these patients, at least five (16.7%) patients felt especially uncomfortable reminding a physician, citing feeling “awkward” and “disrespectful”, because the physician “should know what [he/she] is doing”. There were no statistically significant differences in terms of patient demographics or pre-study perceptions between patients who did and did not complete the intervention during at least one encounter or during half or more of the encounters (Table 4).

Patient perceptions of provider response to intervention

As represented in Table 5, patients reported that HCPs responded positively or neutrally to the intervention in 43.8% ($n=35$) and 32.5% ($n=26$) of encounters, respectively. Patients reported a surprised reaction in 10% ($n=8$) of encounters and a negative reaction in 13.7% ($n=11$) of encounters. Patients’ perceived provider responses did not have a statistically significant impact on their likelihood to complete the intervention. In post-study interviews, at least two patients (6.7%) reported choosing to stop reminding HCPs after receiving a negative HCP reaction to the reminder.

Patient hand hygiene perceptions

The majority ($n=21$; 70.0%) patients scored 9–10 out of 10 points on the pre-study survey, indicating accurate hand hygiene knowledge and relative familiarity with reminding HCPs to perform hand hygiene. The two most common questions that patients missed were “prior experience with asking an HCP to perform hand hygiene” ($n=25$; 83.3%) and “comfort with the task of reminding an HCP to perform hand hygiene” ($n=5$; 16.7%). Five (16.7%) patients missed at least one hand hygiene knowledge question, the majority of whom did not realise hand sanitiser use aided in stopping the spread of infection.

In the post-study survey, 27 (90%) of patients scored 9–10 out of 10 points, representing an improvement of 28.6%. All patients but one ($n=29$; 96.7%) correctly answered all of the hand hygiene knowledge questions, an improvement of 16%. Nineteen (63.3%) patients reported new experience reminding an HCP to perform hand hygiene. Two (6.7%) patients reported new comfort with reminding an HCP, although two (6.7%) patients reported a loss of comfort with reminding an HCP. There were no explanations provided for this sentiment.

Discussion

Hand hygiene is a well-documented and widely accepted method for reducing HAIs. This is especially important among oncology patients whose immune systems are frequently compromised secondary to chemotherapy and radiation (Morrison, 2014; Shankar et al, 2020). This study sought to assess the frequency of hand hygiene and the efficacy of a patient-empowered intervention for improving hand hygiene compliance in the setting of a large, ambulatory oncology centre.

This study prospectively enrolled 30 adult and paediatric patients undergoing long-term cancer therapy between October 2016 and May 2017. On completion of the study, patients reported an HCP hand hygiene compliance rate of 11.6%. This is much lower than the authors expected, as average hand hygiene compliance rates of 30–50% have been reported in the literature, although most studies consist primarily of inpatient data collection (Kingston et al, 2016; Livorsi et al, 2018). Although significantly limited in availability, studies specifically focusing on the outpatient setting have reported vastly varying hand hygiene compliance rates ranging from 6% to 63% (Kato et al, 2021; KuKanich et al, 2013; Thompson et al, 2016). These reduced compliance rates may be secondary to the historical paucity of robust hand hygiene interventions, education and funding in the outpatient versus inpatient setting (Bingham et al, 2016).

The 2009 WHO hand hygiene guidelines clearly encourage patient empowerment as one of the strategies for improving HCP hand hygiene compliance (WHO, 2009). Despite this, there have been few data published supporting

Table 4. Study variables and intervention completion during half or more encounters.

| Variable | Intervention completion, N (%) | P value ^a |
|--|--------------------------------|----------------------|
| Gender | | |
| Female | 12 (44.4) | 0.46 |
| Male | 2 (66.7) | |
| Age, years | | |
| <50 years | 6 (42.9) | 0.70 |
| ≥50 years | 8 (50.0) | |
| Highest level of education completed | | |
| High school | 10 (50.0) | 0.61 |
| College or other advanced degree | 4 (40.0) | |
| Preferred language | | |
| English | 4 (66.7) | 0.27 |
| English/Spanish or Spanish | 10 (41.7) | |
| Ethnicity | | |
| Hispanic | 6 (40.0) | 0.46 |
| Non-Hispanic | 8 (53.3) | |
| Patient experience prior to study initiation | | |
| Reported experience with reminding HCP to perform hand hygiene | 4 (80.0) | 0.10 |
| Comfortable reminding HCP to perform hand hygiene | 12 (48.0) | 0.74 |
| Patient experience during the study | | |
| Reported discomfort with reminding HCP to perform hand hygiene | 6 (42.9) | 0.70 |
| Positive or neutral HCP reaction to reminder | 10 (45.5) | 0.83 |
| Negative HCP reaction to reminder | 4 (50.0) | |

^aA P value of <0.05 was accepted for determination of statistical significance.
HCP: healthcare provider.

Table 5. Patient perception of healthcare provider responses to the intervention.

| Healthcare provider response | N (%) |
|------------------------------|-----------|
| Positive | 35 (43.8) |
| Neutral | 26 (32.5) |
| Negative | 11 (13.7) |
| Surprised | 8 (10.0) |
| Total ^a | 80 (100) |

^aThe majority of encounters involved more than one healthcare provider.

robust patient-centred interventions. In this study, we report that patients providing the reminder to HCPs to perform hand hygiene resulted in a compliance improvement from 11.6% to 48.9%, as every provider who received a reminder complied immediately. Interestingly, one patient commented that her reminder to the HCP resulted in that

provider reminding other HCPs who interacted with her that day to perform hand hygiene. These data are promising for future, larger scaled interventions in outpatient settings and echo results from numerous similar pilot studies that have reported improvements in HCP compliance following the implementation of patient-driven hand hygiene interventions (Awaji and Al-Surimi, 2016; Davis et al, 2015; Görig et al, 2019; McLean et al, 2017).

Of the encounters when the provider neglected to perform hand hygiene prior to establishing physical contact with the patient, patients reported reminding the provider in 37.4% of the encounters. While patients did not provide the reminder in 38.4% of warranted encounters, this level of patient participation was expected given the well-established discomfort patients experience when confronting a provider. McGuckin and Govednik (2014) reported that 17% of 1000 survey respondents asked an HCP to perform hand hygiene. While some patients in this study neglected to remind the HCP due to uncertainties regarding gloves, hand sanitiser and simple forgetfulness, nearly half of patients expressed fear or discomfort when presented with

the situation. A 2012 questionnaire of 200 hospitalised patients reported that despite 99–100% of patients agreeing that HCPs should wash their hands prior to each patient encounter, only half responded feeling comfortable reminding an HCP to do so, and fewer than 15% reported ever reminding an HCP in the past (Ottum et al, 2013). Similarly, a 2012 report found that 57% of patients interviewed as part of the United Kingdom “Clean Your Hands” campaign endorsed discomfort with asking HCPs to complete hand hygiene (Butenko et al, 2017). Similarly, Vijayalakshmi et al (2017) reported only 28.7% of respondents responded feeling comfortable about reminding an HCP to perform hand hygiene. Heightened anxiety while interacting with HCPs is a well-known phenomenon and has been seen to cause physical and psychological stress, including a reduced likelihood that patients will ask questions and voice concerns (Judson et al, 2013; Pioli et al, 2018, Tolan, 2012).

Although statistically significant associations were not made in this study population, patient perceived HCP willingness to receive feedback from the patient may be another contributor to the discomfort felt by patients. While the majority of patients perceived positive and/or neutral HCP reactions to the reminder, 13.7% of HCP responses were perceived as negative. At least two patients reported this negative response as the reason why they stopped reminding subsequent HCPs they encountered, and two different patients reported a decrease in confidence with reminding an HCP after study completion. On the contrary, at least three patients reported being more likely to speak up when the reminder was regarded as appreciated and supported by the HCP. These responses highlight that the success of a patient-driven intervention depends in part on HCP perceptions, which historically have not always been favourable towards patients or patient family member involvement in hand hygiene interventions (Davis et al, 2014; Lastinger et al, 2017; Sande-Meijide et al, 2019).

A significant percentage of patients cited simply forgetting to remind the HCP during at least one encounter. Because patients only received the instruction to initiate the reminder at the beginning of the study, a higher percentage of patients may have performed the intervention if a reminder was offered during subsequent encounters. In addition, the initial instruction the patients received seemed also to improve general hand hygiene knowledge, as all but one patient correctly answered every hand hygiene knowledge question on the post-study survey, an improvement of 16%. In a study published in 2017 centred around outpatient diabetes care centres, increased patient hand hygiene knowledge was directly correlated with an increased likelihood to speak about hand hygiene to the HCP (von Lengerke et al, 2017). These findings suggest repetitive hand hygiene reminders and education directed at patients may inadvertently improve HCP hand hygiene compliance rates.

The primary strength of this study is the use of patients to observe covertly the behaviours of multiple types of

HCPs, as opposed to limiting the observation to physicians and nurses. Without the use of patients, it would be difficult to obtain an accurate account of HCP practices, because direct observation by a third party would result in the Hawthorne effect as well as a disruption in the privacy of the patient–provider interaction. Observation of HCPs from multiple departments allows for multidisciplinary opportunities for improvement throughout the cancer treatment centre, as opposed to isolated future interventions.

This study has several limitations. Given the pilot nature of the study, the sample size was small resulting in an underpowered study, largely due to the limited number of study authors, time frame and available funding. While the results of this study are not generalisable to the public, the authors hope this initial experience may assist others in implementing a patient-empowered strategy for improving hand hygiene compliance in the ambulatory setting. The study is also limited by observation and recall bias due to its reliance on patient responses. Initial delivery of hand hygiene education and intervention instructions for patients was standardised, but it was not demonstrated or repeated at subsequent encounters. Given that it was not practical to observe the patients’ interactions with every HCP directly, the accuracy of responses likely fluctuated, particularly during later encounters. Finally, one study author was also involved in encounters with patients, resulting in the potential for the Hawthorne effect, although they represented an extreme minority of all HCPs encountered by patients.

Conclusions

Pilot results from this study suggest that a patient-empowered hand hygiene strategy could improve compliance rates among HCPs in the outpatient setting, although higher powered studies are required to determine the full potential of this intervention. Dedication to fostering a supportive environment for issuing and receiving feedback between patients and HCPs will also be required for sustainable implementation to relieve the emotional burden on patients while maintaining a positive patient–provider relationship. Ultimately, while patient empowerment may be one of many components of improving compliance, the main burden of responsibility should be shouldered by HCPs to ensure patient and provider safety by following the established hand hygiene policy.

Key points

Question: What is the impact of the patient empowerment model on hand hygiene compliance among healthcare providers?

Findings: In this study of 30 patients with 190 healthcare provider encounters, appropriate healthcare provider hand hygiene was observed in 11.6% of encounters without intervention and improved to 48.9% with implementation of this intervention.

Meaning: Patient-empowered hand hygiene is a useful strategy for improving hand hygiene compliance among healthcare providers.

Authors' contributions

Tony Eng: Corresponding author, recruiting patients, analysing data, writing final manuscript.

Nina Eng: Analysing the data and helping write the manuscript. Reviewing and editing final manuscript.

Carol Jenkins: Recruiting patients, following up on patients, reviewing and editing final manuscript.

Patti Grota: Senior author, interviewing patients, analysing data, reviewing and editing final manuscript.

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Appendix I: Glossary of terms and definitions

Appropriate hand hygiene

Definition: Observed hand washing with soap and water or use of the clinic’s waterless alcohol-based, antiseptic scrub.

One encounter

Definition: One scheduled patient visit. The authors note that patients interact with a vastly varying number of healthcare providers (HCPs) during each encounter. Individual interactions were not quantified by the authors or the patients. Examples of encounters include the following:

- Visit with a physician
- Visit with a nurse, nurse practitioner, or physician assistant
- Visit with a radiation oncology therapist
- Visit with a phlebotomist in the laboratory
- Visit with a radiology or radiation oncology technician

Intervention completion

Definition: One or more patient-initiated reminders to the HCP to complete hand hygiene when it was not initially observed during one given encounter. The number of times the patient initiated the reminder during one individual encounter was not quantified, as the number of HCP interactions per encounter was not quantifiable.

Patient reported HCPs’ reactions

Definition: Categorized as positive, neutral, negative or surprised. The following keywords were agreed upon and identified from the patient interview transcripts for categorization:

- Positive: happy, glad, thank you, thank(ed), laugh(ed), smile(d)
- Neutral: absence of positive, negative, or surprised keywords
- Negative: angry, irritate(d), not happy, bother(ed), upset, rude, strange
- Surprised: surprise(d), never asked me before, unusual

Patient discomfort

Definition: Presence of the following keywords identified in the patient interview transcripts: awkward, discomfort, uncomfortable, intimidate(d), difficult, hard, scare(d), scary, offend(ed), bother(ed).