



Major Article

Patient perceptions of chlorhexidine bathing: A pilot study using the health belief model



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Background: Many studies investigating daily chlorhexidine gluconate (CHG) bathing as an infection control intervention to decrease health care–associated infections have focused on reduction of infection and colonization; few studies have assessed CHG bathing compliance, work system factors, facilitators, and barriers to implementation.

Methods: This is a combination retrospective/prospective pilot study conducted at a large academic teaching hospital that implemented daily CHG bathing across all inpatient units. CHG compliance and patient refusal were calculated on the basis of documentation in the electronic medical record. We used the health belief model to guide semistructured interviews with patients about knowledge and barriers related to CHG bathing.

Results: Of the 31 patients interviewed, 74% reported using CHG soap during their stay. Average compliance documented in the electronic medical record was 78% with a range of 57%–91% among all hospital units. Sixteen percent of patients declined CHG bathing, and refusal ranged from 3%–29% among all units. Major themes about CHG bathing from patient interviews include low perceived susceptibility to infection, high degree of trust in medical professionals, low knowledge of benefits of CHG, and low perceived self-efficacy in preventing HAIs.

Conclusions: Educating patients about CHG bathing appears to be a critical factor in decreasing patient refusal of CHG bathing.

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The significant morbidity, mortality, and increased cost of care associated with health care–associated infections (HAIs) have led to substantial efforts devoted to infection prevention through interventions such as daily bathing with chlorhexidine gluconate (CHG).^{1,2} Multicenter, randomized trials and meta-analyses have demonstrated reduced rates of methicillin-resistant *Staphylococcus aureus* colonization and bacteremia, as well as central line–associated bloodstream infections, with CHG bathing implementation.^{3–8} Daily CHG bathing has been widely adopted in intensive care and

non-intensive care unit settings.⁹ Most studies pertaining to CHG bathing have focused on reductions of infection and cutaneous colonization, but there is a paucity of data on compliance with CHG bathing and barriers to implementation.

Reported compliance with CHG bathing varies widely, from 28%–97%, and criteria for compliance are inconsistent, including direct observation, documentation in the electronic medical record (EMR), inventory assessments, and unmentioned criteria.^{10–19} At our academic medical center, we implemented CHG daily bathing across all inpatient hospital wards. Six months after implementation, we found compliance to be 72% based on EMR data and 56% based on inventory assessment.¹⁰ According to EMR documentation, 16% of patients declined CHG bathing at that time. The results from this prior study provided the impetus for our current exploration into the patient perspective of CHG bathing.

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The barriers to successful CHG daily bathing implementation are multifactorial, including organizational and provider- and patient-related factors.²⁰ Although patient refusal is only 1 contributor to compliance, it appears to be a significant addressable barrier.²⁰ To date, patient perceptions and reasons for refusal of CHG bathing have not been examined. The objective of this study was to evaluate patient perception of CHG bathing and identify barriers to successful implementation using the health belief model (HBM) as a guide for asking questions.

METHODS

Our study was a combination retrospective/prospective study conducted at an academic-based regional referral center (505 beds) and home to level 1 pediatric and adult trauma centers. This facility also serves as a regional burn center and is one of the nation's largest transplantation centers. The hospital implemented daily CHG bathing across all inpatient units 2.5 years before the start of this study.

The retrospective and quantitative component of this study consisted of calculating CHG compliance and patient refusal on the basis of documentation in the EMR. We examined compliance from April 2014 through April 2016. A patient was considered "compliant" if he or she received a daily CHG bath, daily CHG-based shower, or preoperative CHG-based bath. We calculated compliance by dividing the total number of recorded patient CHG baths by the total number of patient days for each ward. We defined patient refusals as patients who declined a CHG bath as documented in the EMR. We calculated the refusal rate by dividing the total number of refused CHG baths by the total number of patient days for each ward. We excluded patient data from the following wards owing to differences in bathing schedule, bathing products used, or length of stay: burn intensive care unit, rehabilitation, psychiatry, clinical research, and care initiation unit (a unit for short-stay patients).

The prospective and qualitative component of this study involved interviewing patients. We used the HBM as the theoretical framework to examine patient views on daily CHG bathing and how this affected their perceived role and likelihood of engagement in HAI prevention. The HBM is an ideal framework for explaining and predicting behaviors associated with positive health outcomes, and we believed that the concepts of the HBM fit the aim of exploring what hinders or helps patients comply with CHG bathing.^{21–24} Over time, the model has evolved to include constructs of (1) perceived susceptibility/seriousness, (2) perceived severity (perceived threat), (3) perceived benefits, (4) perceived barriers, (5) cues to action, and (6) self-efficacy.^{21,24} The HBM has been validated and used as a tool to describe adoption of preventative behaviors, illness prevention, sick role behaviors, patient safety, and patient involvement in treatment.^{22–25} Constructs of the HBM as they are defined for our study are as follows:

- 1 *Perceived seriousness/susceptibility*: The patient's subjective assessment of developing an HAI. Example interview question: "How likely do you think you are to get a new infection during your current hospitalization?"
- 2 *Perceived threat*: The patient's assessment of the severity of HAIs and their potential consequences. Example interview question: "What do you see as consequences of getting a new infection in the hospital?"
- 3 *Perceived benefits*: The patient's assessment of the potential outcome and effectiveness of daily CHG bathing. Example interview question: "What are reasons why you would want to bathe with chlorhexidine soap?"
- 4 *Perceived barriers*: The patient's assessment of potential risks of treatment and barriers to daily CHG bathing. Example interview

question: "What are reasons that you would choose not to bathe with chlorhexidine soap?"

- 5 *Perceived self-efficacy*: The patient's perception of ability to modify his or her risk of acquiring an HAI. Example interview question: "Do you feel like you personally have a role in reducing your risk of getting a new infection in the hospital?"
- 6 *Cues to action*: A trigger to prompt engagement in daily CHG bathing. The strength of the necessary cue may vary based on patient perception of the constructs.

We conducted semistructured interviews of inpatients at our 505-bed academic medical center in Madison, Wisconsin, in May–June 2016. The inclusion criteria were length of stay >1 day, CHG bath offered the day of or the day before the interview (shown in the EMR), adults aged ≥18, English speaking, and ability to converse. We identified patients using the EMR by purposive sampling from general medicine and surgical wards. Our institutional review board considered this work as quality improvement and exempted it from review. All study participants verbally consented to participation.

Using an interview guide based on the HBM, we used a semistructured format to conduct interviews in patient rooms. This interview guide contained general prompts with optional probes to encourage conversation and elicit patient perception. Questions were broadly framed using constructs of the HBM and were modified by the study team based on 2 pilot interviews.

Immediately after the interview process, a single individual transcribed all interviews. An additional team member regularly reviewed transcribed interviews to ensure fidelity to the interview guide. Two team members performed line-by-line coding followed by thematic analysis using Dedoose software, 2015 version 6.1.18 (SocioCultural Research Consultants LLC, Los Angeles, CA). We assessed codes for recurrent themes, and we extracted illustrative quotations from the data set.

RESULTS

Calculated compliance and refusal rates

Based on available EMR data between April 2014 and April 2016, average compliance for patients across all units was 78%. Compliance among individual wards ranged from 57%–91%. Based on our criteria for refusal, 16% of patients across all units declined CHG bathing during these 2 years. Between wards included in the study, refusal ranged from 3%–29%.

Patient interviews—Demographics and CHG compliance

We interviewed 31 patients: 15 (48%) were men, and 16 (52%) were women (Table 1). The mean age of participants was 57.5 years (standard deviation = 17.0). One-third of patients had a previous history of an HAI. Seventy-four percent of patients reported using CHG soap at some point during their current hospitalization. For 3 patients, a CHG bath was recorded in the EMR, but the patient could not recall receiving one. Only 11 patients reported receiving education about the importance or rationale for CHG bathing in the hospital. Except for 1 patient who reported dry skin, no patients reported an adverse reaction to CHG bathing.

Patient interviews—Refusal

Of the 8 patients interviewed who did not receive CHG baths, 5 reported that they were not offered or were unsure if they were offered CHG bathing. Of the 3 who were offered CHG bathing, 1 patient refused it because she wanted to use her own personal soap, 1 patient "didn't feel up to" bathing in general, and the other patient

Table 1
Characteristics of patient participants

Characteristic	Participants (%)
Age	
≤40 y	3 (10)
41–50 y	7 (23)
51–60 y	7 (23)
>60 y	14 (45)
Sex	
Men	15 (48)
Women	16 (52)
Race/ethnicity	
White	26 (84)
African American	3 (10)
Asian	1 (3)
Hispanic or Latino	1 (3)
Education	
<High school	1 (3)
High school	8 (26)
Some college	8 (26)
Bachelor degree	6 (19)
Associate degree	3 (10)
Master degree	3 (10)
Graduate degree	2 (6)
Employment	
Retired	7 (23)
Disability	7 (23)
Current or former health care worker*	5 (16)
Student	2 (6)
Currently employed, not in health care	12 (39)
Unit type	
Medical	19 (61)
Surgical	12 (39)
ICU status	
ICU	3 (10)
Non-ICU	28 (90)
History of HAI	
Yes	10 (32)
No	21 (68)
Current HAI	
Yes	4 (13)
No	27 (87)
Patient reported CHG bathing during hospitalization	
Yes	23 (74)
No	8 (26)
Patient was taught why CHG is used in the hospital	
Yes	11 (35)
No	18 (58)
Unsure	2 (6)

CHG, chlorhexidine gluconate; HAI, health care–associated infection; ICU, intensive care unit.

*Includes nurse, certified nursing assistant, emergency medical technician, employee of public health department, and employee of health and human services. Overlap between former health care worker and currently employed, but not in health care.

refused CHG bathing because she knew she was being discharged the following day. None of the patients interviewed refused CHG bathing based on a characteristic of or concern with a CHG product.

HBM THEMES

Theme 1: Patients perceive low susceptibility to acquiring an HAI in the hospital. Although all patients reported that it was very important for health care institutions to take measures to prevent infections, most said that they were personally unlikely to acquire an infection during their current hospitalization (Table 2, Quotation 1). Many patients noted that they were unlikely to get an infection because of the cleanliness of the hospital itself, as well as the hygiene practices of the staff they observed (Quotations 2–3). Several patients stated that they did not feel like they had to shower or bathe in the hospital in general, especially if they anticipated that their stay would be

short. Other patients cited personal factors lowering their likelihood of getting an HAI, including their personal hygiene practices and perceived strong immune systems (Quotations 4–5). Several patients reported, primarily because of their presenting health problem, that they had not thought about the possibility of acquiring a new infection in the hospital (Quotations 6–7).

Theme 2: Patients report a high degree of trust in medical professionals. Patients discussed an important level of trust in the health care professionals caring for them during their hospitalization (Quotations 8–11). Furthermore, these patients expressed their willingness to comply with medical recommendations (Quotations 10–11), saying, for example, “If there’s certain things nurses or doctors tell me I should do that will help, then as someone who doesn’t want to get more sick, I should do those things” (Quotation 10). A sentiment shared by most interviewed patients not using CHG soap was that they would use it if their doctor or nurse recommended it.

Theme 3: Low knowledge of potential benefits of CHG bathing is a barrier to its use. Only 35% of patients reported receiving education about CHG bathing. Consequently, patients lacked knowledge about risks and benefits of CHG bathing. Many patients lacked cues to action. One patient not using CHG soap stated, “Since I don’t use it, I don’t know what the benefits are. I don’t know how it’s useful” (Quotation 12). Several patients had CHG soap in the room unopened and were unaware of its purpose (Quotation 14). Some patients were told to use CHG soap without understanding its purpose, and 1 patient noted that he bathed with it only because he was told to (Quotation 13). Education was the primary barrier identified during interviews for most of the patients who had declined CHG bathing, as supported by patients making statements such as “I would use it more now that I know what it’s about and what I would be treated for” (Quotation 15).

Patient education regarding CHG bathing appeared to differ by ward. A nursing manager for one unit noted that there was high turnover of nursing assistants, the individuals providing most of the CHG education and administering CHG baths. As a result, some of the nursing assistants were not thought to be as knowledgeable about CHG bathing and could not provide high-quality teaching to patients. Another unit’s nursing manager noted that there was a culture of expectation for patients to receive CHG bathing daily. If a patient refused CHG bathing with a nursing assistant, then the nurse would talk to the patient, followed by a clinical nursing specialist. As a result, this unit had a relatively high rate of compliance compared with that in other units.

Theme 4: Patients report low perceived self-efficacy in HAI prevention. Although only 5 patients (16%) said directly that they had a limited role in reducing their risk of getting an infection in the hospital, a greater number indicated they did not know what they could do to prevent infection. These sentiments are exemplified in this statement: “I’m not sure exactly how I would go about preventing any kind of risk. I’m the one that’s sick” (Quotation 16). Like the ideas shared in Theme 2 (trust in health care professionals), statements of several patients supported a belief that the hospital staff and environment were responsible for reducing risk of HAIs (Quotations 19–20).

This theme is especially pertinent for independent bathers, who constitute 42% of this study’s participants. Unlike patients who receive partial or full assistance in bathing, there is no nursing assistant to ensure that correct bathing protocol is being followed. One clinical nursing specialist noted that there has been concern on some of the units that patients who bathe independently did not use all supplies.

DISCUSSION

The main themes elicited from our interviews with patients regarding daily CHG bathing included low perceived susceptibility

Table 2
Themes identified and illustrative quotes from patients

Themes	Topics	Illustrative quotation*
Patients perceive low susceptibility to acquiring a HAI	Low perceived susceptibility to infection	(1) Oh, I don't think I'll get more infection here. [29]
	Patients' perception of external factors	(2) I don't think very likely. It seems pretty clean around here. [20] (3) They asked me if I wanted one (a bath) and I said no. I'm a part-time farmer, and we come out of the barn when we're dirty and shower up in the house. But here, I feel like I'm on extreme clean premises and I didn't need it. [23]
Patients report a high degree of trust in medical professionals	Patients' perception of personal characteristics	(4) I don't think I'm likely because I wash my hands a lot. [4] (5) If you look at my health history, I'm a pretty strong individual. I can go 2 years without catching the common cold. [27]
	Low priority of potential infection for the patient	(6) I really haven't given it much thought, so I'm not very concerned. [25] (7) I have other things I'm more worried about at this point. [28]
	High degree of trust in knowledge of health care professionals	(8) I would think that the medical personnel is more knowledgeable than I am to know. [9]
Low knowledge of potential benefits of CHG is a barrier to its use	Trust in medical professionals could lead to increased use of health interventions	(9) (You should use CHG soap) If they tell you it's good for you. What I do for a living, hopefully people trust me. They do this for a living—I trust them. [11] (10) If there's certain things nurses or doctors tell me I should do that will help, then, as someone who doesn't want to get more sick: I should do those things. [16] (11) Follow instructions from the doctors and nurses. That's what I think. [29]
	Patients often do not receive education about CHG benefits	(12) Basically, since I don't use it, I don't know what the benefits are. I don't know how it's useful. [1]
Patients report low perceived self-efficacy in HAI prevention	Lack of cues to action	(13) (I bathe with it) Because they told me to. I'm being honest. They said, "This is what we do, you can do it or we can do it." [22] (14) That (bottle of CHG) was just brought in and sat down and nobody even said what was in there. [7] (15) I would use it more now that I know what it's about and what I would be treated for. [30]
	Patients are unsure of potential role in HAI prevention	(16) I'm not sure exactly how I would go about preventing any kind of risk. I'm the one that's sick. [19] (17) Patients have a responsibility to a certain extent for what they do in the hospital, and of course some things are outside of your control. [28] (18) What can the patient do besides wash their hands? I mean, really. [30] (19) I'm not sure what that role would be just because they've made it so simple here. They keep it so clean. [11]
	Perception that patients have no role in prevention of HAIs	(20) In my mind, a patient wouldn't have to do with catching it (an infection) in the hospital. [30]

CHG, chlorhexidine gluconate; HAI, health care–associated infection.

*Numbers in brackets after illustrative quotations are participant study numbers.

to infection in the hospital, a high degree of trust in medical professionals, low knowledge of potential benefits of CHG, and low perceived self-efficacy in preventing HAIs. Given the high degree of trust patients reported in medical professionals, it may be beneficial to emphasize CHG bathing as a treatment recommended by doctors and nurses during patient education. Our institution changed from using the term *bath* to using the term *chlorhexidine treatment* with patients shortly after our data collection was completed.

It is concerning that only 35% of patients reported receiving CHG education, because this has been an institutional emphasis and highlights the need for improved education of nursing staff and subsequently patients. Teaching patients, especially patients who use CHG independently from nursing staff, the potential benefits of CHG bathing may help increase perceived self-efficacy in preventing certain HAIs. Educating patients may start with a systematic way to educate and update staff members who are providing the “bath” or “treatment” and a way to continually educate new employees to the unit. We are developing and implementing the use of a readily available script when talking with patients about the risks and benefits of CHG bathing.

It is important to note that patient factors such as patient acuity or a patient's level of care influence the level of nursing care required, which in turn influences options for CHG bathing and the decision to carry out a CHG bath. If patients have urgent care needs, CHG baths are more likely to be delayed.

Documented compliance with CHG bathing improved at our institution from 72% during the first 6 months of implementation to 78%

in the 2-year span before conducting this study. The observed patient refusal rate of 16% is difficult to interpret because documentation may not reflect actual practice of patient refusal, and charting options at the time of this study did not identify the reason for patient refusal of CHG. To better assess CHG compliance and refusal going forward, our institution has changed charting options in the EMR to address refusal of CHG treatment versus refusal of hygiene in general.

No previous studies have examined patient perceptions of CHG bathing, although several have assessed perceptions of nursing staff and other members of the health care team.^{10,11,20} These studies identified patient factors as important barriers to successful implementation. Hines et al¹¹ surveyed nurses and patient care technicians electronically and identified patient refusal as a major barrier to daily CHG bathing implementation, more so than reluctance or refusal of nurses. Musuuza et al²⁰ conducted semistructured interviews with nursing staff and health care technicians and found that patient factors including clinical stability, patient refusal, presence of intravenous lines, and general hygiene primarily influenced the provider's decision to use or not use CHG soap.

Patient engagement has been shown to be important in improving patient health outcomes and has a possible role in reducing health care costs.^{26–28} Our data demonstrate a need for greater patient education and engagement in CHG bathing. Potential means to increase patient engagement as identified in our interviews include teaching the value of CHG bathing, emphasizing CHG as a treatment recommended by nursing staff and physicians, and encouraging patients to take an active role in this aspect of their medical care. Although there will be an upfront time investment in creating a systematic way to

teach nursing staff to teach patients, the subsequent amount of time it will take to discuss CHG bathing with patients will be minimal when compared with potential costs of not receiving the treatment.

Our pilot study had several limitations, including a small sample size. In addition, our method of documenting refusal likely resulted in underestimation of refusal rate because nursing staff may not document patient refusal for every patient who declines CHG bathing, and it is also unclear whether patient refusal that is documented signifies patient refusal of CHG versus refusal of bathing in general. These limitations highlight the need for improved documentation options in the EMR to better monitor CHG bathing implementation. Because the clinical nursing specialist or nurse manager on each unit was aware of this CHG quality improvement project, it is possible that there was greater emphasis on patient CHG usage and education on days that patient interviews were conducted. Future research should include a larger sample size to be able to compare patient demographics with understanding of CHG and to link findings about patient perceptions of CHG bathing with patient outcomes.

CONCLUSIONS

Our pilot findings strongly suggest that many patients were not provided adequate education about daily CHG bathing; therefore, patients were not likely to understand benefits or risks. These findings have important implications for infection preventionists, nurses (nurse managers, nurse educators), and physicians. Key themes from patient interviews pertain to the need for education (both patients and staff) about CHG bathing, the necessity of building on the trust patients have in medical professionals, and addressing patient self-efficacy when it comes to knowing how to prevent infections while in the hospital. Addressing these 3 perceptions may allow for increased patient engagement in the CHG bathing process, which in turn may increase patient understanding and compliance.

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