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## Review article

## Patient-centered hand hygiene: The next step in infection prevention

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Patient safety  
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Hand hygiene has been recognized as the most important means of preventing the transmission of infection, and great emphasis has been placed on ways to improve hand hygiene compliance by health care workers (HCWs). Despite increasing evidence that patients' flora and the hospital environment are the primary source of many infections, little effort has been directed toward involving patients in their own hand hygiene. Most previous work involving patients has included patients as monitors or auditors of hand hygiene practices by their HCWs. This article reviews the evidence on the benefits of including patients more directly in hand hygiene initiatives, and uses the framework of patient-centered safety initiatives to provide recommendations for the timing and implementation of patient hand hygiene protocols. It also addresses key areas for further research, practice guideline development, and implications for training of HCWs.

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In efforts to prevent infection and improve patient safety, one area of priority focus has been the improvement of hand hygiene compliance health care workers (HCWs). This focus has included significant wide-reaching initiatives, including the World Health Organization (WHO) 5 Moments for Hand Hygiene and the Centers for Disease Control and Prevention (CDC) hand hygiene guidelines.<sup>1,2</sup> Continuing technological innovation has resulted in improved monitoring options to evaluate hand hygiene activity, and the widespread use of alcohol-based hand rubs (ABHRs) have increased the availability and tolerability of hand hygiene products. To date, initiatives aimed at improving hand hygiene have primarily targeted HCW practices, without full consideration of the patient and the patient's caregiver network. However, emerging evidence suggests that most infections occur as a result of bacteria present within the patient's own flora and bacteria present on surfaces within the health care environment. Because patients and HCWs touch surrounding items and surfaces, including patients in the performance of hand hygiene could decrease pathogen transmission and the risk of health care–associated infections (HAIs).

In this review, we provide an overview of previous efforts to include patients in hand hygiene activities, highlight the importance of patient hand hygiene as a means to prevent infection, and frame patient hand hygiene in the context of a patient-centered safety initiative. After reviewing current approaches, we advocate for the development and implementation of strategies to include patient hand hygiene as part of routine care. Although the role of the patient in hand hygiene as a means to prevent infection has been recommended by others, this review suggests that patient hand hygiene remains an underused method of preventing HAIs. Existing clinical practice guidelines, recommendations for clinical application, and implications for HCW training and education are identified.

For the purpose of this review, patient hand hygiene is defined as hand hygiene practices performed by the patient on his or her own hands, including handwashing, use of ABHRs, and use of disinfecting wipes. In certain situations, this care may need to be provided to patients by professional caregivers or family members.

## HISTORICAL PERSPECTIVE

It is well documented that the hands of HCWs are involved in the transmission of health care–associated pathogens. Transmission via the hands of HCWs accounts for a high proportion of HAIs, and improvement of hand hygiene practices has been linked to reduced transmission of health care–associated pathogens and reduced infection rates.<sup>3–8</sup> Current evidence clearly indicates that increasing hand hygiene compliance directly results in a reduction in HAIs, and

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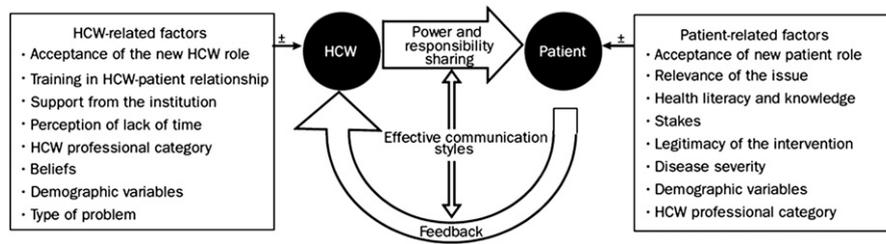


Fig 1. Conceptual model of factors influencing patient participation in preventing errors. (Reprinted with permission.<sup>24</sup>)

both the CDC and the WHO consider hand hygiene the most important measure for preventing HAIs and the spread of pathogens.<sup>1,2</sup>

To date, hand hygiene guidelines and policies have focused primarily on HCWs.<sup>1,2</sup> In light of strong evidence supporting the role of HCW hands in HAI transmission, the major focus of studies regarding the role of patients in hand hygiene has been on patients as monitors or auditors of HCW hand hygiene. The primary goal of including patients in hand hygiene has been to improve HCW hand hygiene compliance, and various campaigns have been created to involve patients as monitors of hand hygiene.

In the United States, the Joint Commission's "Speak Up" program urges patients to take a role in preventing health care errors by becoming active, involved, and informed participants in the health care team.<sup>9</sup> The Joint Commission publication "Five Things You Can Do to Prevent Infections" instructs patients to ask HCWs to clean their hands before any treatments and provides recommendations on when and how patients should clean their own hands.<sup>9</sup>

Internationally, various campaigns have been created to include patients as observers of hand hygiene. In 2009, the "Save Lives: Clean Your Hands" campaign, an extension of the 2005 "Clean Care is Safer Care" WHO Patient Safety Challenge, was launched to stimulate international efforts in promoting hand hygiene compliance among HCWs in an endeavor to reduce HAIs.<sup>10,11</sup> The Save Lives campaign, which promoted My 5 Moments for Hand Hygiene for HCWs, also recommended that patients ask HCWs to wash their hands in an effort to improve hand hygiene practices among HCWs.<sup>11</sup> In the United Kingdom, the National Patient Safety Agency initiated the "Cleanyourhands" campaign, aimed at best practices in hand hygiene compliance among HCWs, with an emphasis on performing hand hygiene "at the right time and in the right place."<sup>12</sup> A central message of this campaign was "It's OK to ask," encouraging patients to ask HCWs whether they had performed hand hygiene before providing patient care.<sup>13</sup> Canada's Patient Safety Institute initiated a national hand hygiene campaign, "Stop! Clean Your Hands," which specified 4 moments for HCWs to wash their hands and addressed the patient's role in hand hygiene.<sup>14</sup>

The literature suggests that patient participation programs can help to increase HCW hand hygiene compliance. For example, 2 studies found that when patients were encouraged to ask HCWs if they performed hand hygiene, soap consumption increased by 34%<sup>15</sup> and 50%,<sup>16</sup> reflecting increased hand hygiene among HCWs. Similarly, McGuckin et al<sup>17</sup> reported a 94% increase in hand hygiene events when patients asked whether HCWs performed hand hygiene. Although initiatives that engage patients as monitors of hand hygiene have yielded positive results, the long-term sustained effect on hand hygiene compliance and impact on infection rates remain unknown.

A positive byproduct of these efforts has been the inclusion of patients in health care activities and decisions related to their own safety. Empowering patients to become partners in ensuring safe care has been described as patient collaboration, patient involvement, partnership, and patient-centered care. Studies have shown that patients are willing to participate in hand hygiene programs,

but that their participation often depends on the type of program and how it was developed.<sup>15-23</sup> For example, Longtin et al<sup>21</sup> found that of 198 patients asked to participate in the promotion of HCW hand hygiene compliance, approximately 75% did not feel comfortable asking their nurse or physician to perform hand hygiene. However, when HCWs invited patients to ask about HCW hand hygiene, 83% of patients felt comfortable asking nurses and 78% felt comfortable asking physicians.<sup>21</sup> However, despite patients' apparent willingness to participate, McGuckin and coworkers<sup>15-17</sup> reported that only 60%-70% of patients actually ask their HCW about performing hand hygiene.

Including patients in their care has been used as a strategy to promote medication adherence, improve patient safety after surgery, and foster open communication with health care providers.<sup>24</sup> A variety of factors influence the willingness of HCWs and patients to share responsibility for patient care (Fig 1). Factors that influence patient participation in patient safety include behavioral aspects, attitudes, norms, and beliefs, as well as perception of the risk of infection<sup>25</sup>; for example, it has been suggested that having an extroverted personality may increase a patient's willingness to participate in hand hygiene monitoring.<sup>21,26</sup> However, only 55% of highly extroverted patients in one study reported that they would always ask their nurse about hand hygiene.<sup>26</sup> Other patient factors associated with willingness to act as monitors of HCWs hand hygiene activities are shown in Table 1.

The trend of including patients in safety initiatives is growing.<sup>27</sup> Major organizations involved in patient safety, including Health Canada and the Joint Commission, have published brochures that instruct patients on how to help prevent care errors through appropriate communication and behaviors.<sup>9,28,29</sup> Including patients as active participants in their care appears to have much potential for improving patient safety.<sup>20,21,24,25,30,31</sup> Patient participation in disease-management programs has been shown to be effective for asthma and type 2 diabetes, resulting in better disease control and improved patient outcomes.<sup>21</sup> A review of patients' ability to influence physician decisions found that patients who asked for a prescription were 3 times more likely to get it than those who did not, and patients who asked for a referral were 4 times more likely to receive one than those who did not.<sup>21</sup> Finally, a systematic review of patient-centered safety research by Schwappach et al<sup>25</sup> suggested that successful interventions had some common key features: they directly engaged the patients' perspectives, used multiple measures to promote complex behavior change, emphasized the patients at the center of care, and encouraged staff to engender and maintain a trusting relationship with their patients. Thus, patient hand hygiene can serve as an important measure to prevent infection, and also may advance broader patient engagement in safety initiatives.

Increasing patient safety through increased patient engagement and empowerment presents a potential paradox.<sup>32</sup> Along with the desire to improve patient outcomes, there is concern that patients may feel an undue burden for their own safety in these campaigns, and that such perceptions could undermine trust.

**Table 1**  
Factors associated with patient willingness to participate in prompting HCWs to perform hand hygiene

Factor	Reference
Factors that may influence a patient's willingness to participate in hand hygiene monitoring	
Extroverted personality	Longtin et al <sup>21</sup> ; Duncanson and Pearson <sup>26</sup>
Internal control belief (that he or she can control HCWs' hand hygiene behavior)	Davis et al <sup>77</sup>
Age	Duncanson and Pearson <sup>26</sup>
Awareness of severity of HAIs	Longtin et al <sup>21</sup> ; Davis et al <sup>77</sup>
Invitation from HCW to ask about hand hygiene	Longtin et al <sup>21</sup>
Religious beliefs	Longtin et al <sup>21</sup>
Provision of alcohol-based hand sanitizer to patient	Pittet et al <sup>19</sup>
Factors that may limit a patient's willingness to participate in hand hygiene monitoring	
Assumption that HCWs had already cleaned their hands	Pittet et al <sup>19</sup>
Older age	Duncanson and Pearson <sup>26</sup>
Feeling uncomfortable asking about hand hygiene	Longtin et al <sup>21</sup>
Trust that HCW would perform hand hygiene	Pittet et al <sup>19</sup>
Role of HCW (physician vs nurse)	McGuckin et al <sup>16</sup>
Factors not shown to be related to willingness to participate	
Previous hospitalizations, infection, or isolation	Duncanson and Pearson <sup>26</sup>

Despite this paradox, evidence suggests that patient participation does yield positive results, and that most patients are willing and able to participate in their own hand hygiene. Accumulating evidence suggests that attention to patient hand hygiene can play a critical role in preventing the spread of infection, because patients can be involved in the spread of pathogens through multiple routes.

#### EMERGING PERSPECTIVE

Patients may be involved in the transmission of pathogens and HAI risk in 4 significant ways: through the transfer of pathogens within the environment, by directly spreading pathogens to other patients, by cross-contamination through direct contact with HCWs, and by increasing their own risk of infection from an endogenous source. Organisms residing on the skin can be transferred by hands to other surfaces; thus, patients' hands can transfer pathogens to HCWs, to their surrounding environment, to other patients, and to high-risk areas on their own bodies, such as incision sites, healing surgical wounds, access sites of invasive and intravascular devices, and the mouth.<sup>33-35</sup> This underscores the importance of patients in the carriage and transmission of organisms capable of causing HAIs.

In the hospital environment, patients diagnosed with HAIs, such as infections with *Clostridium difficile*, vancomycin-resistant *Enterococcus* (VRE), and methicillin-resistant *Staphylococcus aureus* (MRSA), contaminate their surrounding environment.<sup>33,34,36</sup> In particular, bacterial contamination has been detected on various high-touch environmental surfaces, such as bed rails, bedside tables, call buttons, toilet seats, and phones in patient rooms.<sup>33,34,36</sup> In addition, asymptomatic carriers of health care-associated pathogens also contribute to contamination of the hospital environment. In the case of *C difficile*, patients may continue to shed spores into the environment for 5-6 weeks after symptoms have resolved and antibiotic treatment has been stopped.<sup>36</sup> Health care-associated pathogens can survive on inanimate hospital surfaces for months and can be transferred via hands to other objects.<sup>37-42</sup>

Cleaning and disinfection regimens do not always eliminate pathogens from surfaces.<sup>43-49</sup> The presence of soil combined with the need for proper surface coverage and adequate disinfectant contact time makes proper disinfection a challenge in health care settings. Although existing policies may contain appropriate recommendations, actual disinfection practices may be inconsistent within an institution. Consequently, pathogens shed into the environment might persist despite disinfection and/or cleaning regimens. As a result, a patient is at greater risk of acquiring an antibiotic-resistant organism when admitted to a room previously

occupied by a patient infected with such a pathogen.<sup>50-52</sup> The presence of pathogens in the patient environment make the patients' hands an important vehicle for transmission of organisms to HCWs, other susceptible patients, environmental surfaces, or even their own wounds or invasive devices.

Patients not only contaminate their environment with the organisms that they may be carrying, they also can acquire pathogens from the environment and through contact with HCWs. It is widely believed that many patients who acquire an HAI become infected with strains originating from their own skin and flora.

Antibiotic-resistant organisms such as VRE, MRSA, *Acinetobacter* spp, *C difficile*, and *Pseudomonas aeruginosa* can be detected on the skin in such areas as the groin, arms, abdomen, chest, and hands.<sup>34-36,53</sup> Organisms residing on the skin can be readily transferred by the hands to other surfaces,<sup>33-35</sup> again highlighting the importance of patients in the carriage and transmission of health care-associated pathogens. There is also strong evidence that patients may play a more important role than HCWs in pathogen transmission to other patients. For example, patient-indexed cases of norovirus were associated with significantly more cases compared with staff-indexed cases (39.5 cases/patient-indexed vs 24.3 cases/staff-indexed), and exposure to an infected patient was associated with a markedly increased risk of developing norovirus infection compared with exposure to an infected staff member (odds ratio, 4.8).<sup>54</sup> Thus, patients can play a key role in transmitting pathogens to other patients.

Even though a complete picture of the role of patients' hands in the transmission of HAIs has not yet emerged, the literature strongly reinforces the need for patient hand hygiene programs. This appears to be true for patients with known HAIs as well as those otherwise assumed to be uninfected; for example, in one study, fecal coliform colonization was detected in 20.4% of patients in a general medical ward and 35.8% of patients in a spinal ward.<sup>55</sup> Hospitalized patients are more likely to have antibiotic-resistant organisms as part of their normal flora compared with outpatients.<sup>56</sup> One study reported that after 7 days in a hospital, 62% of all patients were positive for enterococcal hand contamination, compared with 10.7% of nonhospitalized adults.<sup>57</sup> Similarly, Istenes et al<sup>58</sup> found that 39% of patients had at least one hospital-associated pathogen on their hands within 48 hours of admission. Although whether these patients' hands were contaminated on admission was unknown, this study supports patient hands as an important source of contamination. Taken together, these studies suggest that the entire patient population should be included in hand hygiene. Patient hand hygiene may prove to be a critical aspect in HAI prevention, given the role of infected and even uninfected patients in transmitting pathogens to

the environment, to HCWs and to other patients, and through infections originating from their own flora.

Regarding the reported discomfort many patients experience monitoring HCW hand hygiene, initiatives that focus on patient hand hygiene may help them overcome this discomfort and allow them to more fully engage as active participants in other aspects of their care as well in HAI reduction. Literature focusing on the engagement of patients in their own hand hygiene is sparse, however. As early as 1983, Lawrence<sup>59</sup> speculated on the importance of patient hand hygiene, and in 1995, Burnett et al<sup>60</sup> suggested that patient hand hygiene could play an important role in infection control. Yet, only 10 years later, a literature review by Banfield and Kerr<sup>61</sup> reported a dearth of studies focusing on patient hand hygiene and urged an increased focus on this topic.

This call to action has remained largely unaddressed, however. Few studies have examined the possible impact of patient hand hygiene practices on the reduction of HAIs, although the existing reports are compelling.<sup>62</sup> In one notable study, Gagne et al<sup>63</sup> evaluated a comprehensive approach that included greeting patients and visitors at the door, explaining the importance of hand hygiene, and instruction on the proper use of ABHRs. The program was well received by patients and families, with "virtually all" participating, and produced a 51% reduction in the total number of MRSA infections and a 71% decrease in overall mortality from MRSA over a 1-year period. Interestingly, implementing the patient-centered hand hygiene program was also associated with an ~30% increase in HCWs' compliance. Grabsch et al<sup>64</sup> also indicate that patient hand hygiene could play a significant role in reducing VRE contamination, and in another study, supervised use of ABHR every 4 hours by psychiatric patients was associated with a decrease in the number of unit-based respiratory outbreaks from 4 per year to 1 per year and a decrease in cases of respiratory illness from 60 to 6.<sup>54</sup>

There are few published descriptive studies on patients performance of hand hygiene. One observational study conducted during peak visiting hours in 27 wards in 9 hospitals reported that out of 290 total observed uses of soap or alcohol-based hand rub, not one of them was by a patient.<sup>65</sup>

To address the need for patient hand hygiene, Ward<sup>62</sup> proposed a range of strategies to better promote patient hand hygiene. Although some studies have suggested that patients' poor hand hygiene can be attributed to lack of knowledge, perceived importance (as demonstrated by HCWs), impeded movement, and physical impairments, the fundamental question may be whether or not patients are encouraged to clean their hands at all.<sup>61,62,66,67</sup> Prompted by anecdotal reports of patients not being regularly offered hand wipes intended for patient use at a hospital on the Isle of Wight, Whiller and Cooper<sup>67</sup> conducted a small study to identify whether patients were offered hand-cleansing resources after using the commode. They found that only 50% of patients were always offered hand hygiene resources after using the commode, and 31% of patients were never offered them. After the introduction of staff reminders and readily accessible resources, all patients reported having resources offered to them at least some of the time, and the percentage of patients who were always offered hand hygiene resources rose from 50% to 85%.<sup>67</sup>

The perception of support and/or importance of patient hand hygiene also may play a role in promoting patient hand hygiene behavior. In one study, 64% of nurses reported offering hand hygiene to patients, but only 15% of patients recalled being offered the opportunity for hand hygiene.<sup>60</sup>

Although few formal programs exist, both patients and HCWs seem to recognize the importance of hand hygiene. Burnett et al<sup>60</sup> solicited nurses' and patients' perceptions about hand hygiene and whether nurses encouraged and offered assistance with hand hygiene to patients. They found that although nurses and patients

alike (100% and 95%, respectively) believed that handwashing is important in preventing infection, hand hygiene assistance was offered only once by a nurse in 75 patient hand hygiene opportunities observed.<sup>60</sup> Burnett et al<sup>68</sup> followed that study with an effort to correlate self-reported attitudes with behavior in support of patient hand hygiene, and found that despite nurses' acknowledgment of the importance of patient hand hygiene as an important component in controlling and preventing HAIs, patients were not consistently provided with assistance in performing their own hand hygiene.<sup>68</sup>

Patient performance of hand hygiene has been reported as an example of patient involvement in the care process by many authors and organizations, including the WHO Alliance for Patient Safety, the Joint Commission, and the CDC. These organizations have provided limited guidelines for patients' involvement in patient safety and hand hygiene-related practices.<sup>18,21,22</sup> If patient hand hygiene is to become a clinical reality and have an impact on patient safety and the reduction of HAIs, clear guidelines and a range of support must be established to promote patient hand hygiene behavior.

## IMPLICATIONS FOR PRACTICE

In the health care setting, current best practices to promote hand hygiene behavior include the use of multimodal strategies. As with HCWs, successful patient hand hygiene programs will likely require a multimodal approach that emphasizes important features, including the formulation, design, and availability of hand hygiene resources; timing and technique for hand hygiene behavior; education and training of patients and caregivers; monitoring adherence and providing feedback and reminders; and creating a culture of hand hygiene and patient safety among patients, HCWs, and senior hospital personnel<sup>69</sup> (Table 2). For a review of the components of a multimodal strategy, see the article by Pincock et al.<sup>70</sup> in this supplement.

Implementing an effective patient hand hygiene programs relies on the development of a multimodal set of best practice recommendations specific to the role of patients in infection prevention, and the needs and challenges of patients in the health care environment. In particular, further work is needed on specific components of a multimodal patient hand hygiene strategy, including timing and technique for patient hand hygiene; product, design, and placement considerations; best patient education and training strategies; and HCW education and training needs for the implementation of a multimodal strategy.

### *Timing and technique for patient hand hygiene*

Best practice recommendations are needed for the specific indications for patient hand hygiene and steps in hand hygiene. Although guidelines have addressed the timing and techniques of hand hygiene in HCWs, there are few recommendations for both the frequency and methods techniques applicable to patient hand hygiene. Future work should use available resources to develop specific recommendations for the timing of patient hand hygiene, including preferred techniques and products, as well as methods for delivering both patient and HCW education and training. Patient hand hygiene should be implemented in health professional training programs and included in local facility policies and procedures.

For HCWs, recommended indications for hand hygiene have been developed for specific time points or "moments" during patient care. The WHO's 5 Moments for Hand Hygiene include (1) before touching a patient, (2) before an invasive or aseptic procedure, (3) after contact with body fluids or excretions, (4) after touching the patient, and (5) after touching the surrounding environment.<sup>2</sup>

**Table 2**  
Key considerations for future work to promote patient hand hygiene

Content area	Rationale	Specific steps
Timing and technique <ul style="list-style-type: none"> <li>Validate and promote when patients should perform hand hygiene.</li> </ul>	The most critical moments for hand hygiene may differ between patients and HCWs.	<ul style="list-style-type: none"> <li>Research, validate, fortify, and promote the framework identified here.</li> <li>Encourage product providers to research, develop, and trial various options for a patient hand hygiene agenda.</li> </ul>
Product, design, and placement <ul style="list-style-type: none"> <li>Determine some of the key challenges, barriers, and needs specific to the patient.</li> <li>Evaluate appropriate patient product formulation(s) and delivery vehicles.</li> </ul>	Pain, mobility, and confinement contribute to a patient's ability to participate in hand hygiene. The formulations most applicable for patient use may vary from formulations appropriate for HCWs. Likewise, format (eg, rinse, gel, foam, wipe) should be considered with the patient specifically in mind.	<ul style="list-style-type: none"> <li>Identify existing barriers to patient hand hygiene.</li> <li>Encourage product manufacturers to research, develop, and trial various options for a patient hand hygiene agenda.</li> </ul>
Patient education and training <ul style="list-style-type: none"> <li>Provide educational tools for patients and visitors.</li> </ul>	Improving patient hand hygiene requires that patients and HCWs understand the why, how, and when of patient hand hygiene.	<ul style="list-style-type: none"> <li>Leverage existing tools on patient hand hygiene from such resources as the Joint Commission's SpeakUp program, as well as product providers.</li> </ul>
HCW education and training <ul style="list-style-type: none"> <li>Provide education and training to HCWs on the rationale and technique of patient hand hygiene.</li> </ul>	Emphasize the role of HCWs in supporting patient hand hygiene.	<ul style="list-style-type: none"> <li>Assess and develop opportunities within HCW curricular agendas to introduce and fortify a focus on the patient hand hygiene agenda.</li> </ul>
Multimodal strategy <ul style="list-style-type: none"> <li>Identify opportunities to coordinate efforts to promote the need for and methods of patient hand hygiene to participants in the health care setting—HCWs, patients, families, and visitors alike.</li> </ul>	It is not enough to provide the appropriate tools and educate patients and HCWs about patient hand hygiene. The practice also must be actively promoted from various angles and to the full range of health care setting participants to become part of the culture, practice, and behavior of health care, and to contribute to the reduction of HAIs.	<ul style="list-style-type: none"> <li>Apply some of the lessons learned from multimodal strategies intended to change hand hygiene behavior of HCWs. Use posters, displays, reminders, and other components to promote patient hand hygiene across health care settings.</li> </ul>

The most appropriate hand-hygiene opportunities should be identified for patients, which may be significantly different than those recommended for HCWs. For example, it will be important to identify routine patient activities, such as eating or bathroom activities, during which hand hygiene should be performed. Table 3 presents a proposed list of moments for patient hand hygiene based on the timing of exposure to pathogens.

#### *Product design and placement considerations for patient hand hygiene*

Better understanding of patient behavior, with specific attention to the moments for patient hand hygiene, is needed to identify the specific design attributes of patient-focused hand hygiene products. Preferred hand hygiene products and optimal product placement require further exploration. Currently, most commercially available hand hygiene products have been developed specifically for use by HCWs and reflect the frequency with which hand hygiene is performed. Therefore, the formulations of these products are recommended in routine HCW hand hygiene. For patients, specific formulations (eg, efficacy, skin performance), formats (ie, handwash, leave-on, rinse, foam, gel, wipe), and dispensing

systems need to be created and evaluated with the patient specifically in mind.<sup>71</sup> Because of patients' susceptibility to infection and likely fewer opportunities for hand hygiene, clinically effective formulations for patients may differ from those for use by HCWs. In addition, because many patients face unique environmental obstacles in addition to physical challenges, more research is needed on specific product delivery characteristics, including usability, placement, and durability. With this information, hand hygiene manufacturers can then create clinically effective solutions that will be accepted and used by patients.

#### *Patient education and training to support patient hand hygiene*

Further study is needed to determine the best methods of patient education to promote hand hygiene. The same research used to design HCW education and training programs is needed for patients to create solutions that will improve patient awareness, understanding, usage, and compliance. Currently, the Joint Commission requires hospitals to provide patients with information on hand hygiene to patients, which will provide a foundation for growth.<sup>9</sup> The Joint Commission's SpeakUp program includes educational material on measures that patients can take to reduce infections, including handwashing and use of ABHRs.<sup>9</sup> Formal evaluation of these tools and initiatives may provide a basis on which to develop and expand a robust program for educating patients on patient hand hygiene practices.

#### *HCW education and training to support patient hand hygiene*

Efforts to increase awareness of patient hand hygiene among clinicians and health care profession students should be promoted. When evaluating the potential role of HCWs in this equation, an important resource must include the various curricula used to train HCWs. Specifically, the assessment of curricula used to train health care professionals who have significant hands-on care responsibilities, such as physicians, nurses, physical therapists, and

**Table 3**  
Moments for patient hand hygiene

1. After using the toilet, bedpan, or commode
2. When returning to room after test or procedure
3. Before eating, drinking, taking medicine, or putting anything in your mouth
4. When visibly dirty
5. Before touching any breaks in the skin (eg, wounds, dressing, tubes) or any care procedures (eg, dialysis, IV drug administration, injections)
6. Before dialysis, contact with IV lines or other tubes
7. After coughing, sneezing, or touching nose or mouth
8. Before interacting with visitors and after they leave
9. When there is concern about whether hands are clean

respiratory therapists. Although each of these disciplines is unique, with distinct curricular elements, evaluation of the individual curricular elements of each discipline is an important consideration. Based on our review of foundational literature as well as textbooks applied to curriculum supporting front-line roles within health care, a focus on patient hand hygiene appears to be lacking. Coverage of an approach that teaches patients when and how to perform hand hygiene is universally absent from the curricula. Although some hand hygiene product manufacturers have developed tools that can be adapted to teach patients about hand hygiene, specific patient-centered tools have not been integrated into the education of health care professionals.

There are additional considerations involved in engaging patients in their own hand hygiene. Technique, education and promotion, and potential barriers may be unique to each patient's condition. An understanding of the barriers, timing, and other considerations for patient hand hygiene provides an important foundation for the ability to educate about and promote the practice. The adoption of patient hand hygiene as the next important infection prevention measure will require the inclusion of curricular elements that support the goal of improved patient hand hygiene. By applying some of the lessons learned from guidelines associated with the WHO's 5 Moments, as well as work derived from other guidelines established for HCWs and families with regard to hand hygiene practices, we can establish a potential framework for the components of a HCW training curriculum that best recognizes and supports the importance of patient hand hygiene. This work must then be fortified with an understanding of the barriers, timing, formal training in indications and techniques, and other considerations specific to the patient, as well as the principles of patient-centered care as the rationale for patient hand hygiene.

With the patient at the center of this approach, efforts should focus on educational in-services that are patient-centered and promote hand hygiene practices even among the most critically ill patients. Education and training of both patients and HCWs in patient hand hygiene will provide an important foundation for teaching about and promoting the practice.

#### *Importance of a multimodal strategy*

A single intervention is not sufficient to sustain changes in hand hygiene behavior in either patients or HCWs. Accordingly, beyond product design and accessibility considerations, patient and HCW education must be augmented by a range of other supports, such as feedback and visual and verbal reminders (eg, posters, brochures, feedback) that are relevant to and easily understood by patients and their families to support and sustain behavior change. These multiple aspects must be identified and adapted to each individual patient's role in his or her personal hand hygiene (Table 3).

Broad support for the creation of a culture of patient-centered care can promote a shift toward a paradigm of hand hygiene that accepts the importance of the patient's role and places the patient at the center of the patient safety movement.

#### **FUTURE RESEARCH**

HAIs occur in 1.7 million hospitalized US patients every year, causing approximately 100,000 deaths and costing \$6.7 billion annually.<sup>72,73</sup> Yet the focus on hand hygiene as the single most effective means of preventing the spread of infection has primarily targeted HCWs. As a result, patients have been relegated to roles that simply support and encourage hand hygiene practices of others, rather than being engaged as active participants. The evidence presented in this review indicates that this is a significant oversight, but which provides an opportunity for growth.

Twelve years after the launch of the patient safety movement, reports from many health care agencies indicated continued challenges in patient safety.<sup>74-76</sup> An approach promoting a culture of safety and HAI reduction involves everyone, top to bottom, in the process. By necessity, this must include the patient. If "patient-centered care" truly has the patient as the central focus, and patient safety is our top priority, then hand hygiene practices must include patients and their caregiver networks in the process.

Patient hand hygiene represents the next big step in infection prevention and in the evolving field of patient-centered care. This review suggests that including patients in hand hygiene practices has the potential to provide patients with the knowledge and skill to be true partners in their care. Fully addressing the risk associated with HAIs requires the appropriate education, products, techniques, practices, and promotional tools to directly engage our patients to fully participate in maintaining safety and reducing HAIs through their own hand hygiene.

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