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Staff Knowledge, Awareness, Perceptions, and Beliefs About Infection Prevention in Pediatric Long-term Care Facilities

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Abstract

Background—The burden of healthcare-associated infection worldwide is considerable, and there is a need to improve surveillance and infection control practices such as hand hygiene.

Objectives—The aims of this study were to explore direct care providers' knowledge about infection prevention and hand hygiene, their attitudes regarding their own and others' hand hygiene practices, and their ideas and advice for improving infection prevention efforts.

Methods—This exploratory study included interviews with direct care providers in three pediatric long-term care facilities. Two trained nurse interviewers conducted semistructured interviews using an interview guide with open-ended questions. Two other nurse researchers independently transcribed the audio recordings and conducted a thematic analysis using a strategy adapted from the systematic text condensation approach.

Results—From 31 interviews, four major thematic categories with subthemes emerged from the analysis: (a) hand hygiene products; (b) knowledge, awareness, perceptions, and beliefs; (c) barriers to infection prevention practices; and (d) suggested improvements. There was confusion regarding hand hygiene recommendations, use of soap or sanitizer, and isolation precaution policies. There was a robust “us” and “them” mentality between professionals.

Discussion—One essential driver of staff behavior change is having expectations that are meaningful to staff, and many staff members stated that they wanted more in-person staff meetings with education and hands-on, practical advice. Workflow patterns and/or the physical environment need to be carefully evaluated to identify systems and methods to minimize cross-contamination.

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Further studies need to evaluate if personal sized containers of hand sanitizer (e.g., for the pocket, attached to a belt or lanyard) would facilitate improvement of hand hygiene in these facilities.

Keywords

hand hygiene; infection prevention; long-term care; pediatrics

The burden of healthcare-associated infection (HAI) worldwide is considerable (Jackson, Lowton, & Griffiths, 2014), and there is need to improve surveillance and infection control practices such as hand hygiene (Allegranzi et al., 2011). Although hand hygiene is a critical patient safety practice for reducing HAI, adherence to hand hygiene guidelines is often low (Mathai et al., 2010; Pfoh, Dy, & Engineer, 2013; Sax et al., 2009).

Pediatric long-term care facilities (pLTCFs) provide medical care as well as onsite social, academic, and therapeutic activities to medically fragile children with an array of neurodevelopmental disorders and complex physical disabilities. The children in such facilities often stay for prolonged periods, live, and attend school there. They are in close contact with other children, their families, and a wide variety of clinical and nonclinical caregivers, and invasive devices such as tracheostomies and feeding tubes are common. Such factors place these children at particularly high risk for HAI (Flodgren et al., 2013).

Despite this high-risk population, little infection prevention research has been conducted in this unique setting. Several outbreaks, particularly of viral upper respiratory infections, have been reported in pLTCFs across the country (James et al., 2007; Kopel et al., 2010). Between January 2010 and December 2013 in the three pLTCFs included in this current study, we identified 62 outbreaks involving 700 cases in residents and 250 cases in staff (Murray et al., 2015). Furthermore, we conducted a survey at the 2013 Pediatric Complex Care Association Annual National Conference in which pLTCF providers reported infection prevention and control issues of greatest concern in a survey, including the lack of best practice guidelines, multidrug-resistant bacteria, and viral respiratory infections (Murray et al., 2014).

In 2009, the World Health Organization (WHO, 2009) published the *5 Moments for Hand Hygiene*, the first global guidelines for hand hygiene among healthcare professionals:

- before touching a patient;
- before an aseptic/clean procedure;
- after body fluid exposure risk;
- after touching a patient; and
- after touching patient surroundings without touching a patient during the same care episode (Sax et al., 2007).

The guidelines recommend that models to improve adherence must be multimodal and structurally and culturally tailored (WHO, 2009). Although a variety of interventions have been implemented and tested, results to date have been mixed. The most successful hand hygiene promotional strategies in healthcare have focused primarily on activities that facilitate behavioral interventions, change knowledge, perceived risk, individual attitudes,

and accessibility of hand hygiene products, workload, and type of clinical setting (Pfoh et al., 2013).

For the past several years, we have been conducting an intervention trial in three pLTCFs to reduce HAI by improving hand hygiene practices and patient safety climate (Keep It Clean for Kids: The KICK Project, R01HS021470). As part of our baseline data collection, we found suboptimal hand hygiene at these study sites (Buet et al., 2013). Interventions that have been implemented in our current study include the installation of an electronic group monitoring system to measure the frequency of hand hygiene, formation of staff-managed “KICK teams,” education, posters, and continuous surveillance of infection rates. To date, however, results have been relatively modest, and it became apparent that a better understanding of the elements necessary to effect change in this setting was needed.

On the basis of social cognitive theory (Bandura, 1986), behavior change is governed by the interaction of personal and environmental factors. A key factor, for example, is to ensure that healthcare workers have adequate knowledge of the role their hands play in the spread of HAI during different patient care activities. As such, it was important that we be fully aware of the knowledge, attitudes, beliefs, and intentions of the pLTCF staff. Therefore, the aim of this study was to explore and identify possible barriers to hand hygiene and infection prevention perceived by pLTCF staff and to elicit their ideas for improvement. The research question explored in this study was *What are pLTCF staff members’ general thoughts and knowledge about infection prevention and hand hygiene, their attitudes regarding their own and others’ hand hygiene practice at the site, and their ideas and advice for improving infection prevention efforts?*

METHODS

Design

This was an exploratory study. We conducted open-ended, semistructured interviews with care providers who had direct contact with residents.

Sample and Settings

Our sample comprised direct care providers in three pLTCFs in the larger New York City metropolitan area. Sites ranged in size from approximately 50 to 140 beds with 14–53 individual children’s rooms and an average of 2–10 new admissions per month. The length of stay for children ranged from 1 day to 21 years with facility length of stay means of approximately 240, 475, and 1,000 days. Most of the children had feeding tubes, almost half had tracheostomies, and fewer than 10% were ventilator dependent and/or had central venous catheters. Staff in each facility included registered nurses, certified nurse assistants (CNAs), physicians, therapists (respiratory, physical, speech, occupational, child life, recreational, among others), and school staff including teachers, teachers’ aides, therapists, and school nurses. All three facilities had schools with 4–14 classrooms onsite, each staffed and administered by their respective city and/or county education boards.

Interview Guide

A draft of the interview guide featuring eight open-ended questions (Table 1) was developed with input from a multidisciplinary group of researchers familiar with, but independent of, the current project. The interview included participants' perceptions of barriers to hand hygiene and infection prevention and control protocols, and their "outside-the-box" ideas and advice for improving protocol adherence by staff. The draft guide was pilot tested, and the interviewers practiced doing interviews and received feedback with two graduate nursing students who had clinical experience with children and two additional members of the research team. On the basis of their feedback about relevance, clarity, and effectiveness, the wording of the prompts and the approach of the interviewers were modified.

Recruitment and Interviews

Following Columbia University Medical Center Institutional Review Board approval, we met with infection control officers and/or administrators at each facility, described the project in detail, and secured leadership buy-in and agreement to encourage staff participation. Because members of the research team had been collecting data at the study sites for several years and had established working relationship with staff members, we were concerned that staff would feel coerced to participate or provide socially desirable responses to them. To minimize this problem, two trained qualitative interviewers, who were not known to the staff, helped to develop the interview guide and conducted the interviews. A graduate nursing student with a background in journalism served as the interviewer, and a doctorally prepared nursing faculty member with expertise in qualitative research recorded the interviews, took detailed notes, and helped focus the conversations.

To obtain a wide range of staff viewpoints, we sought a purposive sample of approximately 10 direct healthcare providers from each site who were on duty during one of three days during which the study interviewers were present in the facility and willing to be interviewed for about 25 minutes. At each of the three sites, we included one or more from each of the following groups: registered nurses, CNAs, therapists (respiratory, physical, speech, occupational, child life, recreational, among others), and school staff, including teachers, teachers' aides, therapists, and school nurses. We did not include physicians, because there were only one or two per facility and they would have been easily identifiable.

The study interviewers visited each facility 1 day each week for 3 weeks in late February and early March 2015. On interview days, introductory fliers were distributed to facility administrators and staff to recruit participants. The flyer explained the goal of the interviews, with reassurance that their participation was voluntary and their answers would remain confidential. Flyers were displayed in a brightly decorated box in busy staff areas and handed personally to staff members by the study team. Staff members were actively encouraged by each facility's leadership to participate. During the days in which the researchers were present, staff members who were willing to participate made themselves known and a convenient meeting time and place was arranged. On any given day, there were approximately 25–35 staff members present; interviews were conducted with the first individuals who met our inclusion criteria, were available, and expressed interest. Following a full explanation of the study, participants provided verbal consent for their interviews,

which were conducted in private rooms to facilitate participants' candor and the audio recordings.

Data Analysis

Two researchers not participating in the field interviews or data collection independently listened to audio recordings of all 31 interviews to benefit from "wider analytic space" as recommended by Malterud (2012). Prior to listening, the researchers discussed professional positions and preconceptions that required bracketing. One researcher transcribed the field notes verbatim and the other recorded notes by pen and paper.

The analytic approach was adapted from the systematic text condensation approach as described by Malterud (2012). The approach guided the researchers through an iterative process to assure methodological rigor in stages of total immersion in the data, identification of exemplar key words and phrases (also termed "meaning units"), extraction of major thematic categories and subcategories, and reevaluating the fit and appropriateness of the exemplar data. Following immersion in the data, both researchers independently listed preliminary, general thematic categories, which were then discussed to identify areas of convergence and divergence. They compared notes of their initial analyses to develop a deeper understanding of their interpretation of the empirical data and summarize their findings. The researchers then developed consensus through multiple discussions on separate occasions timed to allow for reflexivity, ultimately selecting four to eight preliminary categories to prioritize for analysis. These emerging thematic categories were discussed in meetings with the field researchers who collected the data to enhance clarity and assure rigor of interpretive analysis through analytic triangulation (Lincoln & Guba, 1985). After agreement on the thematic framework, the analytic researchers relistened and reread the empirical data for systematic abstraction of exemplar data. These exemplars were sorted into the thematic categories and analyzed for emergence of subthemes. At this stage, the two researchers negotiated the organization and priorities of the empirical data into subthemes and thematic categories by example "splitting" subthemes covering two or more distinct phenomena and "lumping" subthemes representing same issues (Malterud, 2012). Following the full process of decontextualization, coding, synthesis, and recontextualization, the final thematic categories, subthemes, and exemplar data were documented and discussed with the full research team (Malterud, 2012; Patton, 2002).

Finally, formal feedback was provided to the participating sites in person by members of the data collection and data analysis research subteams. This reciprocity of the fieldwork allowed for member checking and verification of the findings of the systematic analysis, thereby establishing validity and credibility, and also served as evaluative feedback for the ongoing intervention study (Lincoln & Guba, 1985; Patton, 2002). Examples of steps taken in our evaluation of trustworthiness using Lincoln and Guba, and Malterud, are shown in Table 2. (Lincoln & Guba, 1985; Malterud, 2001).

RESULTS

A total of 31 staff interviews were completed (e.g., registered nurses, CNAs, therapists, and teachers), and more than 50 staff members participated in member-checking sessions, during

which the thematic categories were discussed. Staff confirmed that these categories were reflective of their attitudes and beliefs and that they were comprehensive, that is, no new issues or themes emerged. Four major thematic categories emerged from the analysis: (a) hand hygiene products; (b) knowledge, awareness, perceptions, and beliefs; (c) barriers to infection prevention practices; and (d) suggested improvements (Table 3).

Hand Hygiene Products

The theme of hand hygiene products occurred in all interviews across all settings. The subthemes identified included (a) varying perceptions on preference and efficacy of hand hygiene products, (b) negative comments on quality and end-user effects of all types of hand hygiene products, and (c) limited product availability and access.

The subtheme “perceptions” emerged universally across all sites and participants. By example, when guided by the interview question, “*How do you decide when to use soap and water versus alcohol rub?*” many referenced a feeling, emotion, like, or dislike as a driver of their behavior. Participants acknowledged different methods to perform hand hygiene, using either soap and water or alcohol-based hand rub, although many were staunchly in favor of one method over the other. One participant stated, “I like the handwashing better” (CNA), whereas another stated, “I just prefer the alcohol” (RN). Beyond the stated preference, some shared what they “felt” or “liked,” which offered a glimpse into factors that may influence this preference. As one respondent stated,

I would maybe use the sanitizer in a situation where I didn't need to wash my hands...like if I walked in the room and thought let me kill some germs, I might put the hand sanitizer on...but usually I don't like to use it; I think the water helps, but I guess the water can be drying too...usually I just wash my hands. (CNA)

The subtheme “negative comments” emerged across all sites and included all product types (i.e., soap, alcohol-based hand rub, and lotions). Negativity was evident in the transcribed narrative as well as in the auditory files in tone and language. Some of the negative comments were limited to aesthetic factors such as smell, as one respondent stated,

We asked for lotion and we got lotion but people don't like it, it's not scented...it's got a funky smell. (RN)

Others reported adverse effects of using the product:

I hate the hand sanitizers, I use them a lot, but as you can see my hands are falling apart over the years because of using it so much. (Therapist)

The final hand hygiene product subtheme “availability” emerged from all sites and encompassed both product placement and physical structure. Many respondents described the physical layout and building structure as a deterrent to performing hand hygiene, either because of the lack of sinks or the location of sinks or other products:

It's only in one location in the room, so if I'm all the way over here with the kids, and I have to cross back and forth, I know it's only a couple of steps, but it's just like, you know it's not efficient and need a sink in the classroom. We have to leave the classroom to wash our hands. (CNA)

Many of the participants verbalized resignation or feeling unempowered to change the physical environment and instead offered suggestions to increase product availability better integrated with workflow. For example, one participant stated,

I wanna say like an easier way to make sure that something is available that we can distribute those little bottles of the sanitizer so everybody has it on them and you don't have to worry about running somewhere and getting it; it's there. (RN)

Knowledge, Awareness, Perceptions, and Beliefs

This thematic category included rich data that were condensed into four subthemes: (a) internal and external motivation, (b) “us and them,” (c) culture and varying opinions, and (d) applicability of recommendations. These subthemes highlighted the friction and harmony between individual level behaviors and the larger community of practice influences.

The subtheme “internal and external motivation” revealed the dichotomy of the main influences of infection prevention behavior. Participants described the influence of life-long habits:

I was always brought up that you have to wash your hands after common hygiene stuff. (School aide)

Instinct. Our first instinct is to take care of the kid; we don't put ourselves first, we're ready to help the child. (RN)

Personal risk and risk to others within the caregiver's immediate circle were also recognized:

I mean, not that they don't care about the kids, but when you get home it definitely hits home more. (Teacher)

I think if people knew that this child has an infection and if you have a little open cut on your finger and you touch the saliva you're gonna get it, that would be the key. (Therapist)

This theme reflected the value of ingrained practice and the personalized motivation behind behaviors.

The second subtheme, “us and them,” revealed the friction between care providers and the perception of each worker's role in providing care and preventing infections. Microcosms of provider types and work settings were evident; many respondents self-identified by role, and these were framed in contradistinction to “others.” For example, one stated,

I don't know if the CNAs are washing their hands as much as they should either...I observed going from one kid to another. (RN)

and another provider type stated,

It's not like you know upstairs where you don't have anywhere you need to go. (Teacher)

In the third subtheme, “culture,” the normative value emerged as a factor in infection prevention behaviors. Respondents described the importance of implicit and explicit organizational support:

It's a catch-22 like, you know, do you wanna answer the call bell or do you wanna wash your hands? (RN)

The positive effect of a supportive culture and the impact of seamless transitions of care emerged as stated,

So it's nice when like everyone knows and when there's time and when that's done you can wash your hands and get the child out of the room. When that works really smoothly it's nice; that's what I mean by culture. (Therapist)

Finally, the subtheme “varying opinions and applicability of recommendations” captured the conflict expressed by many participants across all sites. Heard clearly was the awareness of guidelines, although there were varying opinions of what the recommendations for best infection prevention practices specifically entailed in this practice setting. By example, one respondent noted the specific task of changing a diaper:

Just in terms of changing a diaper, how there's like several times in the middle of that you're supposed to stop and wash your hands, I think for the effort and in the interest in time, sometimes convenience is just, you know, changing your gloves twice throughout the diaper change, anytime you ask people to do more, it's difficult. (RN)

and another noted the setting-specific incongruence of guidelines and practice:

It's not always practical to wash your hands every time you come in contact with the kids because they're coming into contact with you all the time and they're coming into contact with each other, we do a lot of social interaction thing. (School staff member)

In addition, essential knowledge of core concepts of infection prevention practices seemed lacking and was revealed in terms of beliefs and adaptation to the setting. By example,

Not so much handwashing you either do it or you don't it couldn't be simpler, but there's a lot of confusion with isolation precautions and cohorting units, and how are we doing it and I think everyone kind of does it differently. (RN)

Barriers to Infection Prevention Practices

This category included four subthemes: (a) patient characteristics, (b) access and timeliness of information, (c) workflow and setting, and (d) low priority. Unique challenges in the specialized pediatric setting were identified and highlighted the mobility of the children in a small confined setting. One respondent stated,

Our space is small and our kids don't have the ability to cover their mouth when they cough, etc. (CNA)

Exacerbating these challenges was the limited patient information available for some staff members such as those working in the schools:

When we are working with these children we don't know what they have. We try to do universal precautions; we are wiping spit, vomit, urine. It's really hard because we don't know what is going on. (Therapist)

In the third subtheme, “workflow and setting,” many respondents described the unique barriers present in their setting and the conflict between recommendations and workflow:

When I work in nursery it is hard for me to follow procedure. It is overwhelming. If you turn around you actually touch the other bed. (CNA)

Other respondents suggested that rather than trying to implement the guidelines, revising them for their specific setting may be useful:

If there were “5 Moments” for the school, it would be beneficial. (Teacher)

In addition to the patient and setting characteristics that emerged as barriers, the final subtheme, “low priority,” reflected the provider characteristics. Innate characteristics were suggested as independent barriers:

Some people are always in a rush, laziness, don't want to be bothered. (CNA)

and the interaction of those characteristics and the setting were seen to influence the prioritization of infection prevention practices:

People don't do the right thing. Negligence. I wouldn't say they don't care; it's just too much time. (RN)

Suggested Improvements

The final category included four subthemes: (a) firm, (b) fun, (c) feedback, and (d) fine. These subthemes captured the various approaches to and engagement of staff members in process improvement. In the first subtheme, “firm,” the importance of clear and firm direction from organizational leaders was emphasized. The value of face-to-face meetings, direct communication, and observational feedback was highlighted by respondents. This was best captured by one respondent who stated,

Be restrictive, observe, and show them. (CNA)

Other respondents suggested the path to improvement should be fun, interactive, competitive, and celebratory. As shared by one respondent,

We love to compete and love to be the best. Some kind of incentive or prize and they give you some little stupid thing. (RN)

The quality, frequency, and format of performance feedback were seen as essential regardless of a “firm” or “fun” approach. The quality of interpersonal communication was highlighted by many respondents who verbalized a desire for personal, respectful, and direct communication. One respondent suggested that improvement would follow if leaders:

Practice what you preach. If you see an employee doing what they are supposed to do, say “good job.” Don't patronize. (CNA)

The importance of feedback frequency to foster behavior change emerged throughout the interviews. Staff acknowledged that they were busy and needed repetition as they process a lot of information. This feedback could occur verbally, one on one or in group huddles, or through written reports or presentation of data. Regardless of format, respondents suggested

that, for the intended message to be received, it must be presented in a manner that is easily understandable:

To change behavior, make the statistics more user-friendly. People care, it's just that there are a lot of other things on their plate. (School staff)

...more education. Emailing doesn't work. Don't have time to see elevators, maybe "overhead," doing something different, more meetings or seminars, requiring us to come every quarter. (RN)

The final subtheme, "fine," emerged as respondents reflected on current practices and shared what was going well in their setting. Respondents highlighted leadership support, the availability of products, and the ingrained behaviors both personally and of others. In each setting, an element of group pride emerged as respondents shared that things were "fine" in their setting, and perhaps these suggestions for improvement could be applied elsewhere:

People do it all the time, are very on top of that. Washing ad nauseam. Maybe there is something you can do elsewhere, but we are very self-motivated. (CNA)

DISCUSSION

To our knowledge, this is the first study to explore the general perceptions and knowledge of pLTCF staff regarding infection prevention. Direct care providers offered valuable insights, which were generally consistent with previous studies from acute care facilities (Allegranzi, Conway, Larson, & Pittet, 2014; Erasmus et al., 2009; Jackson, Lowton, et al., 2014; Squires et al., 2014). There were a number of commonalities and shared opinions across the three sites, although some differences were identified between various work groups. For example, unlike the nursing staff, teachers and therapists had not necessarily been previously exposed to infection prevention concepts and reported unmet educational and training needs. Some conflicts were reported within and between professional groups, each with their own job responsibilities and varying levels of training. There was a robust "it's not me, it's you" mentality between nursing and nonnursing professionals, a finding that has also been previously described (Jackson, Lowton, et al., 2014). Nevertheless, although there is a universal desire to consider oneself as "the best in class," studies measuring performance of hand hygiene in different professional groups have shown that variations in adherence are related as much to unit and institutional culture as to discipline or specialty (Alsubaie et al., 2013; Lebovic, Siddiqui, & Muller, 2013; Lee et al., 2011).

The children in these facilities are at particularly high risk of infection. In addition to the usual bacterial pathogens common in hospitals, children in pLTCFs have frequent viral infections including vaccine preventable infections, such as varicella, rubella, hepatitis A, influenza, and rotavirus, as well as respiratory viral pathogens such as respiratory syncytial virus, adenovirus, rhinovirus, human metapneumovirus, and parainfluenza and gastrointestinal viruses such as noroviruses (James et al., 2007; von Renesse et al., 2009). For example, in one of these facilities between January 2009 and September 2013, 471 acute respiratory infections were diagnosed in 183 residents (Jackson, Murray, Hutcheon, Saiman, & Neu, 2014). One study site experienced an outbreak of influenza-like illnesses in 2010 during which 45% of the children became ill and 21% required transfer to an acute care

facility for respiratory support. The mean length of hospitalization was 11 days, and one child died (Neu et al., 2012). Such outbreaks, however, are just the tip of the iceberg, as many infections are endemic in pLTCFs and the burden of infections in these facilities has not been fully appreciated.

Despite the high-risk environment, some staff members seemed largely unprepared to face the routinely encountered barriers to infection prevention practices. Many suggested that perhaps the *5 Moments* do not apply to or are not feasible in pLTCFs—at least not the care delivered outside residents' rooms. Although WHO designed the *5 Moments* to be easily learned and interwoven with the natural workflow in acute care settings (WHO, 2009), a recent study found that the *5 Moments* were inadequate in overcrowded areas (Salmon, Pittet, Sax, & McLaws, 2015). Because children in these settings are highly mobile, several staff members in our study suggested that *5 Moments* specific to settings in which patients are not generally confined to one room (as they are in acute care) may be necessary, tailored to the realities of children's developmental needs and rehabilitative goals.

One of the findings from this study was that there was confusion regarding hand hygiene recommendations, use of soap or sanitizer, and isolation precaution policies, and many staff members stated that they wanted more, short in-person staff meetings with education and hands-on practical advice. Similar to findings from other studies (Dixit, Hagtvedt, Reay, Ballermann, & Forgie, 2012; Erasmus et al., 2009), the staff interviewed in this study focused on the importance of self-protection and preventing transmission of infectious agents to their homes. The World Bank has noted that outcome expectations and reinforcements are important key variables in effecting behavior change, and this may be relevant to infection prevention (World Bank, n.d.). Which consequences will improved hand hygiene adherence lead to, and what are the consequences of not improving hand hygiene? An essential driver of staff behavior change would be having expectations that are meaningful to them.

Limitations

Limitations in this study included the fact that those who were interviewed were individuals willing and able to spend time during the specific periods when research staff were onsite. As with volunteers in any study, it is likely that they differed from those who did not choose or have time to be interviewed, perhaps in ways important to infection prevention practice. Furthermore, it is possible that staff member responses were influenced in unknown ways by the way questions were asked. Respondents may have wanted to provide socially desirable responses, and many were aware of the ongoing intervention study being conducted. We attempted to mitigate these problems by having interviewers who were not directly involved in the parent study as well as having role-modeling sessions in which interviewers rehearsed and received feedback. Finally, some of the staff responses could be categorized into more than one theme.

Conclusions

In summary, infection prevention and control pose many challenges in facilities for medically fragile children who require complex care in the context of a more home-like

setting. Three recommendations have clearly emerged from this qualitative study. First, educational offerings in pLTCFs must include information regarding feasible infection prevention strategies, which is delivered in meaningful ways to all types of staff, visitors, and family members who provide care to the children. Second, workflow patterns need to be carefully evaluated to identify systems and methods to minimize cross-contamination and facilitate delivery of care in this high-touch, high-risk, but home-like setting. For example, the *5 Moments* may require modification to help staff prioritize highest risk contacts and make fully informed choices about prevention strategies. Third, hand hygiene products are essential at the point of contact with children. Even conveniently located dispensers may be difficult to reach. In such environments, personal sized containers of hand sanitizer (e.g., for the pocket, attached to a belt or lanyard) would greatly facilitate hand hygiene.

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TABLE 1

Interview Questions

Area	Questions
General thoughts	<ul style="list-style-type: none">• What first comes to mind when you hear the term infection prevention?• Can you please tell us about the various situations in which you clean your hands?• How do you decide when to use soap and water versus alcohol rub?• What is your sense of other staff members' hand hygiene or infection prevention practices?• What, if any, barriers to practicing hand hygiene or infection do you see?• What do you think are the major infection problems in your facility?
Ideas and advice	<ul style="list-style-type: none">• If you were in charge of infection control and responsible for improving hand hygiene in your facility, what would you invent or develop that would be helpful?• If you gave three pieces of advice to the administration about how to improve hand hygiene, what would you suggest?

TABLE 2

Methods Used to Assess Study Trustworthiness and Establish Rigor

Step	Techniques	Examples of techniques used
Credibility/internal validity Confidence in the “truth” of the findings	Prolonged engagement Persistent observation Triangulation Peer debriefing Negative case analysis Referential adequacy Member-checking	<ul style="list-style-type: none"> Sufficient time spent in field to develop rapport, learn and understand aspects of the culture and social setting with a range of members of the culture. Before the study, researchers were in the field to plan all logistics for site-specific interviews. Persistent observation showed by many on-site meetings, observations of workflow/infection prevention behaviors. Analyst triangulation used to ensure multiple observers and analysts elucidated all facets of the data. Peer debriefing through weekly research team meetings Two researchers searched for/discussed deviant cases to revise, broaden, and confirm patterns emerging from data. Members of the culture were provided the opportunity to co-create meaning and assess adequacy of data collection and analysis through informal meetings.
Transferability/external validity Demonstrating the findings have applicability in other contexts	Thick description	<ul style="list-style-type: none"> Field researchers provided a detailed account of settings, participants, time, and contextual events to illuminate patterns of relationships and place in context.
Dependability Demonstrating the findings are consistent and could be repeated	Inquiry audit	<ul style="list-style-type: none"> Decision trail and rules developed; process of transforming data into themes and codes described. External audit of the research study to assess/evaluate accuracy of findings, interpretations, and conclusions supported by the data; conducted by a nurse researcher not involved in the project.
Confirmability A degree of neutrality or the extent to which the findings of a study are shaped by the respondents and not researcher bias, motivation, or interest	Audit trail Triangulation Reflexivity	<ul style="list-style-type: none"> Steps taken to manage, analyze, and report the data were recorded and described, including information regarding raw data, data reduction and analysis products, data reconstruction and synthesis products, materials related to intentions and disposition including reflexive notes and expectations, and instrument development. Methods triangulation was used to examine consistency between qualitative and quantitative study findings. Source triangulation examined the consistency of different data sources by location and role in healthcare setting. Analyst triangulation occurred through multiple analysts examining the findings as well as use of multiple observers and analysts (number of observers = 4). Authors reported research perspectives, positions, and assumptions in the manuscript. Reflexive dialogue was fostered through a multi-investigator design and regular team meetings.

Note. Methods and techniques are based on recommendations from Lincoln and Guba (1985) and Malterud (2001).

TABLE 3

The Four Major Thematic Categories and Subthemes From the Analysis

Theme	Subtheme
Hand hygiene products	<ul style="list-style-type: none"> • Perceptions and preference • Negative comments • Availability and access
Knowledge, awareness, perceptions, and beliefs	<ul style="list-style-type: none"> • Internal and external motivation • “Us” and “them” • Culture • Varying options and applicability of recommendations
Barriers to infection prevention practices	<ul style="list-style-type: none"> • Patient characteristics • Access and timeliness of information • Workflow and setting • Low priority
Suggested improvements	<ul style="list-style-type: none"> • Firm • Fun • Feedback • Fine