

Tools for Hand Hygiene Intervention Monitoring in a Long-Term Care Facility

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Date : November 27, 2018



Peer Reviewed

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Abstract

Background: Hand hygiene is the most effective measure to prevent healthcare-associated infections. However, the role of residents' hand hygiene is unexplored.

Purpose: To test the feasibility and acceptability of a resident-focused hand hygiene intervention within a long-term care facility.

Methods

The qualitative phase began with direct observation, followed by interviews of six residents and six staff members using a semi-structured interview guide.. The study included four researcher-developed tools for use in the quantitative phase: 1) Flowsheet for Hand Hygiene Observation, 2) The Participant Demographics and Environmental Context Questionnaire, 3) Risk for Healthcare-Associated Infections Tool, and 4) Health Beliefs Related to Hand Hygiene Tool. In addition, the researcher recorded the participant's reaction to the hand hygiene intervention using a modified Participant's Reaction to the Hand Hygiene Intervention questionnaire, derived from the World Health Organization's (2009) Perception of Hand Hygiene Survey.

Significance/Results

While hand hygiene opportunities were constant for all participants eating in the dining hall, respiratory hygiene opportunities and episodes of T-zone touching varied. Although hand hygiene increased minimally, the mean percentage of adherence to respiratory hygiene increased, with a decrease in the range of T-zone touching following the intervention. These findings suggest the participants were more aware of the role of respiratory hygiene and T-zone touching in disease transmission after the intervention. There were medium or large effect sizes noted in all sub-scales of the Health Beliefs Related to Hand Hygiene Tool. Measures of central tendency described the total scale and item-level means on the Participant's Reaction to Hand Hygiene Intervention questionnaire. Findings suggest the residents tolerated the wipes and valued the educational intervention.

Conclusion

This feasibility study assessed current hand hygiene behaviors in the long-term care facility residents. The study incorporated behavior modification and hand hygiene research to inform future studies to establish evidence-based practice to prevent healthcare-associated infections. The intervention may enhance self-efficacy as the skill remains with the resident regardless of setting or staffing. In addition, the study provided initial psychometric evidence for the researcher developed tools and provided key information to direct future development of the tools.

Introduction

In the United States, approximately three million people in all healthcare settings develop healthcare-associated infections annually (Centers for Disease Control [CDC], 2016; Office of Disease Prevention and Health Promotion [ODHP], 2013). Hand hygiene is a strategy to prevent infections because hands are the most common vehicle of disease transmission. Adherence to hand hygiene continues to be suboptimal in all settings, despite evidence indicating providers understand the significance of hand hygiene (World Health Organization [WHO], 2009). Therefore, hand hygiene has been deemed a quality indicator, with mandated public disclosure (WHO, 2009).

Given the prevalence and impact of infections, research and prevention have historically focused on providers' adherence to hand hygiene, leaving the effect of residents' hand hygiene largely unexplored. Studies have validated the importance of hospital patient hand hygiene, suggesting patients' hands become a reservoir and a means of transmission when hands are not adequately cleansed (Burnett, Lee, & Kydd, 2008; Lawrence, 1983).

As many long-term care facilities lack specialized infection control staff, infection control and surveillance can be challenging in this setting. Long-term care facilities serve populations with diminished immune response or malnutrition, which increases the risk of infections. Long-term care residents may also have multiple co-morbidities or polypharmacy, which can further compromise the immune system (Smith et al., 2008). Cognitive or functional ability of residents may increase their need for hand hygiene while decreasing their ability to perform it. In long-term care facilities, two major factors increase risk of transmission through direct or indirect contact: 1) Medicaid reimburses for semi-private rooms and 2) long-term care facilities promote socialization of residents. As a result, residents are susceptible to transmission and subsequent colonization with infectious organisms.

The conceptual framework for the study was the Health Belief Model (Figure 1). Four psychologists developed this social cognitive model in the 1950s to examine barriers to preventive health programs (Rosenstock, 1974). The Health Belief Model has been widely used to understand differing behaviors or attitudes under the same condition and has been previously tested as a theoretical model to measure healthcare providers' attitudes toward hand hygiene (Kretzer & Larson, 1998). The Health Belief Model allowed the researcher to identify and understand barriers to resident hand hygiene, thus making it a good fit for a feasibility study.

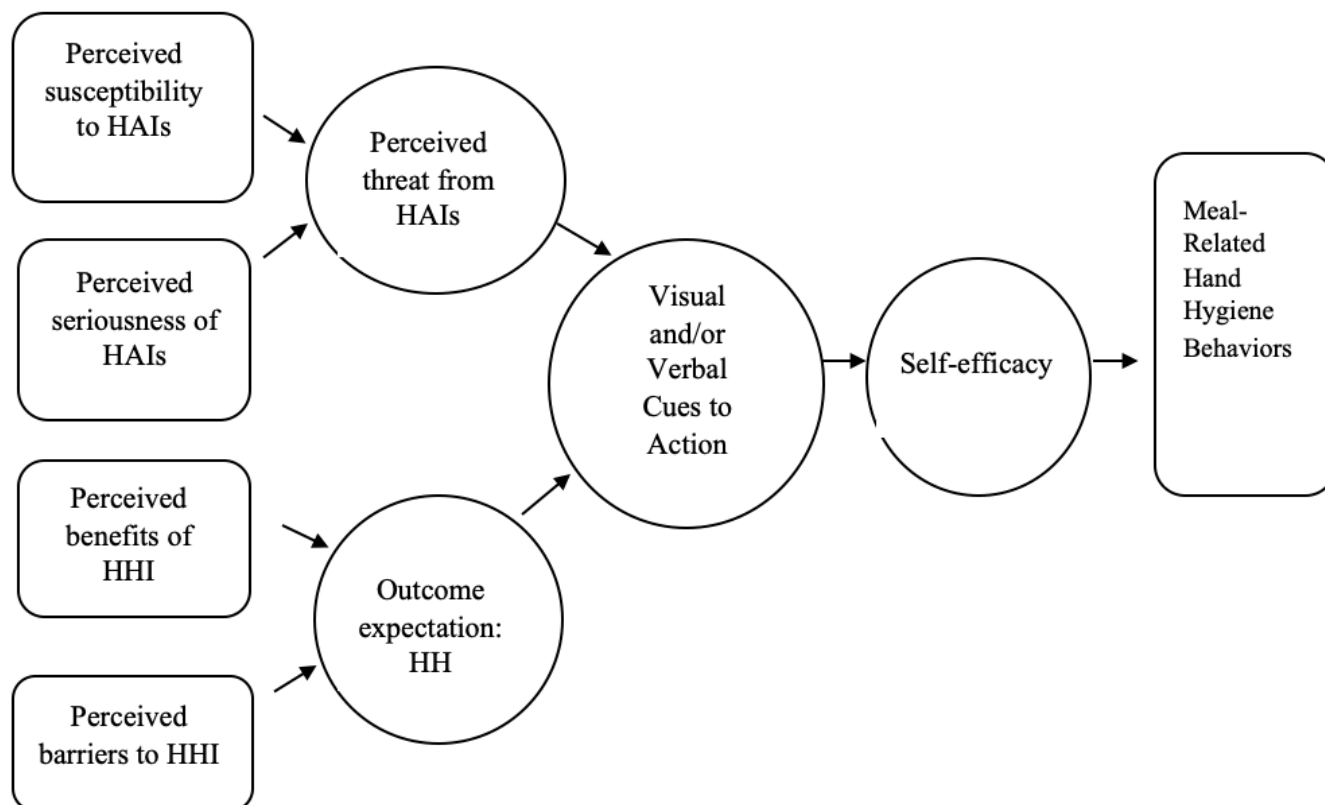


Figure 1: Health Belief Model Applied to Resident-Focused Hand Hygiene

Note: HAIs = Healthcare-Associated Infections; HHI = Hand Hygiene Intervention; HH = Hand Hygiene

The original model had four constructs: perceived susceptibility, perceived seriousness, perceived benefit, and perceived barriers to action (Rosenstock, 1990). Two additional constructs were later added: cues to action and self-efficacy (Rosenstock, 1990). According to the theory, for an individual to take preventive action, such as hand hygiene, the individual must first perceive he/she is personally susceptible to a health risk, such as a healthcare-associated infection. Next, the health risk (infections) must have at least a moderately serious impact on some component of the individual's life. Furthermore, the advised preventive health action must be beneficial, reducing the individual's susceptibility to the health risk or the seriousness of the health risk. Lastly, taking the advised preventive health action must not exceed tangible and/or psychological costs (Rosenstock, 1974). In other words, when an individual believes a health risk can be avoided, has a positive expectation that taking a recommended action will lead to avoiding the health risk, and believes he/she can successfully complete the advised preventive health action, the individual is more likely to complete the advised preventive health action.

The purpose of this study was to test the feasibility and acceptability of a resident-focused hand hygiene intervention within a long-term care facility using the World Health Organization's Participant's Reaction to the Hand Hygiene Intervention Questionnaire (WHO, 2009). Although this tool is established and widely accepted, there was no reported reliability or validity data found in the literature. The World Health Organization's original questionnaire was modified for use in the study.

Methods

The study followed an exploratory sequential mixed methods design. Phases were implemented sequentially, starting

with qualitative data collection and analysis. Detailed study procedures for the qualitative phase (Figure 2) included researcher observation of all meals in dining hall on one weekday and one weekend day in the setting for feasibility issues and to identify barriers.

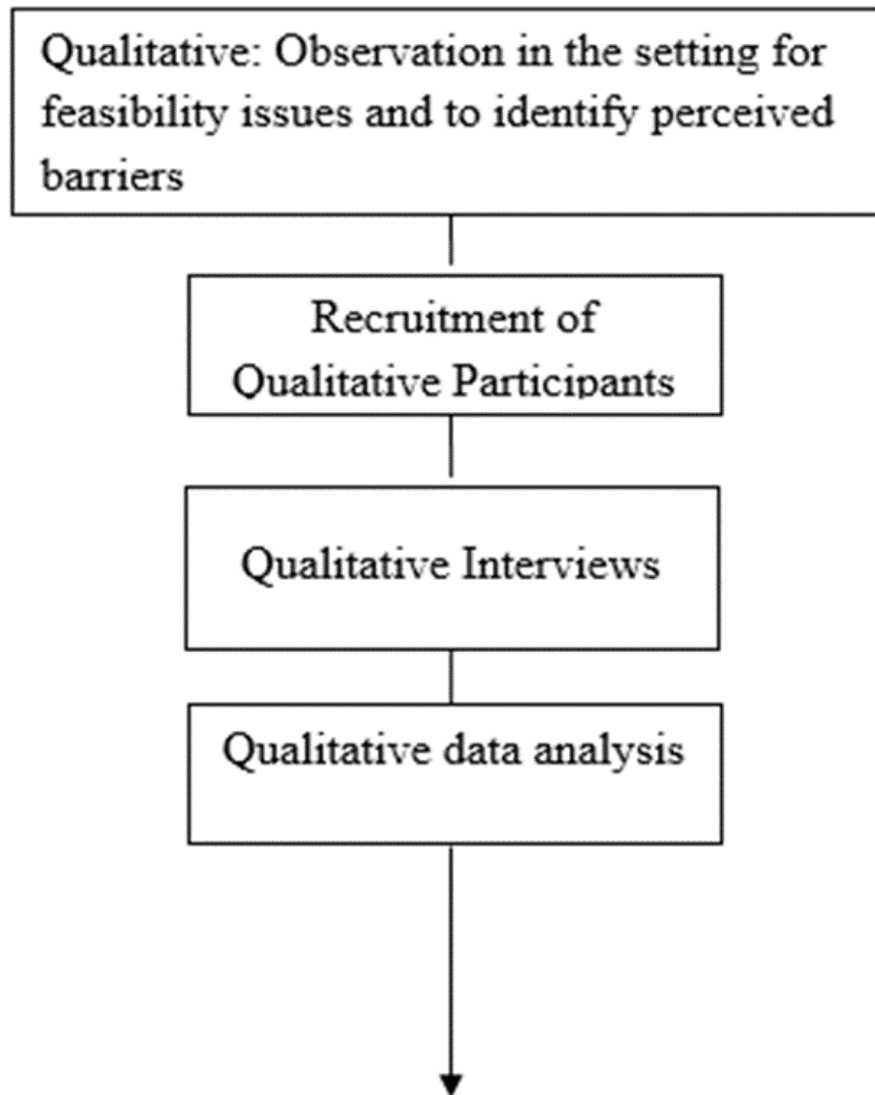


Figure 2: Design and Flow Qualitative Phase.

Qualitative Observation

Since direct observation is the gold standard to monitor hand hygiene adherence, the researcher observed baseline meal-related hand hygiene behaviors during all three meals over two days. Specifically, the researcher noted whether the residents used a wipe prior to eating, whether they touched their T-zones, and if and how they covered coughs/sneezes. The facility mealtimes included two groups of residents. The first group was independent, while the second group could not independently feed themselves and required assistance to perform hand hygiene.

Adherence was calculated by dividing the number of hand hygiene episodes by the number of opportunities. An

episode of hand hygiene referred to the action of cleaning the surfaces of both hands with a disposable wipe. An opportunity referred to pre-meal hand hygiene in the dining hall.

Both the resident and staff samples in the qualitative phase were a purposive sample meeting the following inclusion criteria: can speak English; at least 18 years of age; and able to provide written, informed consent. In addition, the inclusion criteria for the resident sample included a Brief Interview for Mental Status (BIMS) score of 13–15 which indicated intact cognition. The sole exclusion criterion included incomprehensible speech, such as dysphasia. An additional inclusion criterion for the staff member sample was able to provide direct resident care, including assisting with meals. There were no exclusion criteria for the staff sample.

Qualitative Interviews and Analysis

Resident and staff participants' data were transcribed verbatim and analyzed using the six-step procedure for mixed methods data analysis described by Creswell and Plano Clark (2011). To explore the data, the researcher read the data, wrote memos, and developed a qualitative codebook. The researcher coded the data using procedures recommended by Saldaña (2013), assigned labels to codes, grouped codes into categories, and interrelated the categories into a smaller set of categories. The categories that emerged from the data were as follows: susceptibility to infection, social exposure/social distancing, seriousness of infection, benefits of hand hygiene, barriers to hand hygiene, cues to action, and lack of personal accountability/self-efficacy.

Quantitative Phase

The qualitative findings informed the second phase, which had a quantitative emphasis. The quantitative intervention protocol (Figure 3) was refined based on staff and resident feedback and the researcher's observation. The schedule for the hand hygiene interventions included the meal-related hand hygiene related behaviors (including respiratory hygiene and T-zone touching) based on the facility's current practice. The quantitative phase was implemented in three four-day cycles.

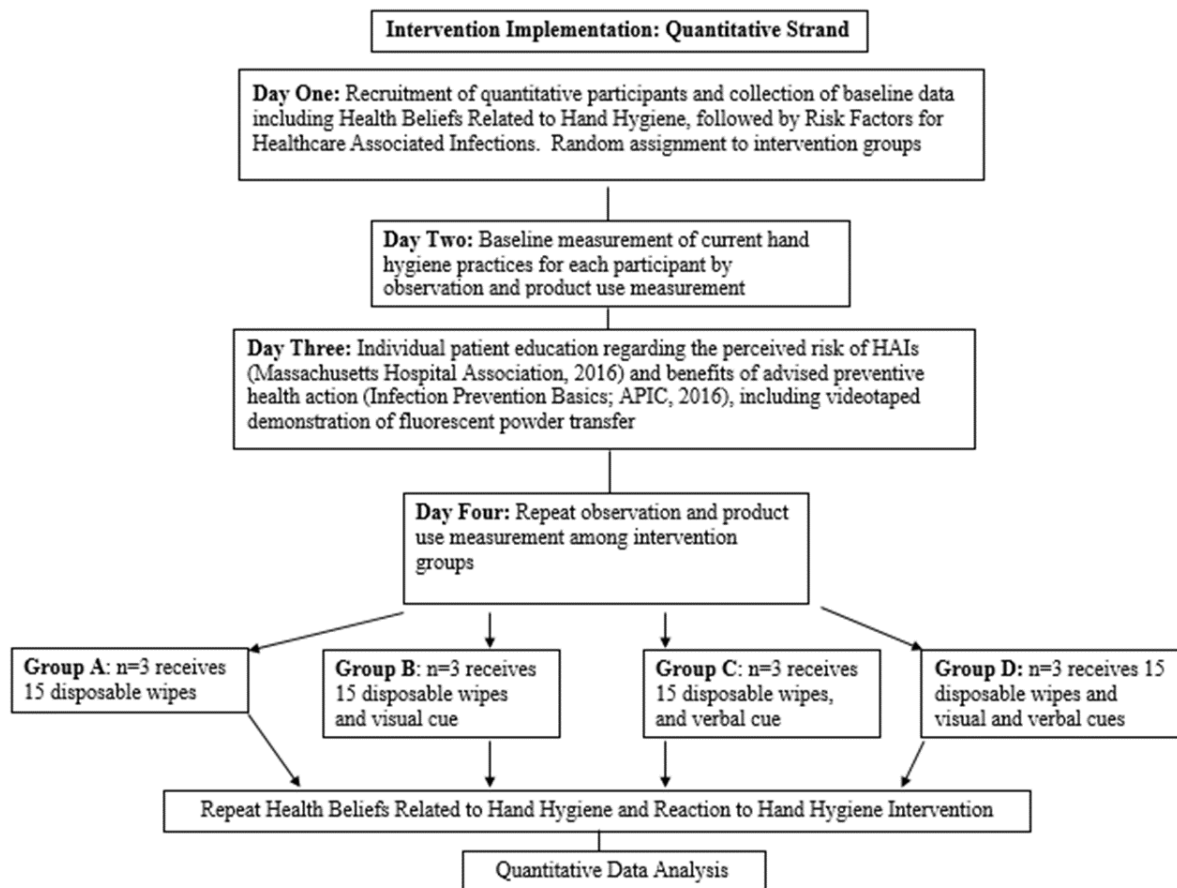


Figure 3: Design and Flow: Quantitative Phase.

Quantitative Measurement

On the first day, the researcher completed The Participant Demographics and Environmental Questionnaire (Appendix B) and the Risk for Healthcare-Associated Infection Tool (Appendix C). The researcher also administered The Health Beliefs Related to Hand Hygiene (Appendix D) face-to-face. On the second day, all participants received disposable wipes per the facility's current practice. The researcher observed episodes of meal-related hand hygiene behaviors throughout the meal. This included verbal cues from healthcare workers. On the third day, participants received education regarding the seriousness of healthcare-associated infections (Massachusetts Hospital Association, 2016). To promote perceived benefit of the advised preventive health action and enhance self-efficacy, participants received the Infection Prevention Basics (APIC, 2016). The individual risk factors for healthcare-associated infections were discussed with the participants. For consistency, education was also presented in a [short web-based video](#). Lastly, participants demonstrated proper hand hygiene with a disposable wipe accompanied by lyrics written by the researcher to the tune of *Happy Birthday* to time the hand hygiene.

Quantitative Visual Cue

Participants were randomly assigned to receive visual cues. Six participants (n=6) received education, a disposable wipe, and verbal cues per the facility's current practice. Six participants (n=6) received education, disposable wipe, verbal cues per the facility's current practice, and a laminated visual cue, which was a triangular table tent placed on

the participant's table (Appendix E). Other tables had a similar table tent with a generic greeting.

Quantitative Data Analysis

The researcher entered the quantitative data into Excel and created a codebook. Dichotomous items were coded 0 for *no* and 1 for *yes*. Likert items were scored according to instrument documentation. Quantitative data analysis was conducted using SPSS version 23.0. The researcher entered the data into SPSS, screened the data for errors, and cleaned the data using established protocols (Pallant, 2013). Frequency distributions were calculated for each variable to check the minimum and maximum scores and to assess valid and missing data. Missing data were minimal and assigned the code 999.

Flowsheet for Hand Hygiene Observation

Observation of hand hygiene situations, behaviors, and adherence both prior to and after the intervention were recorded on the Flowsheet for Hand Hygiene Observation. Respiratory hygiene actions included covering a cough or sneeze with anything other than the bare hand. T-zone touching was defined as skin-to-skin contact of the hand with the eyes, nose, or mouth. Wiping the mouth with a napkin was not included as an episode of T-zone touching. Finger licking was included as an episode of T-zone touching. If a participant did not eat a meal in the dining hall, no data were entered for that meal. The data on this tool is at the interval/ratio level. The percentage of adherence to hand and respiratory hygiene was calculated using the conventional method defining the numerator as an observed episode of hand or respiratory hygiene and the denominator as an observed opportunity when hand or respiratory hygiene would be appropriate. For example, if a participant ate all three meals in the dining hall, there were three opportunities for pre-meal hand hygiene. If the participant performed hand hygiene prior to one of those meals, the adherence score would be 0.33. If a participant did not eat a meal in the dining hall, no data were entered for that meal.

Results and Discussion

There was a total of 155 episodes and 386 pre-meal hand hygiene opportunities for an overall adherence of 40%. Forty-six of these hand hygiene episodes were assisted by staff. While the researcher's presence in the dining hall may have initially served as a reminder to perform hand hygiene, pre-meal hand hygiene trended downward from 55% prior to breakfast on the first day of observation to 25% prior to the evening meal on the second day of observation.

Respiratory hygiene involves behaviors associated with coughing/sneezing to prevent the spread of infection. Since it may be difficult for residents to cover coughs/sneezes with their elbow, covering the cough or sneeze with something other than their bare hand was considered acceptable for the study. A bare hand was considered unacceptable as it contaminated the hand and potentiated the spread of infection. Tissues were not provided to the residents in the dining hall; however, disposable napkins were. There were 490 episodes of coughing/sneezing observed. None were addressed by residents using acceptable respiratory hygiene methods (Table 1).

Table 1. Field Observation of Hand Hygiene, T-zone Touching, and Respiratory Hygiene

Date and Length of Observation Time	Pre-meal Hand Hygiene Episode	Pre-meal Hand Hygiene Opportunity	Pre-meal Hand hygiene Adherence	Mealttime T-zone Touching	Mealttime Respiratory Hygiene Episode	Mealttime Respiratory Hygiene Opportunity
Day One Breakfast: 3 hours 15 minutes	36 (12 assisted)	66	55%	25	0	76
Day One Lunch: 3 hours	25 (14 assisted)	69	36%	27	0	42
Day One Evening Meal: 3 hours	23 (3 assisted)	60	38%	49	0	93
Day Two Breakfast: 3 hours	27 (11 assisted)	63	43%	28	0	110
Day Two Lunch: 2 hours 30 minutes	29 (5 assisted)	69	42%	53	0	90
Day Two Evening Meal: 3 hours	15 (1 assisted)	59	25%	34	0	79

Qualitative Recruitment

The population size was 150 residents (number of beds in the facility). Participants in the qualitative phase included an equal number of male and female long-term care facility residents and staff members (total n=12).

While hand hygiene opportunities were constant for all participants eating in the dining hall, respiratory hygiene opportunities and episodes of T-zone touching varied (Table 2). Although hand hygiene increased minimally, the mean percentage of adherence to respiratory hygiene increased with a decrease in the range of T-zone touching following the intervention. These findings suggest the participants were more aware of the role of respiratory hygiene and T-zone touching in disease transmission after the intervention.

Table 2: Comparison of Adherence to Pre and Post-intervention Meal-related Hand Hygiene Behaviors

	Pre-intervention	Post-intervention	t statistic	p value	Cohen's d
	M (SD) Observed Range	M (SD) Observed Range			
Hand Hygiene	42.4% (32.8) 0-100%	43.8% (39.6) 0-100%	-0.10	0.92	0.04
Respiratory Hygiene	36.2 (35.5) 0-75%	82.8 (35.2) 0-100%			
T-zone Touching	4.3 (3.3) 1-11 episodes	3.6 (2.4) 1-7 episodes			

Participant Demographics and Environmental Context Questionnaire

The quantitative sample was predominantly female with a mean age of 85 years (Table 3). On average, resident participants resided in the long-term care facility for 2 ½ years. Polypharmacy was noted, with a mean of 14 routine

medications (range of 9–23 medications) and a mean of 21 total daily doses of routine medications (range of 7–40 doses) for the sample.

Table 3: Sample Demographic and Clinical Characteristics (n=12)

Variable	Mean ± SD
Age	84.75 ± 11.55
BIMS score	14.75 ± 0.45
Number of days in the long-term care facility at time of study entry	951 ± 1197
Number of routine medications	14.08 ± 5.27
Number of total daily doses of routine medications	21.33 ± 10.85
Gender	Frequency (%)