



Major Article

Acute care nurses' responses and recommendations for improvement of hand hygiene compliance: A cross-sectional factorial survey research study



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Key Words:

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Background: Hand hygiene is promoted as an effective practice to counter health care-acquired infections; however, compliance is less than optimal. Nurses have many patient contact opportunities and therefore are frequent participants in intervention research. The optimal combination of efficient and effective intervention components has not been conclusively identified.

Methods: A factorial survey research design offers an efficient method to assess multiple factors simultaneously by combining elements into vignettes. This article describes a process, grounded in the framework of Bandura's social cognitive theory, that explored environmental and individual factors that potentially influence nurses' hand hygiene behavior in acute care settings. Survey respondents consisted of nurses employed in patient care; respondents also could address an open response item.

Results: A total of 466 participants scored a total of 3,685 vignettes. Statistically significant parameters included goal, supervisor priority, electronic monitoring, and rewards. The most frequently mentioned open response item was the need to keep hand hygiene product dispensers refilled. Participants also suggested that culture and intrinsic motivation influenced hand hygiene behavior.

Conclusions: Researchers might consider assessing promising factors, especially use of goal setting, as an intervention rather than as components of an intervention. Further research is indicated to better understand how nurses define and view hand hygiene culture.

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BACKGROUND

Hand hygiene is widely recognized and promoted as a simple but effective practice to counter incidences of health care-acquired infections; however, compliance worldwide is less than optimal.^{1,2} Key findings from several published systematic reviews and meta-analyses include that various multicomponent interventions have improved hand hygiene compliance in health care settings.³⁻⁷ Limitations in primary research identified by authors of research reviews

include lack of controlled studies, inconsistent reporting, and provision of insufficient detail to encourage replication of interventions.³⁻⁷ As the authors of one published longitudinal research report observed, many researchers describe minimal and temporary improvements rather than more substantial or long-term changes in compliance, and authors often fail to offer explanations that take contextual details into account.⁸

The authors of one meta-analysis⁷ identified several more promising combinations of interventions. These authors suggested that other researchers should continue to work to provide evidence that identifies the components of a multicomponent intervention that are optimal based on efficiency and efficacy-based criteria.⁷ The factorial survey research described in this article represents an intermediate step toward systematic development and assessment of multicomponent interventions that consider these criteria. A factorial survey research design in general offers an efficient method to assess multiple factors simultaneously by randomly or purposively combining elements into brief descriptions of circumstances or vignettes.⁹ The process described in this article, grounded

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in the framework of Bandura's social cognitive theory,¹⁰ facilitated exploration of several environmental and individual factors that potentially influence hand hygiene behavior in the context of acute health care settings. In a factorial survey design, participants score multiple vignettes to express intentions or preferences, or as was the case in this research, to identify the set or sets of circumstances they believe are most likely to improve hand hygiene compliance. Authors have advocated for use of vignette research in nursing research because the method is more cost effective and flexible than observational research. Additionally, because vignettes are administered in a survey setting, larger sample sizes might be accessed than for observational or quasi-experimental studies.^{11,12}

Vignette research designs have previously been used in nursing and infection control contexts to assess how the interaction between attitudes and knowledge influenced health care workers' reported responses to risk incurred when touching various surfaces,¹³ or how health care workers might respond when prompted by family members of patients to engage in hand hygiene.¹⁴ Previous intervention testing applications of factorial survey included exploration of men's group exercise preferences¹⁵ and exploration of the most attractive elements of partner notification programs for individuals who are HIV positive.¹⁶ To our knowledge, no previous published research reported use of the factorial survey process to solicit nurses' input on factors that nurses think might encourage hand hygiene compliance in health care settings, nor has any previous published research report described use of a factorial survey to plan hand hygiene interventions. Therefore, the purpose of this article is to describe the structure and analysis of an online factorial survey research project designed to help systematically identify the most appropriate environmental and individual targets for hand hygiene compliance improvement interventions directed at acute care nurses in U.S. hospitals. The results of data analysis from our previously conducted interview research project¹⁷ suggested that nurses are not always involved in development or enforcement of protocols used to govern and assess their practice. Given this, one additional goal of this research project was to involve nurses in intervention design. We addressed this goal by using focus groups of nurses to discuss and refine the survey instrument, by using only nurses as survey respondents, and by soliciting additional feedback from respondents through use of an open response item.

MATERIALS AND METHODS

Survey design

We identified multiple changeable circumstances that might influence hand hygiene compliance in acute health care settings through analysis of data from previously conducted individual interviews,¹⁷ review of previously published hand hygiene intervention research, and consultations with multiple experienced clinical professionals. We clustered similar circumstances to derive 11 distinct factors. Consistent with a social cognitive approach,¹⁰ we considered factors, referred to as dimensions in a factorial survey research design,⁹ that referenced elements of the behavior by representing individual and environmental factors. Each dimension was represented by at least 2 alternatives, referred to as levels. **Table 1** shows each dimension and a sample level. A full list of dimensions and levels is available by contacting the first author.

Dimensions were inserted into plain language sentences to form vignettes designed to describe the conditions that a nurse with a sex-neutral name might encounter during the course of work in a busy hospital unit. Prior researchers have observed that allowing participants to respond on behalf of another (the character depicted in the vignette) reduces participants' sensitivity when being

Table 1
Dimensions and levels

Dimension	Level
Type of information provided	Hand hygiene compliance reports
Information delivery method	Available to access online
Information detail	Reflect unit-level information
Current compliance in unit	Unit met their current hand hygiene compliance goal
Supervisor priority	Places low priority on hand hygiene compliance
Location of resources	Hand hygiene product dispensers are located on the wall outside of the patient's room
Training and education content	Discussion of recent death and permanent harm related to HCAs on the unit
Training and education delivery	Provided via annual online self-study
Enforcement	Through use of electronic unit-level activity-based monitoring
Rewards and punishments	Meeting hand hygiene compliance standards can result in monetary rewards
Risk perception or priority	Nurse's primary concern is protection of self and family

HCAI, health care-acquired infection.

asked about uncomfortable subject matter, such as professional practice.¹¹ One sample vignette is shown in **Figure 1**.

The research team solicited comments from 2 former nurses, one who had extensive training and quality control experience and the other who was a certified infection control professional, and conducted 2 group interviews, each consisting of 8 currently practicing acute care nurses to ensure to the extent possible that vignettes represented meaningful factors that influence hand hygiene practices, described in context and language that represented realistic circumstances. As a result of recommendations made by group members, we changed the original 0-100 scoring to 0-10 and expanded definitions of the levels that represented electronic monitoring systems. Group interview members provided additional meaningful comments regarding their experiences with hand hygiene and other infection control practices at various facilities and their attitudes toward prior and ongoing behavior change efforts. This information will be detailed in a future research report.

Vignettes were physically produced using R statistical software (R Core Team, Vienna, Austria)¹⁸ in conjunction with Microsoft Word and Excel (Mac 2011, version 14; Microsoft, Redmond, WA). Factorial survey researchers using complex vignettes have the alternative of selecting a fraction of all available vignettes or of using design of experiment techniques to identify optimal designs using criteria such as D optimality. This research represented the former approach; however, a sample of 200 distinct vignettes was created because this is the number at which fractional designs and D optimal designs are increasingly likely to result in similarly unbiased estimates.¹⁹ Additional process detail and sample R code are available by contacting the first author. Interested readers are also referred to another publication the first and last authors published with another collaborator, describing a similar survey and analysis process, albeit directed at physical activity rather than hygiene behavior.¹⁵

Because participants were recruited from throughout the United States, randomly created vignettes were entered intact into an online survey program. Each eligible participant received a random sample of 8 of the 200 vignettes. Participants were not forced to score any vignettes and were able to navigate backward and forward to change scores as desired. To improve reliability of parameter estimates, we programmed the survey software such that each vignette was administered as near to the same number of times as was possible. Each participant, on completion of vignette scoring, was given an opportunity to provide his or her recommendations for the ideal circumstances to encourage the nurse described in the vignette to comply with hand hygiene policies.

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