

CRE 12-289: Building an Optimal Hand Hygiene Bundle: A Mixed Methods Approach

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Background / Rationale:

"Hand hygiene is the single most important measure to prevent transmission of infectious organisms" (VHA Directive 2010-006, MRSA Prevention Initiative). Despite its fundamental place in infection prevention, compliance rates with hand hygiene protocols remain substantially below target levels. For example, prior studies in acute care hospitals have reported rates of compliance that average only 40%, while in a recent VHA study led by Dr. Perencevich (IIR 09-099), compliance rates across 11 hospital units in 3 VISNs ranged from 53% to 71% and averaged 61%.

Hospital-associated infections (HAI) are a major threat to patient safety. The most significant cause of HAI is methicillin-resistant *Staphylococcus aureus* (MRSA), which accounts for an estimated 94,000 invasive infections and 19,000 deaths annually in the US. In response to concerns about MRSA, VHA implemented an MRSA Prevention Bundle in October 2007 that included promotion of hand hygiene. Yet, low hand hygiene compliance highlights the considerable potential for hospital staff to serve as vectors for the transmission of MRSA and other HAIs and suggest that significant room for improvement exists.

A sustained, multifaceted approach is recognized as key to improving hand hygiene practices. However, little is known regarding which components of these multipronged or "bundled" approaches are essential. Identifying the most effective elements of hand hygiene intervention strategies will substantially advance the science in this area and greatly aid the implementation of more focused and efficient approaches for optimizing hand hygiene and reducing MRSA and other HAIs in VHA.

In an effort to establish VHA best practices for hand hygiene, a Working Group, comprised of our research team and several programs in the Office of Public Health and Office of Patient Care Services, is developing a national hand hygiene initiative. For this Working Group, Dr. Reisinger has led a VHA-wide survey of facility-level hand hygiene practices and completed a systematic literature review of hand hygiene interventions. This CREATE proposal builds on the pilot findings from the survey and literature review and is an essential next step in advancing understanding of practices to promote hand hygiene. Based on the systematic review, survey, and our pilot data, we have selected three interventions that are most likely to improve hand hygiene compliance; however, they are not yet evaluated sufficiently in the literature-individually or combined as a bundle-to recommend wide adoption. These interventions are 1) hand hygiene point-of-use reminder signs to serve as an environmental cue to action; 2) individual hand sanitizers, and 3) health care worker hand cultures. Additionally, significant barriers may exist to the adoption of these interventions and wider implementation would benefit from a qualitative process evaluation to examine possible barriers.

The proposal fills an important gap in identifying optimal hand hygiene bundles for acute care facilities and provides guidance to the VHA hand hygiene Working Group. Additionally, this mixed-methods approach has the potential to significantly impact the science of hand hygiene and improve patient safety both in and outside VHA by reducing the number of HAIs, while also improving the existing VHA MRSA prevention bundle.

Objective(s):

The proposed study will use a parallel, mixed-methods design that will integrate qualitative research (Aim 2) with a cluster-randomized controlled trial (Aim 1).

Specific Aims: The two specific aims and associated hypotheses of the project include:

1) Identify combinations of hand hygiene intervention strategies that optimize hand hygiene compliance and that could form an evidence-based hand hygiene bundle for VHA implementation. Hypothesis 1: Combinations of interventions will increase compliance rates more than single interventions. Aim 1 will entail a 30-month cluster-randomized controlled trial that will sequentially test three individual hand hygiene interventions to identify an optimal combination of interventions to increase hand hygiene compliance. The trial will be conducted in 59 hospital units in 10 VA hospitals in order to test the efficacy of individual and then sequentially added interventions to determine their incremental impact on hand hygiene compliance.

2) Identify institutional, organizational, ward/ICU, and individual level facilitators and barriers to implementing hand hygiene interventions. Hypothesis 2: Facilitators and barriers will pattern around contextual factors such as level of leadership support and organization of infection control programs. Aim 2 will entail a qualitative process evaluation that includes site visits to purposefully selected sites, semi-structured interviews, and observations to examine barriers and facilitators to the interventions and develop contextual insight for implementing and scaling-up the intervention at additional sites as a national initiative.

Methods:**AIM 1:**

The hand hygiene behavior of all facility staff working on the wards/ICUs during the periods of hand hygiene observation will be recorded.

All veterans admitted to acute care at the 10 VA medical centers during the study period will be included in this retrospective data analysis. Approximately 135,852 veterans will be included regardless of age, race, gender, or underlying health status. Additionally, women and minorities will be included in this study.

AIM 2:

VA Infection Control (IC) Teams: Approximately 18 hospital epidemiologists, Infection Control Professionals, and MRSA/MDRO Coordinators will be asked to participate in the study through in-person and phone semi-structured interviews (3 members of the IC team from 6 sites). Hospital epidemiologists, Infection Control Professionals, and MRSA/MDRO Coordinators from 4 additional sites will be asked to participate in the study through phone interviews (approximately 12 study participants, 3 members of the IC team from 4 sites). The hospital epidemiologist is a Site PI on the study and will facilitate introductions to the IC team. The IC team will be asked to participate because of the unique knowledge they have regarding how hand hygiene is currently monitored and promoted at each VA facility and may have unique insights into the barriers and facilitators of implementation. The participants may not be veterans, but are important to the study due to role as VA practitioners.

VA Healthcare Workers (HCWs): Approximately 140-150 healthcare workers (facility, leadership, nurses, physicians, respiratory therapists, dieticians, etc.) will be asked to participate in the study through in-person individual and group interviews. Approximately 24 will be from facility leadership. We anticipate approximately 6 participants per focus group. Two focus

groups will be conducted on different units within each of 6 VA facilities. Healthcare workers may or may not be veterans; however, their participation in the study is important as they will provide crucial insight into how hand hygiene is practiced at their facility and barriers and facilitators to the interventions being implemented in the study.

Findings / Results:

Pre-and post- intervention qualitative data collection for Aim 2 was conducted FY15-FY17. We conducted semi-structured interviews with 47 infection control staff and hospital leadership. We conducted 20 focus groups with 102 frontline staff at the 6 hospitals. We also collected local hand hygiene policies and data collection forms from the 10 participating hospitals. Despite being part of a single healthcare system, hand hygiene programs varied considerably across the ten facilities, including approaches to monitoring hand hygiene and interventions to improve compliance. Auditing hand hygiene compliance within these acute-care hospitals was problematic, because audit results were not seen as accurate and the feedback process typically did not encourage positive change (paper under review at BMJ Quality and Safety). In addition, hand hygiene "champions" are tasked with contradictory tasks including monitoring hand hygiene compliance and coaching staff to conduct hand hygiene at appropriate times (paper under development).

We have conducted 87,026 entry and exit hand hygiene observations. Baseline and hygiene compliance rates ranged from 15% to 75% at the different sites (paper near submission). We did not see an improvement in hand hygiene compliance when the frequency of changing hand hygiene signs changed (paper near submission). We have completed an initial analysis of the HH compliance trends; however, analysis testing for differences between interventions is ongoing.

Status:

We have completed pre-and post- intervention qualitative process evaluation (Aim 2). Pre-intervention, this involved traveling to 6 sites (Iowa City, Omaha, Minneapolis, Miami, Portland, and Baltimore) to conduct semi-structured interviews with members of the infection control team as well as with leadership, and focus groups with health care workers. We also conducted phone interviews with members of the infection control team at the sites we did not visit (Ann Arbor, Salt Lake City, Boston, and San Antonio). We also completed the post-intervention qualitative site visits and phone interview in September 2017. We have developed a codebook and completed the first round of coding the transcripts, subcoding two of the major themes identified during the first round of coding. The codebook was revised based on the subcoding and all post-intervention interviews have been coded. We have two manuscripts draft based on these analyses. One on the varying structures of audit and feedback and another on the contradictory tasks assigned to hand hygiene champions. We are in the planning phases of a comprehensive mixed methods manuscript outlining the final results of the interventions, integrating the qualitative data to explain the findings. We were awarded CREATE supplemental funding to continue this project as an Implementation Core for the VA-CDC Partnered Infection Prevention Practice-Based Research Network.

For Aim 1, we developed an in-depth HH Observation protocol and conducted research assistant (RA) training sessions with RA at each facility to ensure the consistency and rigor of the HH observation. Baseline HH observation data collection for phase 1 of the project (Aim 1) was completed 10/1/14-3/31/15. We completed implementation and data collection of the first intervention (frequency of changing HH reminder signs) on 12/31/2015 and the second set of interventions (HH reminder signs and 1 additional HH strategy [individual hand sanitizer or hand culture plates]) on 12/31/2016. We continued HH observations for a final wash-out period until

March 31, 2017. A total of 51,526 health care worker observations were collected. We are finalizing data analysis for publication.

Impact:

The effort to improve hand hygiene practices continues to expand in VHA. Multiple VHA offices are coordinating efforts to establish a national hand hygiene initiative. Our study team is collaborating with several programs including Infection: Don't Pass It On (IDPIO) and Patient Care Services (NIDS) to reach this objective. The efforts include participation on the National Hand Hygiene Workgroup, chaired by Dr. Perencevich with Dr. Reisinger as a committee member, Dr. Reisinger chairing the Workgroup's Hand Hygiene Intervention Subgroup, and a serving on the planning committee and presenting at the VA-wide Summit promoting hand hygiene practices. Our research team and the studies we are conducting are poised to shape VHA policy on improving hand hygiene compliance and decreasing MRSA and other HAIs among our veterans