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A ubiquitous but ineffective intervention: Signs do not increase hand hygiene compliance

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Summary Proper hand hygiene is critical for preventing healthcare-associated infection, but provider compliance remains suboptimal. While signs are commonly used to remind physicians and nurses to perform hand hygiene, the content of these signs is rarely based on specific, validated health behavior theories.

This observational study assessed the efficacy of a hand hygiene sign disseminated by the Centers for Disease Control and Prevention in an intensive care unit compared to an optimized evidence-based sign designed by a team of patient safety experts. The optimized sign was developed by four patient safety experts to include known evidence-based components and was subsequently validated by surveying ten physicians and ten nurses using a 10 point Likert scale.

Eighty-two physicians and 98 nurses (102 females; 78 males) were observed for hand hygiene (HH) compliance, and the total HH compliance rate was 16%. HH compliance was not significantly different among the signs (Baseline 10% vs. CDC 18% vs. OIS 20%; $p = 0.280$).

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The findings of this study suggest that even when the content and design of a hand hygiene reminder sign incorporates evidence-based constructs, healthcare providers comply only a fraction of the time.

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Introduction

Healthcare-associated infection is a significant public health crisis [1,2]. Despite abundant evidence that providers' hands are the primary routes for cross contamination [3–5], hand hygiene (HH) remains problematic [6]. While HH signs are the most commonly used reminder and visible throughout most healthcare institutions, their impact is questionable [2,3,8]. It is not clear if this is because signs do not work or because current signs are not optimally designed. Studies report no significant difference in compliance rates following placement of signs [7], and the only sign that has been previously shown to produce dramatic hand hygiene compliance improvement was one with the warning of surveillance along with a threat of consequences [9].

Despite the abundance of commercially available and "home-made signs," many do not utilize scientific constructs. It has been shown that various evidence-based components are essential for the design of efficacious signs, including gain-framed messages, alerting signal words, appeal to personal responsibility, appeal to patient consequences, a specific activity required from the reader, attention getting features and appropriate design features such as color and letter size [7,10,11]. Our hospital decided to replace current signs with a sign made available by the Centers for Disease Control and Prevention (CDC). The primary aim of this study was to compare the efficacy of this CDC sign with an optimized intervention sign (OIS), which utilized evidence-based constructs. Both signs were also compared with a "baseline sign" that included minimal evidence-based constructs. We hypothesized that signs do not work and that incorporating proven triggers would not produce higher rates of HH than signs that are not evidence-based.

Methods

Hand hygiene rates were collected in our usual hospital environment with a baseline sign prior to posting the two intervention signs: a CDC sign (Fig. 1a) and the OIS (Fig. 1b) [7,10–12].

The OIS was developed by four patient safety experts to include known evidence-based components and was subsequently validated by surveying ten physicians and ten nurses using a 1–10 Likert scale. The placement of the two signs was randomized, and each was located directly outside one intensive care unit (ICU), next to the entry call button and a wall-mounted hand rub dispenser. The data were de-identified, and this Quality Improvement study was granted an exemption by the Institutional Review Board.

Nurses and physicians were observed entering an ICU at random times during a 4-week period, with each sign posted for 4 non-consecutive days. The observations were not limited to one specific time of day. HCWs such as respiratory therapists, physical therapists or dietary workers were excluded from this study.

The observers were unknown to the providers, and at least 5 days elapsed between the observation periods. One observer was stationed outside the unit to observe whether the provider performed HH before entry, and the other remained inside the unit to observe HH compliance between the entry door and prior to patient contact (alcohol-based hand rub is readily available outside the entry door to the ICU and within the ICU). If the provider failed to perform HH upon entry to the unit or prior to patient contact, it was recorded as negative HH.

The data for each sign, practitioner subgroup and gender subgroup were analyzed with a Chi-square test for equal proportions. A multivariable generalized linear model for a binary outcome with sign, practitioner, gender, and the interactions of practitioner and gender with sign was also used to predict HH. *p* Values <0.05 were considered to be statistically significant. SAS 9.3 (SAS Institute, Inc., Cary, NC) was used for all analyses.

With 60 per group, we expected to have 80% power to detect a significant difference as small as 21% at the 1-tailed 0.05 level, given that the baseline at this ICU was estimated at 30%. This difference is equivalent to a moderate effect size of 0.5 using a normal approximation for a binary variable. A 21% difference is in line with the 18% difference found by Torchiana and colleagues [12].

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