

Infection Prevention and Control

# A Multifaceted Approach to Education, Observation, and Feedback in a Successful Hand Hygiene Campaign

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Hand hygiene (HH) is a fundamental part of preventing health care–associated infections (HAIs), which cause mortality and morbidity, prolong hospital stays, and contribute to increases in health care costs.<sup>1–3</sup> In the United States, The Joint Commission has addressed improvement in compliance with HH guidelines through its standards (IC.01.04.01) and National Patient Safety Goals.<sup>4\*</sup> However, in many health care facilities HH compliance remains low.<sup>5–7</sup>

Improvements in HH compliance have been associated with lower rates of acquisition of multidrug-resistant organisms, including methicillin-resistant *Staphylococcus aureus* (MRSA)<sup>8–11</sup> and vancomycin-resistant *Enterococcus* (VRE),<sup>12</sup> within the hospital.

Attention to various behavioral factors and formulation of waterless handrubs that allow ease of use with improved compliance have contributed to some improvements in HH compliance,<sup>13–29</sup> with successful national-, local-, and hospital-level HH campaigns being reported from several countries.<sup>25–29</sup> Prior research has identified the importance of feedback on HH compliance and of making HH campaigns multidisciplinary and multimodal.<sup>20,29,30</sup> The Swiss national campaign, a multimodal program, was successful in improving HH compliance and in sustaining it for three years. Success was attributed to contextual factors within the organization, the encouragement of hand-rub use, and hospitalwide “ownership” of the initiative by managers and senior health professionals.<sup>28,29</sup> Yet in spite of these successes, as documented in the literature, compliance with HH protocols remains a challenge in many health care institutions.

In 2008, at Tufts Medical Center, a 425-bed academic medical center in Boston and the major teaching hospital for Tufts University School of Medicine, HH compliance rates were con-

\* Goal 7: Reduce the risk of health care–associated infections. NPSG.07.01.01: Comply with either the current Centers for Disease Control and Prevention (CDC) hand hygiene guidelines or the current World Health Organization (WHO) hand hygiene guidelines.

## Article-at-a-Glance

**Background:** Prevention of health care–associated infections starts with scrupulous hand hygiene (HH). Improving HH compliance is a major target for the World Health Organization Patient Safety Challenge and is one of The Joint Commission’s National Patient Safety Goals. Yet, adherence to HH protocols is generally poor for health care professionals, despite interventions designed to improve compliance. At Tufts Medical Center (Boston), HH compliance rates were consistently low despite the presence of a traditional HH campaign that used communication and education.

**Methods:** A comprehensive program incorporated strong commitment by hospital leadership—who were actively involved in responsibilities previously only performed by infection preventionists and quality and patient safety staff—dedication of financial resources, including securing a grant; collaborating with a private advertising firm in a marketing campaign; and employing a multifaceted approach to education, observation, and feedback.

**Results:** This campaign resulted in a rapid and sustained improvement in HH compliance: Compared with the mean HH compliance rate for the six months before the campaign (72%), postcampaign HH compliance (mean = 94%) was significantly greater ( $p < .0001$ ). Factors contributing to the success of the campaign included the development of the marketing campaign to fit this academic medical center’s particular culture, strong support from the medical center leadership, a multifaceted educational approach, and monthly feedback on HH compliance.

**Conclusions:** A comprehensive campaign resulted in rapid and sustained improvement in HH compliance at an academic medical center after traditional communication and education strategies failed to improve HH performance.

sistently low despite the presence of a traditional HH campaign that used communication and education. With a Joint Commission accreditation survey approaching, a comprehensive program was developed that resulted in a rapid, significant, and sustained improvement in HH compliance. The program, described in detail in this article, incorporated strong commitment by hospital leadership; dedication of financial resources, including securing of a grant; collaborating with a private advertising firm; and employing a multifaceted approach to education, observation and feedback.

### **Previous Hand Hygiene Campaigns**

A research study on HH conducted in two Tufts Medical Center ICUs in 2002 and 2003 showed compliance rates of 10.1% before patient care and 35.6% after.<sup>31</sup> In 2003, an HH committee, consisting of representatives from Infection Prevention, Infectious Disease, Critical Care, and Nursing, was formed. Strategies such as dissemination of posters and buttons; institution of mandatory training sessions by an infection preventionist, with a posttest upon hire and annually thereafter; strategic placement of hand-rub dispensers; and informational events were implemented. Compliance increased to only 43%–49% before care and 71%–76% after care in 2004 through 2006, as measured by occasional observations. In early 2007, the medical center partnered with the Tufts Health Care Institute (THCI) and the Tufts University School of Medicine Office of Continuing Education (OCE) to obtain a grant to support a pilot HH performance improvement initiative in one adult and one pediatric ICU.

With the aid of an outside continuing education consultant, the medical and nursing staff from both units, along with staff from the hospital's quality and patient safety department, were involved in planning and implementing interventions to improve HH performance. The THCI/OCE and quality and patient safety staffs met once or twice a month from September 2007 to July 2008 with the ICU administrators to shape and guide this pilot project.

On the basis of a root cause analysis, the HH quality improvement (QI) group determined that a number of factors affected the frequency of hand washing in the clinical setting, including inconsistency and inadequacy of placement of sinks and hand sanitizer dispensers; insufficient reminders—visual and interpersonal—to clinicians from other staff as well as “empowered” patients; and deficits in clinician knowledge, attitude, and accountability. As a result of this pilot project, the following actions were taken:

- Hand sanitizers were placed in standardized locations near

patient beds (in the case of the medical ICU [MICU]) and bassinets (in the case of the neonatal ICU [NICU]).

- Reminder signs were developed and mounted in both units.

- Fact sheets with implications of poor HH and instructions for proper hygiene were distributed to all staff in the selected units.

- New orientation packets were developed for resident rotations in the MICU and NICU.

- Comparative data on rates of appropriate HH performance before and after touching patients, which were based on data observations by the quality and patient safety and hospital epidemiology staff, were openly posted in the units and published in the hospital's newsletter.

During six months between the month of September 2007 and February 2008 (defined as “the precampaign period”), HH compliance averaged 72% after care hospitalwide, with higher rates in the two units involved in the grant-funded initiative (95% and 100%). Although this precampaign rate was better than it had been, it did not achieve the hospital's desired goal of 90% compliance. Lessons learned from this grant-funded pilot were therefore incorporated into a hospitalwide HH campaign, launched in the spring of 2008.

### **Developing the Hand Hygiene Campaign**

In February 2008, with a Joint Commission visit anticipated in the spring, Tufts Medical Center's administrative leaders agreed to make the improvement of HH compliance throughout the medical center a top-priority initiative. A private advertising firm was contracted to develop a professional marketing campaign for the hospital. The campaign's development included the initial research, concept, selection, and development phases.

#### **INITIAL RESEARCH PHASE**

1. *Review of Other HH Programs.* Research indicated that many HH programs used posters and stickers, often with images of hands. Some of the posters were too wordy to be read by busy health care workers. Many of these materials lacked the proper “tonality” (impact on audience) to stand out in a cluttered background and to give strong and clear messages.

2. *Review of Marketing Literature.* This review indicated that favorable outcomes were often associated with use of humorous and positive messages.<sup>17,18,32,33</sup>

3. *Internal Interviews.* Representatives from the advertising firm interviewed key clinical, administrative, and infection prevention personnel to assess the culture and the climate for change within the medical center.

4. *Assessment of Patients' Level of Awareness of HAI.* An analysis of mainstream media coverage of HH and HAI suggested that patients would be generally acquainted with these issues before coming into a hospital—so that the campaign materials would not need to educate patients about the importance of HH.

5. *Environmental Tour.* The environmental tour revealed clutter on the walls of the patient care units, which resulted from a variety of “messaging,” including HH posters of varying quality. These tours made it apparent that a successful campaign must graphically break through existing clutter.

#### CAMPAIGN CONCEPT PHASE

On the basis of the assessment, the advertising firm developed four potential approaches, with varying degrees of tonality, which were presented to the patient safety leadership committee at Tufts Medical Center. This multidisciplinary group, which was composed of physicians, nurses, infection preventionists, and QI personnel, served as a focus group for the campaign developers.

Bold colors were selected for the campaign materials so that the campaign message would stand out in the cluttered background of the patient care units. Simple, short, and clear messages were chosen for the campaign materials to appeal to busy health care workers, as well as to patients and families of patients. By using images of hospital leaders in the marketing materials, the campaign conveyed the endorsement of hospital leadership. We did not use the image of hands, given our recognition that the campaign was intended to focus on patient safety, not hands.

#### SELECTION PHASE

The patient safety leadership committee screened the content of all promotional materials before the campaign's initiation.

The tone of the campaign material received significant attention. Humorous and positive messages were favored over negative messages. For example, “Since you care enough, WASH YOUR HANDS” was favored over “Take your dirty hands off me! Of course you can put them back once you've washed.”

#### CAMPAIGN DEVELOPMENT PHASE

To create a campaign with significant impact, the marketing firm developed numerous elements for the campaign. These elements consisted of an e-mail to introduce the campaign to employees, large posters introducing the campaign to patients

and families, a handout that was given to new patients at intake, and small posters (with adhesive allowing them to be easily applied and removed from walls) for the walls of patient rooms, restrooms, staff break areas, and nursing units. In all, posters of varying sizes with more than 30 distinct messages—some targeting patients and families, some targeting employees, and some targeting both—were developed.

#### CAMPAIGN IMPLEMENTATION PHASE

Materials were distributed throughout the medical center on March 18, 2008, for immediate use. The stickers were posted around the nursing units, for example, at the door of each patient's room, by the sink, and by the computer terminals. Pins with similar positive and humorous messages were distributed to employees to wear on white coats, and so on.

#### Leadership Commitment

For the first time in the history of the hospital's HH compliance improvement efforts, the success of HH-related initiatives became the responsibility of hospital administrators rather than exclusively the infection prevention or quality and patient safety staff. The chief medical officer [D.G.F.] and CEO spoke about HH at every given opportunity, and they, along with the physician-in-chief, were featured prominently on campaign signs. Heads of departments and ICU directors were asked to make HH an educational priority and to personally carry out HH observations, which were previously performed only by infection preventionists and quality and patient safety staff.

#### Multifaceted Approach to Hand Hygiene Compliance Improvement

The comprehensive HH compliance improvement program built on previous experience, research, and an understanding of the culture within the hospital. The desire to achieve a certain level of quality in anticipation of the Joint Commission survey was also certainly a driving factor. The HH campaign included visual cues, as described; aggressive educational efforts, including group and online teaching, grand rounds lectures, and nursing inservices, all intended to bring the importance of HH to the forefront; and close observation with feedback.

To further emphasize a culture of infection prevention, alcohol-based hand-sanitizer dispensers were installed in all public non-patient care areas, such as outside elevators, at entrances to the building, at the doorways to the hospital restaurants and coffee shops, and along hallways.

### Sidebar 1. Frequently Asked Questions on Hand Hygiene Observations

**1. If I observe someone go into the room, do I have to wait for them to come out?**

No, not necessarily. Record what they did before care and go collect other observations rather than spending time waiting.

**2. Can you recommend good times for collecting a high number of observations?**

When the teams are rounding, it is often a good time to observe many different individuals and disciplines at once.

When a patient returns from any test or procedure, particularly in an ICU, there are often many individuals/disciplines involved in getting the patient settled back in bed.

In non-ICUs it will be necessary to move about the unit and observe from many different locations in order to observe any indications for hand hygiene.

**3. What if I see someone exit a room but I missed them going in?**

Record your observation of what they do upon exiting the room. Each observation is counted as an independent event. You do not have to observe any one person or groups of persons over time.

## Results

### DATA COLLECTION

Following the recommendations of the CDC,<sup>5</sup> we assessed HH compliance by unannounced direct observations completed during the day shift Monday through Friday (number of hours per week varied) on each inpatient unit. Each observer was trained by an infection preventionist who was experienced in performing observations and analysis of HH performance. The observer was provided with a standardized tool for documenting observations that would allow for data entry into an Excel spreadsheet for analysis (Appendix 1, available in online article). The infection preventionist provided 45–60 minutes of instructions on use of the tool, as well as written guidelines (Appendix 2, available in online article) and a list of Frequently Asked Questions (Sidebar 1, above) to the trainee.

Observers were instructed to record only observations of clear opportunities or indications for HH that were either met or not met. If there was uncertainty, no observation was to be recorded. Observers were encouraged to page or e-mail infection control with any questions about how to conduct observations or document on form. Observers were allowed to spend time practicing until they felt comfortable before observations were “counted.”

An HH compliance failure was recorded when (1) the clinician was observed to touch the patient or an object in the

patient’s room and (2) there was no HH activity observed either before or after the encounter with the patient. Under ambiguous circumstances (when it was not clear if the clinician touched the patient or an object in the room), the monitor did not “score” the encounter. In general, the monitors did not provide immediate feedback to the employees they were monitoring.

The data collection mechanism and the trained professionals monitoring HH compliance were the same in both the pre- and postcampaign period.

### DATA ANALYSIS

The HH compliance rate was calculated as a percentage by dividing the occurrences of HH compliance by the total number of observations. Probability (*p*) values were calculated using the continuity-corrected chi-square test.

### DATA FEEDBACK

In parallel to the initiation of the HH campaign, the chief medical officer distributed monthly HH compliance data, sorted by nursing floor, to all employees which contained both text and graphs.

In special circumstances, specific groups were targeted for HH training on the basis of the compliance data. For example, extra educational sessions were targeted to transportation personnel when HH observation data indicated that this group had significantly low compliance.

### MEASUREMENT OF EPIDEMIOLOGIC MARKERS

Rates of MRSA, VRE, and *Clostridium difficile* acquisition, reported per 1,000 patient days, within the hospital are closely monitored on an ongoing basis per the CDC guidelines<sup>5</sup> (<http://www.cdc.gov/nhsn>). Organisms isolated from clinical specimens but not screening tests are counted in the acquisition rates. Patients known to be colonized at the time of admission are excluded from these rates.

## Results

### HAND HYGIENE COMPLIANCE

In contrast to previous campaigns, which, as stated, resulted in modest incremental but inadequate improvements in HH compliance, this campaign yielded rapid and significant improvement in HH compliance (Figure 1, page 7). Compliance with HH increased markedly to 90% in March 2008, when the campaign began. Although compliance slipped slightly in April 2008 (87%), compliance rebounded and has remained consistently above the target of 90% to the present date. Compared

Hand Hygiene (HH) Compliance, Pre- and Postcampaign, September 2007–February 2009

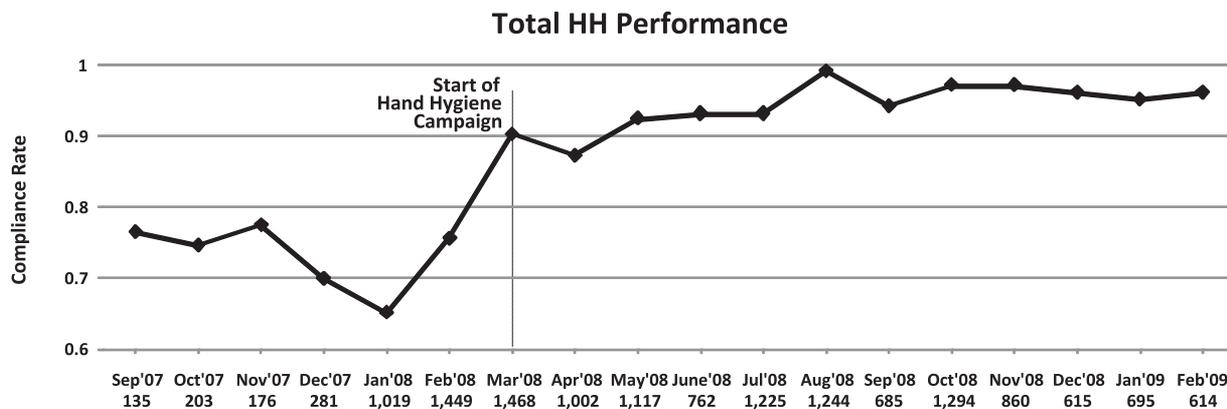


Figure 1. Compliance with HH increased markedly in March 2008, when the campaign began (compliance rate, 90%), and has remained consistently above the target of 90% to the present date. The numbers below the months represent the number of observations in that month.

with the six-month precampaign period, when HH compliance averaged 72%, postcampaign HH compliance improved significantly during a sustained period of 11 months (mean compliance for postcampaign period = 94%,  $p < .0001$ ). Compliance peaked in August (99%), the month of the unannounced Joint Commission survey. (We present only the data from our intensive monitoring period, which ended in February 2009.)

RELATIONSHIP BETWEEN HAND HYGIENE COMPLIANCE AND EPIDEMIOLOGIC MARKERS

Figures 2a–2c (page 8, also available in online article) show the relationship between HH compliance data and acquisition rates for MRSA, VRE, and *C. difficile* for the pre- and postcampaign periods. MRSA and VRE acquisition rates decreased steadily during the period in which HH compliance increased, whereas *C. difficile* acquisition rates increased.

Discussion

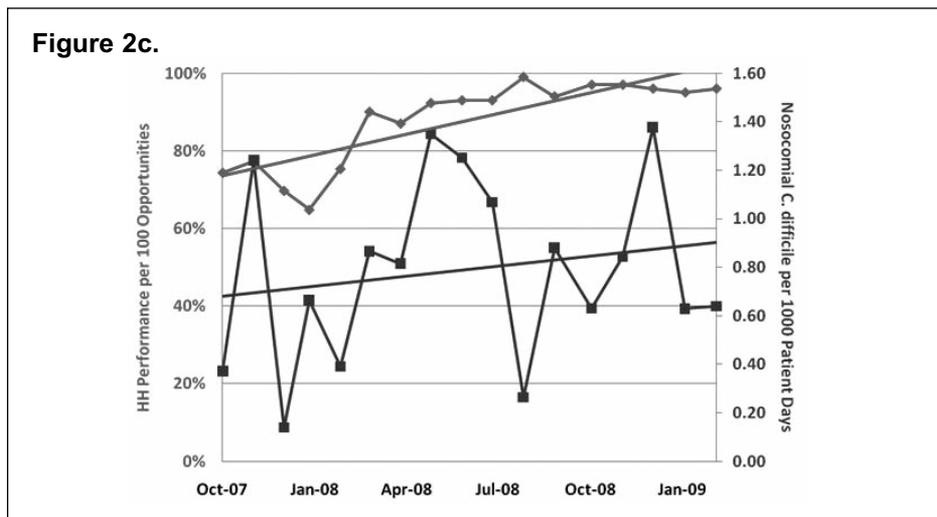
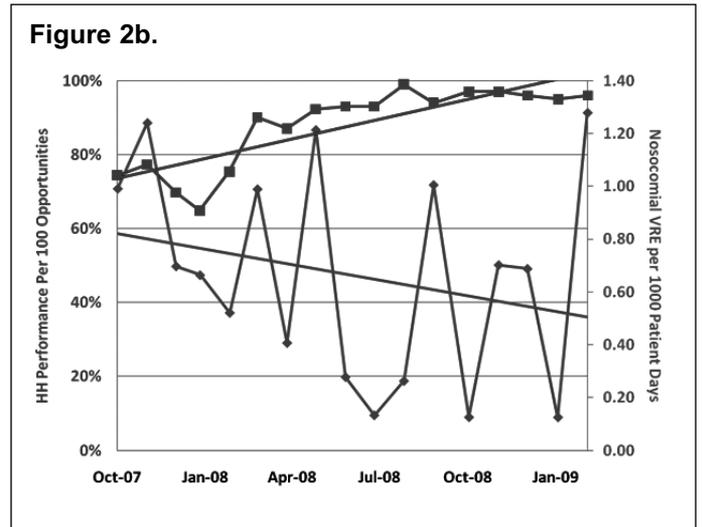
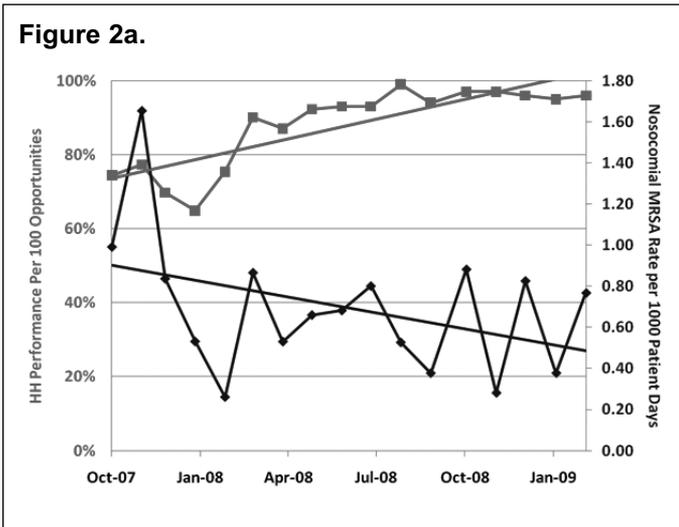
In the setting of mediocre HH compliance despite traditional staff education strategies and a previous unsuccessful campaign, an innovative HH marketing campaign launched in Spring 2008—backed by the strong commitment of hospital administrators and leaders—consisting of humorous and positive advertising materials, coupled with monthly feedback of HH compliance data and aggressive educational activities, was effective in bringing about significant and sustained improvement in HH compliance at our academic medical center. We have enjoyed continued compliance rates of > 90% to the present date.

Our experience confirms the importance of a multifaceted

campaign, as also shown by Lederer et al., who also achieved dramatic results after previous unsuccessful campaigns.<sup>34</sup> Moreover, Lederer et al., like Ancona et al.,<sup>35</sup> also reported a decline in MRSA transmission during the period of improved HH—we demonstrated a decrease in VRE transmission, as well.

We believe that success in achieving HH compliance improvement or any QI goal is absolutely dependent on the visible commitment of high-level hospital administrative staff. In our case, the CEO, chief medical officer, physician-in-chief, and department heads, in conjunction with the continued involvement of infection prevention and quality and patient safety staffs, spoke about HH as often as possible at meetings and in written communications, performed HH compliance observations, and allowed their photos to be depicted in the marketing materials. The marketing campaign generated a “buzz” and a positive feeling about HH, despite the fact that HH had been well promoted in traditional medical language prior to this campaign. In the campaign setting, where caregivers had a heightened awareness of HH, the monthly feedback of HH data appears to have been a significant contributor to the success of the program and, we believe, has helped to sustain interest and awareness over time. The compliance rate, which almost certainly benefited from anticipation about the Joint Commission survey, continues to exceed the organization’s target. Although it is certainly possible that a Hawthorne Effect might explain the increase in HH compliance—according to which awareness of monitors observing HH behavior would have promoted improved HH behavior<sup>5,36,37</sup>—observations were done as covertly as possible, and furthermore, the

**Relationship Between Hand Hygiene (HH) Compliance Data and Acquisition Rates for Methicillin-Resistant *Staphylococcus aureus* (MRSA), Vancomycin-Resistant *Enterococcus* (VRE), and *Clostridium difficile*, October 2007–January 2009**



**Figure 2.** MRSA and VRE acquisition rates decreased steadily during the period in which HH compliance increased (Figures 2a and 2b), whereas the *C. difficile* acquisition rate increased (color version available in online article).

same methodology was used to assess HH both before and after the campaign.

According to Mah et al., behavioral nonadherence to HH practice arises from lack of opportunity (for example, insufficient time, interference with patient care activities, inaccessible hand sinks), lack of ability (inadequate knowledge of HH technique), or lack of attractiveness (skin irritation from hand washing).<sup>18</sup> Before the marketing campaign, we had made

efforts to overcome these barriers by installing containers of nonirritating alcohol handrub throughout the medical center and by providing education to all employees about HH. However, these efforts appear to have been necessary—but not sufficient—to achieve a high rate of HH compliance.

We believe that the following factors made this HH campaign unique and successful:

- The HH marketing campaign was developed to fit the

culture of our particular academic medical center.

■ The medical center leadership provided strong support (as represented, for example, in the promotional materials), which studies have shown to be an important factor to a successful campaign.<sup>29</sup>

■ A multifaceted educational approach was deployed; using a variety of teaching modalities increases the appeal to a wide range of providers.

■ Feedback of HH compliance was provided monthly to the entire medical center community, which would have appealed to people's competitive nature and helped sustain commitment to HH compliance.

We attribute our sustained success to having made a substantial cultural change at the medical center. Providers now take pride in the medical center's identity as an institution that values HH as a way to protect patients from preventable disease. Health care workers understand that their superiors and leaders consider HH a top priority. Of note, we were able to decrease the frequency of HH observations without seeing a decrease in compliance rates.

The fact that MRSA and VRE rates declined steadily during the period in which HH compliance increased is consistent with the evidence that these organisms are largely transmitted from patient to patient on the hands of health care workers and that improvements in HH compliance are critical in the effort to control the spread of these resistant bacteria.<sup>8-12</sup> Yet, the fact that *C. difficile* acquisition rates increased during the period of the campaign is not surprising. With the greater availability of waterless HH agents, superior time efficiency, and lower risk of skin irritation, as compared with use of simply soap and water, it can be presumed (although not measured in this study) that the majority of HH occurrences involve the use of waterless hand sanitizer rather than soap and water. Because waterless hand sanitizer is known to lack activity against *C. difficile* spores, the rate of acquisition of this epidemiologic marker would not be expected to decline with improved HH compliance. Nevertheless, despite continued use of hand sanitizers at our institution, we have seen a consistent decline in *C. difficile* over time (data not shown). In fact, authorities have not endorsed the encouragement of soap and water hand washing in hospitals even after patients known to be colonized or infected with *C. difficile*<sup>5,38</sup> are provided care because noncompliance with soap-and-water HH is so well documented.<sup>39</sup> Many experts believe that for *C. difficile*, in contrast to MRSA and VRE, proper room cleaning and isolation precautions are probably more important than HH.<sup>40</sup>

This study provided data for a relatively short time frame.

Determining the longevity of HH improvement after this campaign and defining the inputs required to sustain these gains in the face of an increasing number of quality and patient safety priorities will be the subject of future study. Further research is also required to determine if the success of this campaign is generalizable to other academic medical centers or to community hospitals. However, our rapid and sustained success suggests that institutions challenged by poor HH compliance should consider a strategy that includes marketing based on the culture of the hospital, visible dedication of hospital leadership and commitment of resources, and a multifaceted educational approach with observation and feedback. Such concepts have been incorporated by the Joint Commission Center for Transforming Healthcare, which has recently made its Targeted Solutions Tool™ for HH available to accredited hospitals.<sup>41</sup> ■

### Online-Only Content

See the online version of this article for

Appendix 1. Performance Monitoring Tool

Appendix 2. Guidelines for Measuring Hand Hygiene Performance/Contact Precautions

Figure 2. Relationship Between Hand Hygiene (HH) Compliance Data and Acquisition Rates for Methicillin-Resistant *Staphylococcus aureus* (MRSA), Vancomycin-Resistant *Enterococcus* (VRE), and *Clostridium difficile*, October 2007–January 2009

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## Appendix 2. Guidelines for Measuring Hand Hygiene Performance/Contact Precautions\*

### Background

Current indications for hand hygiene (per CDC) include before all contact with patients, after all patient contact, and after contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient. Hand hygiene is also indicated if moving from a contaminated-body site to a clean-body site during patient care. Observations of the latter are expected to be limited as health care workers (HCWs) attend to patient privacy; if such is observed it may be recorded as performance both after and before care.

### Data Collection/Use of Worksheet or Tool

1. Use one worksheet per time period of observation. Note location, date, and time of observations at top of sheet. The number of observations collected during a period will depend on location, patient population, acuity, etc. Observe as many opportunities for hand hygiene as you can within the time frame. You may move about as necessary to increase the number of observations. It is not necessary to observe only one room or HCW over time.
2. Circle the title of person being observed for each observation. You may have observations of only RNs, only MDs, or a combination of many different types of HCWs.
3. Categorize (i.e., mark) each observation of hand hygiene performance/nonperformance as Before Care or After Care. (If hand hygiene is performed after care on one patient and the HCW goes directly to another patient without touching other surfaces, this may be counted as 2 observations, one after care and one before care.)

### Definitions

**Before care** = before direct patient contact or before donning sterile gloves for invasive procedures.

**After Care** = after contact with patients (even if gloves are worn) or after contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient.

Observations of hand hygiene performed/not performed when moving from a contaminated-body site during patient care to a clean-body site during patient care will be recorded twice, as both After Care and Before Care. These are expected to be infrequent due to attention to privacy needs.

4. Categorize (i.e., mark) each observation as Handwashing, Handrub, or No Hand Hygiene.

### Definitions

**Handwashing** = use of soap (any soap from a hospital soap dispenser) and water for a minimum of 10–15 seconds.

**Handrub** = Alcohol handrub is applied to skin and distributed over the surface of the hands. No water should be used.

**No Hand Hygiene** = Neither handwashing or use of an alcohol handrub is performed despite it being indicated for the task/activity.

5. If the patient is on Contact Precautions, observe for compliance with Contact Precautions (appropriate use of gloves and gown). For each observation, note if the patient was on isolation precautions or not on precautions.

### Definitions

**Contact Precautions** – Contact Precaution sign posted at door/bed space (sign is pink colored or sometimes white if noncolored copies are made). Modified Contact (orange sign) has different expectations and is not being monitored.

Gloves are required upon entry (crossing threshold) into Contact Precaution room/bed space.

Gowns are required for contact with the patient or the environment that extends beyond gloved hands, e.g., physical exam, bed bath, linen changing/stripping, wound care, other treatments, etc. Gowns are not required to check pump alarm, answer phone, interview or talk with patient, or other task where only contact with patient or environment is limited to gloved hands.

Proper removal of gloves means that gowns and gloves (proper sequence is to remove gown first and gloves second but wouldn't try and assess) are removed upon exiting room or moving beyond bed space. Gloved and/or gowned personnel should not touch any surface outside of the patient's room without removing contaminated barriers and performing hand hygiene.

\* CDC, Centers for Disease Control and Prevention; RN, nurse; MD, attending physician.

Relationship Between Hand Hygiene (HH) Compliance Data and Acquisition Rates for Methicillin-Resistant *Staphylococcus aureus* (MRSA), Vancomycin-Resistant *Enterococcus* (VRE), and *Clostridium difficile*, October 2007–January 2009

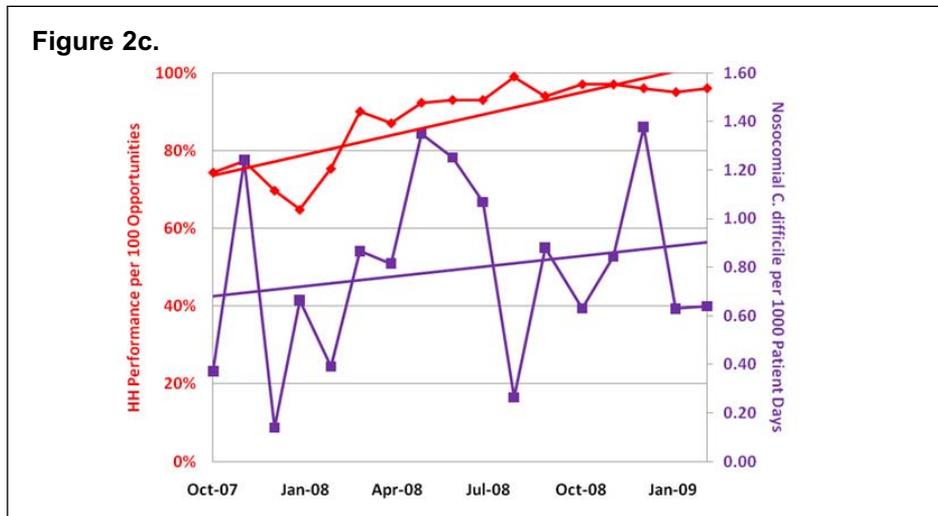
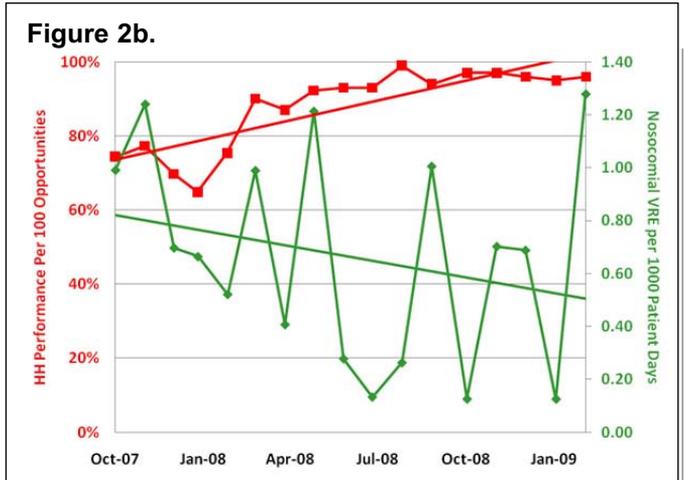
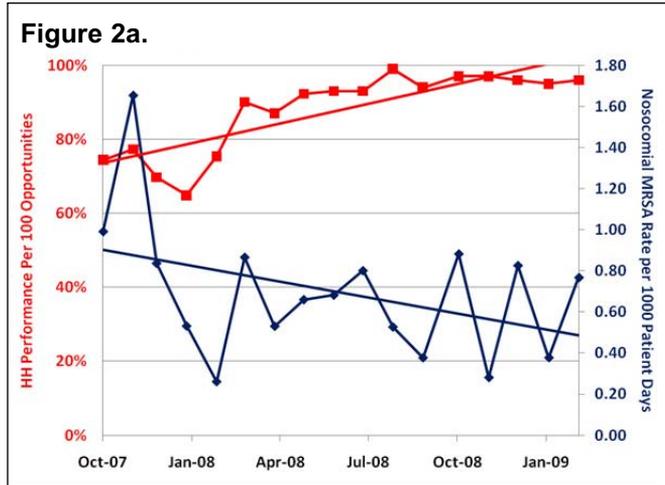


Figure 2. MRSA and VRE acquisition rates decreased steadily during the period in which HH compliance increased (Figures 2a and 2b), whereas the C. difficile acquisition rate increased.