Codman Awards

A Comprehensive Hand Hygiene Approach to Reducing MRSA Health Care–Associated Infections

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Novant Heath is a large, not-for-profit health care system in the southeastern United States. The service area for the system, which is composed of nine integrated hospital facilities and partnerships with seven other facilities, encompasses North Carolina and South Carolina. The nine facilities range in size from 22 beds to more than 950 beds, with a total of 2,650 beds. The system also includes more than 1,200 employed physicians and physician extenders distributed across the service area in 246 practices, as well as 92 imaging centers spread predominately throughout the southeastern United States. The system cares for more than 100,000 inpatient discharges per year and entails more than 3.2 million outpatient visits to the physician practices.

Hand hygiene has been a major tenet of infection control practice for many years. Moreover, it has been recognized as highly effective in reducing morbidity and mortality to patients since the work of Semmelweis in 1846.[1] The seven facilities that were integrated into Novant Health at the time of implementation of the hand hygiene compliance initiative had long based their infection control programs on the recommendations for health care settings that were developed by the Centers for Disease Control and Prevention (CDC).[2] All facilities incorporated and further refined the CDC standards for hand hygiene programs into their infection control programs. Furthermore, in 2000 several of our facilities participated in a southeastern regional collaborative, the Problem Pathogen Partnership, which was aimed at improving hand hygiene compliance. Although the participating facilities gained much through the collaborative, the compliance rates achieved throughout 2000 and 2001 and the sustainability of those rates were disappointing. The Novant facilities' methicillin-resistant *Staphylococcus aureus* (MRSA) health care–associated infection (HAI) rates were greater than the published best practices–associated rates in the peer review literature. In addition, in 2004 one of the facilities experienced an outbreak of MRSA, which resulted in the death of a child.

Article-at-a-Glance

Background: Methicillin-resistant *Staphylococcus aureus* (MRSA) infections are the most common health care–associated infections (HAI) in the acute care setting. The major mode of transmission from patient to patient is through bedside care providers via contaminated hands. After individual projects within Novant Health proved to be ineffective, with any gains in hand hygiene compliance being short-lived, a program was implemented to address unsatisfactory hand hygiene compliance rates. Published studies have associated improvements in hand hygiene compliance with decreases in HAIs.

Methods: A comprehensive systemwide program was developed with major program support from the education, marketing, clinical improvement, and clinical care departments. The key drivers of the program were the use of alcohol-based hand sanitizer and the system's dedication of resources to collect and report the compliance data. Monthly compliance rates were collected by two dedicated compliance monitors, and the results were shared across the system. In addition, MRSA HAI rates were followed for all the acute care facilities.

Results: Hand hygiene compliance rates increased from a baseline compliance of 49% to 98% for December 2008, with sustained rates greater than 90% since November 2006. More importantly, MRSA rates decreased from 0.52 HAIs per 1,000 patient days in 2005 to 0.24 HAIs per 1,000 patient days by year-end 2008.

Discussion: Understanding hand hygiene compliance is a simple matter of observing caregiver behavior during each hand hygiene opportunity and recording the actions taken. The improvements in hand hygiene compliance translated into a real decrease in the number of hospital-acquired MRSA infections.

On the basis of the poor compliance data and the patient experiences, in 2004 the president of Novant proposed to the system's executive team that hand hygiene compliance be addressed as the system's next long-term corporate goal. The goal of the program was to achieve hand hygiene compliance rates of > 90% for all seven acute care facilities within the system. Compliance was defined using the CDC definitions regarding hand hygiene.[2] The system also has physician practices that participated in the program, but the data collected were not used in the systemwide roll-up for hand hygiene compliance. A secondary goal was to reduce HAIs within the acute care facilities. Because MRSA is the most common organism causing HAIs, this organism was selected as a surrogate marker in monitoring for all HAIs.

The targeted population for the program was the inpatient acute care facility population—the population most at risk for acquisition of resistant organisms and subsequent infection. We have historical data regarding our resistant organism rates and patient-associated HAI rates. We hypothesized that a more integrated approach to hand hygiene would result in a more successful overall infection control program. We further believed that this program would be one of our first to truly challenge an entrenched culture of benign noncompliance with performance data and an organizational expectation of excellence.

Methods

Organizational Support

We began this program in 2004 after the executive committee of the organization chose hand hygiene compliance as one of our three-year (2005–2007) corporate goals. Since 2002, the executive committee had chosen clinical goals to include in the overall goals for the organization, which are used at the administrative executive level in financial bonus calculations. The hand hygiene program then became a corporate focus and as such was monitored by an executive committee–appointed team, the clinical systems board. This board provides oversight and barrier removal for all clinical patient safety and quality efforts throughout the organization.

As with all corporate projects, a hand hygiene committee was established in 2004 to set the direction and provide oversight at an operational level to all the constituent facilities through the infection prevention departments in each of the nine facilities. The committee, composed of key clinical and administrative leaders representing the component facilities or corporate departments, was responsible for collecting, analyzing, and disseminating the data reports to the organization. In addition, it developed the program components, including data collection and reporting tools, education, community outreach, and clinical department interface. In general, this committee directed all aspects of the hand hygiene program.

Performance Measurement

In its first meetings in early 2005, the committee focused on indicator development and brainstormed the methodology to be used to collect and report the compliance data. The decision was made in mid-2005 to dedicate two positions (hand hygiene monitors) staffed by experienced nursing trained personnel to collect and report the compliance data. The hand hygiene monitors were trained by the infection control practitioners in the use of the CDC recommendations.[2] Several issues were identified that could influence the data collection, as follows:

- ***Observation Bias.*** It was clear that the presence of the hand hygiene monitors on the units might influence the physicians' and clinical staff's behavior. To validate the data and to ensure that the observation process was sound, the monitors would alternate clinical units to confirm hand hygiene compliance. In addition, individual infection control practitioners would perform independent validation observations within their own regions.
- ***Hospital Bed Census Differences.*** To account for census differences between the facilities involved, the hand hygiene monitors would have to be sensitive to the fact that the smaller facilities could have fewer observation opportunities per hour. This meant that enhanced focus had to be given in these facilities.
- ***Privacy Concerns.*** There were times when patients were receiving care behind closed doors for privacy reasons. In these instances, the monitors were instructed that it was permissible to move on to the next observation opportunity.
- ***Shift Differences.*** To allow for potential different performance levels for different shifts that the staff worked, the monitors tried to periodically monitor staff throughout these different shifts.

All other infection prevention practices for the observational period were adopted from the CDC recommendations.[2] No changes were made in the isolation precautions, active surveillance, HAI patient screening protocols, or environmental cleaning practices within the facilities during the hand hygiene program.

Observational data collection began in November 2005, with use of the hand hygiene observation tool (Appendix 1, page 185). The initial focus was to ensure standardized data collection between the two monitors and to refine their obser-

vational techniques. Later, data collection was accompanied by immediate feedback and education to the observed individual and immediate reporting to his or her department manager. From the outset, when the committee was chartered, employee education, community outreach, and marketing development took place concurrently.

The infection prevention departments in the seven facilities had a consistent process to follow in collecting HAI data, which included all acute care–associated pathogens, with a focus on MRSA as the most common HAI pathogen. At each facility, these data were also provided to the hand hygiene committee and to all nursing unit managers.

Performance Improvement Activities

Key staff involved in this project on a daily basis involved inpatient and outpatient nursing staff, the infection control hand hygiene monitors, the medical staff leadership, and the system's leadership. The nursing leadership on the hand hygiene committee helped ensure that all nursing staff understood the importance of the program, were educated in the data monitoring process and intervention strategies, and received feedback on the performance to goal or when missed opportunities occurred. All staff received reports on the progress to date of the hand hygiene compliance goal, with specific feedback on their own departments. The medical staff leaders also received reports and provided feedback on an individual basis to any physicians noted to be noncompliant with accepted hand hygiene practice. This feedback was provided in a personal letter to the physician, which, as the physician was given to understand, would also be added to his or her credentialing file.

Senior nursing leadership conducted education for the nursing staff on the accepted practices to achieve hand hygiene compliance and on the expectations of clinical staff to adhere to the hand hygiene guidelines. Furthermore, all staff were educated on the role of the monitors and the expectation that the monitors be treated as content experts for hand hygiene processes. This education was repeated at intervals to assure all new employees were instructed and to provide reinforcement of the policies and protocols involved to all nursing staff. Broad education and updates were provided to the medical staff and organizational staff on the whole through memos, posters, e-mails, and leadership presentations with emphasis on the data and progress of the overall initiative and department-specific compliance rates.

Our overall organizational approach to the problem of improving compliance was based on helping caregivers understand the current culture—on educating and informing them of the moral and ethical imperatives underlying the need for a culture of lasting compliance. Our improvement ideas were based on understanding which "touch points" would be particularly moving for the general body of the health care staff. We employed several different campaigns at once across all the facilities, always monitoring the compliance results monthly and providing feedback to all members of the organization. The campaigns included the following:

- Traditional nursing and physician memos and poster-board communications
- Hard-hitting posters (for example, "What You Can't See Is Killing Them," "You Could Kill Him with Your Bare Hands") on the likelihood of staff's harming patient with poor compliance
- Hand hygiene fairs, where staff could view posters on hand hygiene and infection prevention
- A "Gel in, Gel out" button
- Visitor education programs
- An internal marketing campaign, with life-sized cartoon cut-outs emphasizing hand hygiene at visitor entrances and lobbies

Each facility could draw on any of the campaigns on the basis of what seemed most effective to staff visitors or patients. This approach allowed for the uniqueness of each facility's culture and resources to develop supporting improvement activities that would best influence its own caregivers. For example, the smaller facilities, with a limited number of doors for patients and visitors, could strategically place and rotate the life-sized cut-outs, thus keeping the message fresh. On the other hand, the larger facilities generally did not have the resources to provide cut-outs for all their doors. Two facilities' improvement activities are provided in Sidebar 1 (page 183).

As stated, the posters used in the internal communication campaigns were often "hard hitting," which often provoked controversy. The intent was to both challenge the employees and inform as to the importance of hand hygiene in the care of patients and the significant negative outcomes resulting from noncompliance. The marketing challenge was to help create a culture where noncompliance was unacceptable and where patient safety became an individual employee responsibility. All posters, stickers, ads, banners, and other marketing treatments were posted on our Web site (http://www.washinghandssaveslives.org) and have been made available at no cost to any health care organization requesting them. To date, more than 900 organizations, including 41 from outside the United States, have accessed the materials.

Sidebar 1. Examples of Facilities' Improvement Activities

Example 1. A new acute care facility had established itself as determined to achieve excellence in all areas within its first operating year. The facility established its culture before it opened, with the leaders setting safety, quality, and customer satisfaction as priority areas. It developed an educational initiative, "Gel in, Gel out," to energize the facility toward excellence in hand hygiene compliance. A team of staff members developed "Gel in, Gel out" buttons. A rollout plan was developed for the initiative, with the key leaders as champions to ensure the initiative's dissemination across the facility. All staff participated in wearing and distributing the buttons and in educating other staff members, patients, and visitors in the importance of hand hygiene. This facility was one of the first to achieve the goal of 90% compliance, and its campaign served as a model for other facilities to adopt and adapt.

Example 2. The cardiac interventional postprocedure unit in one hospital determined that the most effective way to achieve best results was to work early to change the culture and then to identify how to best create self-supporting performance improvement activities. The unit identified three physicians to serve as peer educators and performance leaders. It then developed an educational package that included a public display board of the unit's approach to infection prevention through strict hand hygiene compliance. Finally, although the unit was part of the regional monitoring from the dedicated observer, the unit conducted its own monitoring program to ensure 100% compliance. The motto for this unit during this project has been "What is measured gets done." The 1 month out of the last 17 months in which an episode of noncompliance was noted occurred when an employee was visiting from another unit. This prompted the unit to provide education on hand hygiene compliance to the units with which it had frequent contact.

Results

The hand hygiene monitors have been able to conduct 2,000–2,500 individual compliance observations a month across all participating facilities. The inpatient data show a marked and sustained improvement for all regions and for our system as a whole from the first baseline data to December 2008. As shown in Figure 1 (right), the systemwide compliance for hand hygiene has been greater than the target of 90% since November 2006. Although the associated data on physician practices were not included in the goal calculations, compliance in the physician practices was consistently sustained at > 95%. The MRSA HAI rate decreased from 0.52 to 0.24 MRSA HAIs per 1,000 patient days, representing a 54% reduction associated with improved compliance (Figure 2, page 184). At the patient level, this translates to 105 fewer MRSA HAIs for the entire system—from 234 patients in 2005 to 129 patients for year-end 2008.

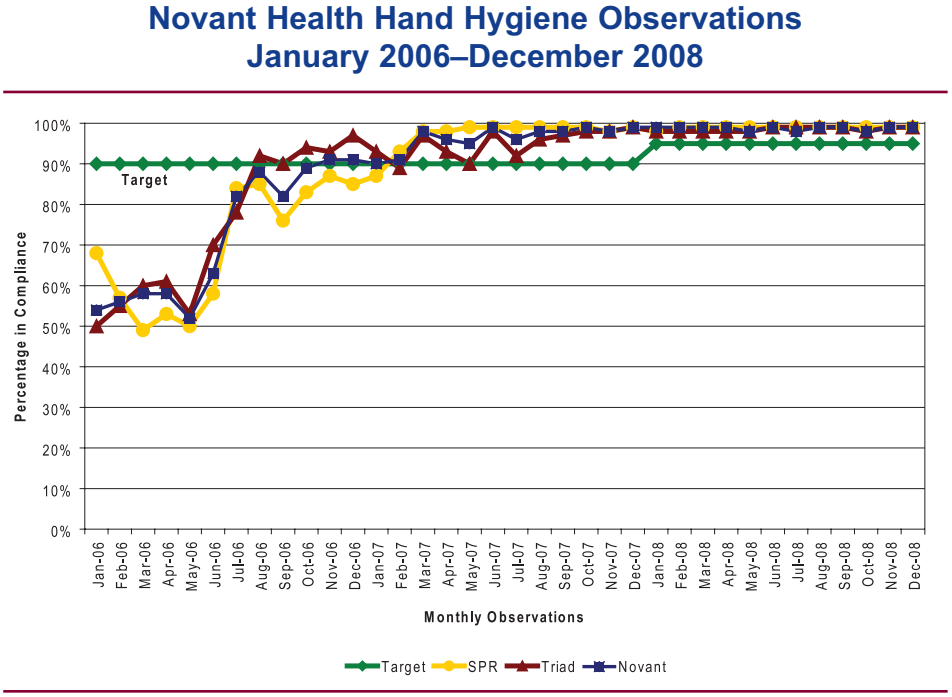

Figure 1. *The figure shows the hand hygiene compliance rates and sustainability for the two largest regions of Novant Health, Southern Piedmont Region (SPR; 4 facilities) and Triad Region (Triad; 3 facilities). Although the three-year goal began in January 2005, systemwide implementation and data collection began in October 2005. Early efforts were varyingly successful. With the advent of immediate, direct feedback in June 2006, continued improvements were seen. By November 2006, the system aggregate performance reached the goal of 90% and has been sustained.*

Discussion

Understanding hand hygiene compliance is a simple matter of observing caregiver behavior during each hand hygiene opportunity and recording the actions taken. Given the simplicity of the problem and the absolute proper outcome clearly defined, it is unsettling that nationally hand hygiene compliance rates are so low. It has become apparent that improving compliance is not a matter alone of better access to technology or better

MRSA Health Care–Associated Infection (HAI) Rate Incidence per 1,000 Acute Care Patient Days, 2002–2008

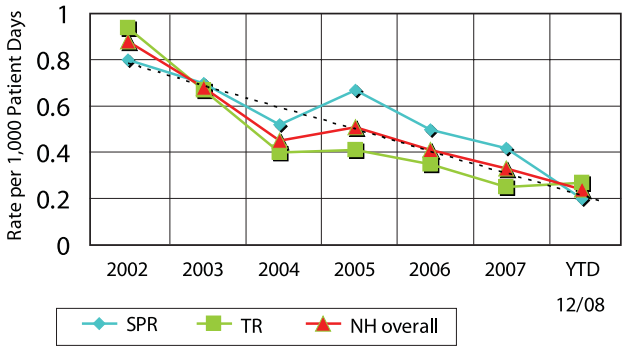

Figure 2. *The figure shows the HAI methicillin-resistant* Staphylococcus aureus *(MRSA) infection rates for the two largest regions of the system, Southern Piedmont Region (SPR; 4 facilities) and Triad Region (Triad; 3 facilities). Any new facilities or regions added were included in the data collection but aggregated into one of the two regions. The data show a decrease in HAI infections for the system from 0.52 to 0.24 infections per 1,000 patient days, representing a 54% reduction.*

monitoring methodologies but one of significant and lasting culture change.

Hand hygiene as a process protecting patients has been known about for over 150 years, yet culturally, how do we embed the practice into the care of our patients? We prioritized changing our organizational culture around patient safety and quality in addition to our processes and clinical improvements. We believe this tandem approach to change was essential to achieving our goal.

The key challenge is to make hand hygiene an automatic competency for all caregivers, much like the campaign to make the wearing of seatbelts an automatic response in driving or riding in a car. The same level of embedded behavior is needed not only with hand sanitization but also with other infection prevention practices, such as isolation precaution barrier compliance. The current hand hygiene program at Novant Health is being extended into an infection reduction program that bundles many of the key infection prevention initiatives into an extended goal for the organization. Performance will be measured in not only hand hygiene compliance but also isolation precaution compliance, environmental cleanliness, intensive care unit device–related infection rates, and facility-level health care–associated MRSA rates. We are also replicating this approach in a more comprehensive, ongoing infection prevention collaborative and in a medication reconciliation project, each focused on patient safety.

Organizations that have hardwired a patient safety culture will find the development of subsequent initiatives easier and complementary with existing ones. In addition, as leaders gain an understanding of their roles in safety, they become more involved in creating best practices, as outlined in the Sidebar. The challenge is for leaders to be seen as change agents for the benefit of patients. After all, the basis for adopting a patient-based safety culture is that changes in caregivers' practices and behaviors will lead to better patient outcomes.

Conclusion

The improvements in hand hygiene compliance translated into a real decrease in the number of health care–associated MRSA infections. Our approach has shown that behaviors can be changed when the employee understands that everyone's behavior counts and everyone is responsible for our patient outcomes. J

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Appendix 1. Novant Health Hand Hygiene Observation Tool

Facility: ☐ FMC ☐ MPH ☐ TMC ☐ PH ☐ PHH ☐ PHM ☐ POH			
Date of Observations:		Shift of Observations:	
Performed by:		Unit of Observation:	
Person Observed (Code Below)	Opportunity Assessed a. before patient care b. during patient care c. after patient care	Type of Hand Hygiene HW – Hand wash HS – Hand Sanitize N – No hand hygiene	Comments / Incidental Observations (i.e., nail enhancements, empty soap, sanitizer dispensers)

Code:
1 – Physician
2 – Physician Support Staff
3 – Nursing (RN, LPN, CNAA, etc.
10 – Other
13 – Environmental Services
4 – Case Management
5 – Pastoral Care
6 – Radiology
11- Hospitalist
7 – Respiratory Therapy
8 – Rehab Medicine
9 – Students
12 – Laboratory