



Service Delivery Innovation Profile

Comprehensive Program to Change Hand Hygiene Culture Improves Adherence to Disinfection Guidelines, Leading to Lower Infection Rates and Costs

Snapshot

Summary

Massachusetts General Hospital instituted a comprehensive hand hygiene program aimed at changing the hospital's culture by making it second nature for staff to clean their hands before and after every patient contact. Program components include education of staff, patients, and visitors; installation of thousands of hand-sanitizer dispensers throughout the hospital; recruitment of 150 employee "champions" who serve as volunteer peer leaders; ongoing support and encouragement from hospital leaders; regular observation, monitoring, and feedback to employees on performance; and incentives and rewards based on performance. The program dramatically improved adherence to established hand hygiene guidelines, leading to meaningful declines in specific infection rates and projected cost savings due to fewer methicillin-resistant *Staphylococcus aureus* infections.

Evidence Rating (What is this?)

Moderate: The evidence consists of pre- and post-implementation comparisons of adherence to established hand hygiene guidelines, incidence rates for select infections, and cases of hand dermatitis among staff, along with post-implementation estimates of the cost savings achieved due to the decline in MRSA infections.

Developing Organizations

Massachusetts General Hospital

Date First Implemented

2003

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Problem Addressed

Hand hygiene guidelines established by the Centers for Disease Control and Prevention (CDC) require hospital staff to disinfect their hands before and after every contact with a patient or a patient's environment. However, many employees do not follow these guidelines, leading to a significant number of preventable health care-associated infections that can result in excess costs, length of stay (LOS), morbidity, and death.

- **Failure to follow appropriate hand hygiene:** Health care staff adherence to appropriate hand hygiene remains low, with multiple studies showing that providers fail to follow established protocols roughly half the time¹; internal surveys at Massachusetts General Hospital in 2000 found similar results.
- **Leading to preventable, costly, and potentially deadly infections:** Health care-associated infections represent a major problem, resulting in extended LOS and excessive financial costs, morbidity, and mortality. According to the CDC, each year an estimated 1.7 million health care-associated infections occur in the United States, leading to 99,000 deaths.² At least one-third of such infections could be prevented, with provider hand hygiene being the single most effective prevention strategy due to its ability to reduce transmission of organisms that cause infections.¹

Description of the Innovative Activity

Massachusetts General Hospital instituted a comprehensive hand hygiene program aimed at changing the hospital's culture by making it second nature for staff to clean their hands before and after every contact with the patient or patient environment. Program components include education of staff, patients, and visitors; installation of thousands of hand-sanitizer dispensers throughout the hospital; recruitment of 150 employee "champions" who serve as volunteer peer leaders; ongoing support and encouragement from hospital leaders; regular observation, monitoring, and feedback to employees on performance; and incentives and rewards based on that performance. Additional details on key program components are described below:

- **Education of staff, patients, and visitors:** All employees receive approximately 10 minutes of training on hand hygiene during initial orientation and again as part of annual training classes or online training sessions. These sessions instruct all employees and volunteers to use Cal Stat, an alcohol-based hand sanitizer, before and after every contact with a patient or a patient's environment, and to wash hands with soap and water, followed by Cal Stat, in certain situations. Small and large groups can also receive special training sessions upon request or whenever the need arises. In addition, a brief video, posters, flyers, and various publications teach staff, patients, and visitors about hand hygiene, and encourage patients and their visitors to ask staff if they have cleaned their hands. Additional details on these educational materials appear below:
 - **Video:** A brief educational video, available in English or Spanish, can be accessed through the hospital's educational television channel and Web site. Advertisements for the video appear in all inpatient rooms.
 - **Posters:** Several times a year, the hospital produces posters featuring individuals or groups from the organization offering hand hygiene tips and/or a catchy slogan, such as 2007's "Be an ACE," with ACE standing for "Always Cal Stat Entering and Exiting" the patient's room.

- **Flyers:** The hospital produces and distributes text-based flyers on specific topics, such as fingernail hygiene, and a comprehensive yet easy-to-read hand hygiene booklet for all work areas.
- **Hospital publications:** Program leaders routinely contribute articles on hand hygiene to periodicals circulated inside the hospital for employees and patients.
- **Liberal placement of hand-sanitizer dispensers:** The hospital installed thousands of Cal Stat dispensers throughout the hospital, including one near the entrance to every patient room; inside most semiprivate, intensive care, and examination rooms; and in many public locations throughout the hospital (such as outside elevators and in waiting rooms). In addition, wall dispensers containing moisturizing lotion have been placed on every floor, with staff being encouraged to use lotion at least twice a day to prevent dryness and promote healthy skin.
- **Peer champions:** Approximately 150 staff from all units and major departments serve as volunteer peer champions, providing a vital link between program leaders and staff through education and feedback, including sharing data from monthly performance reports (see bullet below for more details). Champions are encouraged to be creative in devising strategies to motivate staff, raise awareness, and promote adherence in a positive way. For example, they decorate dispensers with original messages, create homemade posters, develop and distribute special e-mail messages and poems, design contests, and hand out small rewards when they see staff cleaning their hands. Encouraged by a champion, a nurse in a surgical unit wrote and produced a music video entitled "Cal Stat Rap" that gained popularity as a YouTube video, drawing international attention to the program.
- **Ongoing leadership encouragement and reinforcement:** Senior leaders, including the president, chief operating officer, and vice presidents, support the program by regularly articulating the importance of achieving the hospital's goals related to hand hygiene, providing ongoing financial support, incorporating hand hygiene in hospital-wide social events, and holding leaders at all levels accountable for adherence to hand hygiene guidelines within their areas of responsibility.
- **Ongoing observation, measurement, and feedback:** Two infection control nurses routinely monitor hand hygiene adherence before and after patient contact via direct observation on most inpatient units and in several ambulatory care areas. The nurses follow a rotating schedule to ensure representative sampling across weekdays, weekends, and most shifts. They typically visit 9 to 18 units a day, spending from 5 to 25 minutes at each site, depending on the level of activity at each site. In aggregate, they spend a total of 50 minutes per month at each site, recording more than 1,800 observations each quarter. The nurses enter their observations into a database used to calculate adherence rates, which go into monthly and quarterly performance reports for hospital leaders and champions. Nurses also record anecdotal notes describing nonadherent actions, which are used to guide future improvement efforts. They also report egregious acts of nonadherence to the Infection Control Practitioner for that area or to an appropriate leader. Units or areas with low adherence rates receive additional feedback, such as special reports, slide presentations, informal discussions, role playing, quizzes, and distribution of hospital-produced educational booklets and flyers.
- **Rewards for adherence and achieving goals:** Special incentives and rewards have been used to draw attention to the improvement effort and motivate employees to achieve and sustain hand hygiene excellence, including individual, group, and organizational performance awards, as outlined below:
 - **Coupon incentives:** Each month, peer champions receive special coupons, worth \$1 at any hospital-based food or beverage service. The champions can distribute them as on-the-spot rewards for individuals observed using excellent hand hygiene practices or as incentives for improvement.
 - **Party rewards:** Units achieving specific goals receive a pizza or ice cream party. The most recent goal called for 100 percent adherence to both pre- and postencounter hand hygiene requirements for three consecutive months.
 - **Special celebrations:** Two major hospital-wide "90/90" celebrations marked the first time the hospital's overall adherence rates exceeded 90 percent both before and after contact for an entire quarter and an entire year.
 - **Bonuses:** In 2007, half of each employee's annual bonus depended on the hospital achieving average adherence rates of at least 90 percent both before and after contact with patients and patient environments for 1 month. In 2008 and 2009, performance-based bonuses for service-specific groups of physicians depended in part on achieving greater than 90 percent adherence in these measures for a full quarter.

References/Related Articles

Hooper, DC. Making Strides in Hand Hygiene Compliance: To 90% and Beyond. 2008. Slide presentation featuring photos of posters used at Massachusetts General Hospital and additional program details. Available at: <http://www.macoalition.org/Initiatives/docs/MassGeneralHospitalPresentation.pdf> (If you don't have the software to open

this PDF, download free Adobe Acrobat Reader® software [External Web Site Policy](#)).

Pfeiffer S. Rapping nurses? Boston hospitals launch creative hand-washing campaigns. WBUR.org. June 2, 2009. Available at: <http://www.wbur.org/2009/06/02/hand-hygiene>.

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Innovator Disclosures

Ms. Tarselli has not indicated whether she has financial interests or business/professional affiliations relevant to the work

described in this profile.

Did It Work?

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Results

The program dramatically improved adherence to established hand hygiene guidelines, leading to meaningful declines in specific infection rates and projected cost savings due to fewer methicillin-resistant *Staphylococcus aureus* (MRSA) infections.

- **Improved adherence to disinfection guidelines:** Between the third quarter of 2002 and the second quarter of 2009, adherence to hand hygiene guidelines before patient encounters increased dramatically, from 8 percent to 93 percent; corresponding figures for hand hygiene adherence postencounter increased from 47 to 96 percent. In 2009, Massachusetts General Hospital achieved greater than 90 percent hand hygiene adherence for both rates for four consecutive quarters, giving the hospital its first "90/90" year. In the second quarter of 2010, the hospital recorded its sixth consecutive "90/90" quarter, with all units achieving 90 to 100 percent adherence at least once, and 11 units achieving 100 percent adherence in one or both rates for three consecutive months.
- **Fewer infections:** As detailed below, infection rates for three pathogens that can be spread by direct contact decreased significantly as adherence to hand hygiene protocols improved.
 - **MRSA:** The rate for new MRSA cases decreased by 77 percent between the fourth quarter of 2002 and the fourth quarter of 2009, from 1.95 to 0.45 cases per 1,000 patient days. This decline occurred despite a 350 percent increase in the number of patients admitted with known MRSA infection during this time period. In 2010, the MRSA case rate decreased further, reaching 0.42 cases per 1,000 patient days in the first quarter and 0.43 in the second quarter. These figures represent the lowest quarterly rates recorded since the hospital began tracking this measure in 1998.
 - **Vancomycin-resistant enterococci (VRE):** The rate for new VRE cases decreased by 54 percent, from a peak of 0.91 cases per 1,000 patient days in the first quarter of 2003 to 0.42 in the second quarter of 2009. This decline occurred despite a 244 percent increase in the number of patients admitted with known VRE infection between 2002 and 2008. Although the number of patients with VRE present on admission has continued to rise in 2010, the VRE case rate has risen only slightly, to 0.47 cases per 1,000 patient days in the second quarter.
 - **Clostridium difficile-associated disease (CDAD):** Rates of CDAD, caused by a spore-forming organism, leveled off between 2003 and 2006 as hand hygiene adherence improved. They did not substantially decline, however, until special cleaning and hand hygiene practices to reduce the possible spread of spores were introduced. Since then, CDAD rates have decreased by 63 percent, from a peak of 1.30 cases per 1,000 patient days in the second quarter of 2007 to 0.49 in the second quarter of 2009. This decline occurred despite a 38 percent increase in the number of patients admitted with an existing infection between 2006 and 2009. The rate has since risen slightly, reaching 0.58 in the second quarter of 2010.
- **Significant cost savings:** The significant decline in infections has yielded considerable cost savings. For example, the 259 fewer MRSA cases experienced in 2009 (versus 2002) translates into roughly \$4 million to \$8 million in cost savings for that year, based on the well-established industry projection of \$31,000 per case. This figure does not include estimated savings related to the avoidance of additional MRSA cases that might have occurred in the absence of this program due to the 350 percent increase in patients admitted with known MRSA over this time period.
- **Less hand dermatitis among staff:** Between 1999 and 2009, the hospital has experienced a 97 percent decline in the annual number of cases of hand dermatitis reported to the Occupational Health Service.

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Moderate: The evidence consists of pre- and post-implementation comparisons of adherence to established hand hygiene guidelines, incidence rates for select infections, and cases of hand dermatitis among staff, along with post-implementation estimates of the cost savings achieved due to the decline in MRSA infections.

How They Did It

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Context of the Innovation

Massachusetts General Hospital, a 900-bed teaching hospital in Boston, MA, that handles more than 45,000 admissions a year, offers diagnostic and therapeutic care in virtually every specialty and subspecialty of medicine and surgery. The impetus for the hand hygiene program came from an internal report, based on direct observation by Infection Control Practitioners, which found that most hospital staff did not clean their hands before coming into contact with patients, and that many also did not do so after such contact. The Joint Commission's later recommendation that hospitals achieve at least 90 percent adherence to disinfection guidelines both before and after patient contact served as a further motivation for hospital leaders to find strategies to improve hand hygiene.

Planning and Development Process

Key steps in the planning and development process included the following:

- **Forming task force:** The hospital formed a multidisciplinary Hand Hygiene Task Force in 2000, later renamed the STOP Task Force. (STOP stands for *Stop the Transmission of Pathogens*.) The task force, which continues to meet monthly, includes leaders and staff from infection control and patient care services, along with a broad array of representatives from other areas, including buildings and grounds, public affairs, nutrition and food services, occupational health, radiology, information systems, ambulatory care, and the medical staff. The task force originally focused on the introduction of an alcohol-based handrub to replace hand washing as the primary method of hand hygiene, the development of an adherence measurement system, and pilot interventions to improve hand hygiene practices on a small number of units. It now works to promote hand hygiene excellence in all inpatient and ambulatory care areas.
- **Hiring nurse to make direct observations:** In 2002, after pilot surveys, feedback, and interventions proved successful on several units, the hospital created a new full-time position for a registered nurse to conduct hospital-wide

surveillance and oversee the program. This nurse, part of the Infection Control Unit, worked closely with information technology staff to implement a software system for entering and analyzing surveillance data.

- **Focusing on cultural change:** After performing a literature review and discussing the issue with infection control specialists at other hospitals, the task force determined that lasting improvement in hand hygiene would depend on orchestrating a major change in culture. Specifically, appropriate hand hygiene had to become a habit so strong that staff would perform it without thinking and would readily notice and offer reminders or corrections when others did not.
- **Rollout to all inpatient units:** In 2003, the hospital prepared for the rollout of the program to all inpatient units by installing more dispensers, recruiting champions, developing new posters, and collecting surveillance data. In early 2004, the program launched with training sessions for peer champions, unit-based educational sessions for staff on all shifts, the establishment of competitive adherence goals, and the creation of feedback and rewards systems.
- **Continued program expansion and refinement:** In subsequent years, the hospital has expanded the program to include radiology and other outpatient departments. In addition, many refinements and improvements have been made, including the development of a bonus program, database/reporting system, additional educational materials, and a SharePoint site for program leaders; the setting of higher performance goals; augmentation of the surveillance and feedback programs (with reports issued monthly rather than quarterly); and the hiring of another half-time nurse to conduct surveillance and provide other support. In addition, program leaders have participated in special seminars and shared information with other hospitals interested in developing similar programs.

Resources Used and Skills Needed

- **Staffing:** As noted, the program requires 1.5 full-time equivalent (FTE) nurses to conduct surveillance activities and manage the program. Other staff participate as part of their regular job responsibilities.
- **Costs:** Although hard data on costs are not available, the primary expenses include the salary and benefits for the 1.5 FTE nurses along with the costs of hand hygiene supplies (e.g., product dispensers), rewards (e.g., prizes, food and beverage coupons, special events), and printing and production of posters, flyers, reports, and an in-house video.

Funding Sources

Massachusetts General Hospital

The hospital funds the program from its internal operating budget.

Tools and Other Resources

Boyce JM, Pittet D; Healthcare Infection Control Practices Advisory Committee, et al. Guideline for Hand Hygiene in HealthCare Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force (2002). *MMWR Recomm Rep.* 2002;51(RR-16):1-45. [PubMed] Available at: <http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf>.

More information on the program can be found on the Massachusetts General Hospital's Web site at: <http://qualityandsafety.massgeneral.org/measures/hygiene.aspx?id=282>.

A booklet on hand hygiene entitled *Hand Hygiene at Massachusetts General Hospital: Because We Care*, can be found at: <http://www.macoalition.org/Initiatives/docs/MGHStaffTrainingSlides.pdf>.

The *Cal Stat Rap*[®], a video made by a Massachusetts General Hospital nurse to encourage proper hand hygiene, can be accessed at: <http://www.youtube.com/watch?v=wjg5LxRRQfA> (Copyright 2009 by Pauline Albrecht)

Adoption Considerations

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Getting Started with This Innovation

- **Engage senior leaders:** The active support of hospital leaders is crucial both to getting the program off the ground and ensuring its lasting success. Leaders provide the resources necessary to establish and maintain the program; the strength needed to raise awareness, set expectations, approve interventions, and establish accountability through midlevel managers; and the influence needed to achieve cultural change across the organization. To keep leaders engaged, provide them with baseline information documenting the potential for improvement, ongoing progress reports and program updates, and specific requests for resources or their direct involvement.
- **Focus on the positive:** To develop enthusiasm for the program, create a fun atmosphere and emphasize the positive aspects of employee involvement. Elements such as short- and long-term rewards, recruitment of volunteer peer champions, and solicitation of artwork, poems, etc., ensure that staff perceive the program as a positive endeavor that improves patient safety and favors direct employee involvement over a punitive approach.
- **Take multidisciplinary approach:** By including all types of employees on the program's leadership team, the hospital sends the message that every individual, from physicians to housekeeping staff, needs to make hand hygiene a priority. All staff need to share in the ownership and success of the program.
- **Have realistic expectations:** Adherence rates typically start out very low. Expect progress to be slow and steady as more employees gradually buy into the program. By setting attainable short-term goals (such as incremental targets for monthly and quarterly adherence rates), program leaders can maintain a positive focus, achieve interim successes, and meet long-term expectations.
- **Consider direct observation for data collection:** Direct observation represents the most fair and accurate measure of hand hygiene adherence and can also serve as an effective tool for change by offering the following benefits:
 - Insights into factors associated with nonadherence
 - Flexibility for staff to use professional discretion without being penalized when entering a patient's room in situations where contact is not expected to occur
 - The ability for individuals to remain anonymous or to be identified when special intervention may be warranted
 - Results that can be easily defended if challenged
- **Seek assistance with collection and processing systems:** Consult an information systems specialist when choosing data collection tools and setting up the database and/or data processing systems. These experts can identify the best

current resources and assist in maximizing the reporting capabilities of the system.

Sustaining This Innovation

- **Provide quick feedback:** People respond best when they see a direct response to their actions. Having peer champions and/or unit managers hand out reward cards on the spot for good behavior and tactfully pointing out egregious mistakes shortly after they occur can be effective in changing behavior. Monthly reports can track progress and influence the actions of groups, especially when performance can be compared with that of a friendly competitor or larger group. Quarterly reports can be useful for tracking changes over time and assessing the effectiveness of the program as it evolves, including its impact on other related measures, such as infection rates.
- **Celebrate successes:** Use performance reports and observation to identify and celebrate interim achievements, while still remaining focused on long-term goals.
- **Continue direct observation:** Even when adherence rates top 90 percent, the need for direct observation does not subside. Ongoing surveillance keeps employees motivated, raises staff awareness, encourages intervention, and may uncover specific departments, units, or individuals not consistently adhering to the guidelines.
- **Focus on "last 10 percent":** Getting from 90 to 100 percent adherence presents major challenges, but can be done. Success requires attention to individual instances of nonadherence. For example, nurses at Massachusetts General Hospital record brief anecdotal notes whenever they observe nonadherent actions. These notes can be used to identify common factors related to actions, situations, or individuals, thus allowing for further education about a particular component of hand hygiene and/or for an intervention targeted at a particular group, unit/department, or individual.

Additional Considerations and Lessons

This program has been featured at professional seminars, in print and broadcast media, and on several Web sites.

¹ Centers for Disease Control and Prevention. Guideline for hand hygiene in healthcare settings. 2002. Available from: <http://www.cdc.gov/handhygiene>.

² Klevens RM, Edwards JR, Richards CL Jr, et al. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. Public Health Rep. 2007;122(2):160-6. [PubMed] Available from: http://www.cdc.gov/ncidod/dhqp/pdf/hicpac/infections_deaths.pdf.

Comment on this Innovation

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