

Kaiser Permanente National Hand Hygiene Program

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Abstract

Objective: Hand hygiene has historically been identified as an important intervention for preventing infection acquired in health care settings. Recently, the advent of waterless, alcohol-based skin degermer and elimination of artificial nails have been recognized as other important interventions for preventing infection. Supplied with this information, the National Infection Control Peer Group convened a KP Hand Hygiene Work Group, which, in August 2001, launched a National Hand Hygiene Program initiative titled "Infection Control: It's In Our Hands" to increase compliance with hand hygiene throughout the Kaiser Permanente (KP) organization.

Design: The infection control initiative was designed to include employee and physician education as well as to implement standard hand hygiene products (eg, alcohol degermers), eliminate use of artificial nails, and monitor outcomes.

Results: From 2001 through September 2003, the National KP Hand Hygiene Work Group coordinated implementation of the Hand Hygiene initiative throughout the KP organization. To date, outcome monitoring has shown a 26% increase in compliance with hand hygiene as well as a decrease in the number of bloodstream infections and methicillin-resistant *Staphylococcus aureus* (MRSA) infections. As of May 2003, use of artificial nails had been reduced by 97% nationwide.

Conclusions: Endorsement of this Hand Hygiene Program initiative by KP leadership has led to implementation of the initiative at all medical centers throughout the KP organization. Outcome indicators to date suggest that the initiative has been successful; final outcome monitoring will be completed in December 2003.

Introduction

In the nineteenth century, stringent hand hygiene by health care personnel was found to reduce transmission of disease.¹ Recent reports published in lay and professional publications have documented that inadequate hand washing and artificial nails are causally associated with transmission of infection resulting in serious illness and death.^{2,7} In contrast, improved compliance with "hand hygiene" (handwashing or degerming in addition to regular use of lotion) and elimination of artificial nails have been reported as key measures for reducing transmission of hospital-acquired infection in hospital and ambulatory care settings.^{8,9}

Surprising national statistics show that only 50% of direct providers of health care comply with current hand hygiene standards.¹⁰⁻¹³ Similarly, during the year 2000, internal national Kaiser Permanente (KP) observational studies (2317 observations) showed an overall 53% compliance with hand hygiene standards (S Barnes, unpublished data, 2001). In response to this finding, the

KP National Infection Control Peer Group identified hand hygiene as a top priority and began developing a nationwide program to improve clinical practice and patient outcomes. When approached with the proposal for this program, KP's top leaders readily acknowledged the importance of this focus on hand hygiene and endorsed the proposed program.

Consequently, during 2001, KP launched the Infection Control-sponsored National Hand Hygiene Program initiative, "Infection Control: It's in Our Hands." The proposed purpose of this initiative was to ensure organizationwide improvement in hand hygiene by introducing new products, providing education for employees and physicians, and eliminating use of artificial nails. The initiative was designed to introduce two handcare products that were not used consistently before introducing the initiative: waterless alcohol-based skin degermers and lotion. The initiative was also designed to include staff and physician education about the new products as well as the dangers inherent in

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Use of lotion has been well documented to improve the quality of and compliance with hand hygiene and to consequently decrease transmission of infection.

wearing artificial nails during direct patient care. Another key program component was development of a standard organizational hand hygiene policy, which included elimination of artificial nails among direct providers of patient care. The initiative has given to KP's leaders, employees, and physicians the opportunity to participate in promoting an organizational commitment to hand hygiene, a basic-but-essential patient care competency.

National KP Hand Hygiene Program Initiative

On August 3, 2001, in a nationally broadcast internal KP videoconference, a multidisciplinary National Work Group (Table 1) launched the KP Hand Hygiene Program initiative, "Infection Control: It's in Our Hands" and concurrently distributed a Hand Hygiene Program Implementation Manual to each KP facility. The Work Group consisted mostly of Infection Control Coordina-

tors and Managers; additional members represented Union Labor Partners/CNA (although not a formal labor-management partnership initiative), KP infectious disease physicians, and representatives from Human Resources/Labor Management. The videoconference and manuals were developed and provided for facility-level Hand Hygiene Implementation Teams. (At the request of the Hand Hygiene Work Group, each medical center was asked by the KP leadership to convene these teams.) A recommendation extended to the Implementation Teams was that they should include physician-champions. The manuals included all tools that local teams would need for implementing the standardized Hand Hygiene policy and new hand hygiene products: recommended program implementation guidelines and checklist; evidence-based literature; educational flyers and posters; product information and product utilization guidelines; and sample internal communications. For easy access, the manual was also posted on the Infection Control Web site under "General Topics" at <http://kpnet.kp.org/california/nursing/quality/infection/aboutic/index.html>.¹⁴

The Hand Hygiene Program initiative had six main objectives:

- Implementation of standard hand care products, including waterless alcohol-based skin degermers and lotion, in each KP medical center on the basis of specific product utilization guidelines suggesting where, when, and how each product should be used;
- Staff and physician education about use of waterless alcohol-based skin degermers in all patient care areas as an important adjunct to soap and water;
- Staff and physician education regarding use of hand lotion in all patient care areas. Use of lotion has been well documented to improve the quality of and compliance with hand hygiene and to consequently decrease transmission of infection.¹⁵
- A standardized policy on hand hygiene and elimination of artificial and long natural nails in direct patient care settings.
- Determination of the outcomes of the program to be based on improvement in the following indicators: observational hand hygiene studies, rates of bloodstream infection in adult medical-surgical patients in the intensive care unit (ICU) as well as rates of multidrug-resistant infection and rates of using alcohol degermers;
- Continuation of compliance to be accomplished by ensuring that hand hygiene is incorporated into resident orientation programs, new physician

Table 1. Kaiser Permanente National Hand Hygiene Work Group
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education, orientation education for new employees, and annual competency programs.

Local implementation teams were encouraged to do their own hand hygiene demonstrations and hand culturing as part of the educational process.

Cornerstone of the Hand Hygiene Program

The cornerstone of the National Hand Hygiene Program in terms of its potential impact on patient outcomes (infection prevention) is the introduction of waterless alcohol-based skin degermers as an adjunct to soap and water. Because these products are more convenient to use at the point of patient care delivery, they have been found helpful for improving compliance with hand hygiene, in addition to being more effective than soap and water in eliminating bacteria and fungus from the surface of hands.¹⁵⁻¹⁸ In recent years, introduction of this new product to improve hand hygiene compliance has been further supported by information (in both the lay and professional press) about infection transmission associated with inadequate hand hygiene.²⁷ Alcohol-based products cannot replace soap and water, however, because alcohol is not a good cleanser, only a good degermer. For visibly soiled hands, use of soap and water remains standard practice.

Recommendations Against Use of Artificial Nails

A published non-KP study comparing natural vs artificial nail surfaces in subjects who had completed routine hand hygiene¹⁶ stated that alcohol-based waterless skin degermers were clinically significantly more effective for removing bacteria and fungus. As a part of that study, volunteer health care workers with natural and artificial nails performed hand hygiene either with alcohol-based waterless skin degermers or with soap and water. Yeast as well as bacteria (including *Staphylococcus aureus* and *Enterococcus*) were cultured from nails before hand hygiene measures were taken. After using the alcohol-based waterless product, the number of positive bacterial and fungal cultures decreased from 40% to 10% for natural nails and from 80% to 60% for artificial nails. After using antimicrobial soap and water, the number of positive bacteria and fungal cultures also decreased: This number decreased more for subjects with natural nails than for subjects with artificial nails but not as much as for subjects who used the alcohol-based waterless product. Because hand hygiene measures using either soap and water or alcohol-based waterless skin degermer are less effective for remov-

ing bacteria and fungus from artificial nails than from natural nails, the study suggested that health care workers be discouraged from wearing artificial nails.¹⁶

Numerous additional studies have documented that the subungual area harbors high concentrations of bacteria. Compared with health care workers with natural nails, health care workers who wear artificial nails are more likely to harbor gram-negative bacteria on their fingertips, both before and after hand hygiene measures are taken.¹⁶⁻¹⁸ This difference results from the composition of acrylic resins with which artificial nails are made:

Fungus and bacteria bind more strongly to these resins than to the surface of natural nails.¹⁹ Not surprising, therefore, are reports²⁷ that the use of artificial nails has been epidemiologically implicated in several outbreaks of infection caused by gram-negative bacilli and yeast. In addition to implementation manuals, the National Work Group also developed a Manager's Tool Kit for Artificial Nails Elimination to assist KP medical centers in eliminating use of artificial nails. In addition to presenting evidence-based information, the Manager's Tool Kit provided guidance for managers from the KP Human Resources Department, guidelines for removing artificial nails, and postremoval care. This document was also placed on the Infection Control Web site for easy access.²⁰

To optimize this component of the Hand Hygiene Program, the KP leadership decided to make elimination of artificial nails a condition of employment for all direct-care providers in California as well as in the KP regions outside California. In general, this requirement has been met with rationality and acceptance by employees and physicians. In a few instances, KP management and human resources staff have devoted substantial time and attention to addressing reluctance to accept the no-artificial-nails requirement. In these instances, the reluctance of the employees in question was apparently associated with a desire for personal expression and choice.

Other sources of support for the Hand Hygiene Program include published recommendations from the Association of Operating Room Nurses (AORN), the American Academy of Pediatrics with the College of Obstetricians and Gynecologists, and the Centers for Disease Control and Prevention (CDC).^{15,21-23} These recommendations are summarized as follows:

- Association of Operating Room Nurses. *Standards, Recommended Practices and Guidelines* (1997): "Fingernails must be kept short, clean and healthy ... Artificial nails should not be worn." ^{21-p1158}

Alcohol-based products cannot replace soap and water ... For visibly soiled hands, use of soap and water remains standard practice.

- American Academy of Pediatrics and the American College of Obstetricians and Gynecologists (2002): "Fingernails should be trimmed short, and no false fingernails or nail polish should be permitted."^{22:p336}
- Centers for Disease Control and Prevention, *Guideline for Hand Hygiene in Health Care Settings*: "Do not wear artificial fingernails or extenders when having direct contact with patients at high risk (eg, those in intensive-care units or operating rooms)."^{15:p.33}
- Health care Infection Control Practices Advisory Committee and Hand-Hygiene Task Force, et al, *Guideline for Hand Hygiene in health care settings*: "Do not wear artificial fingernails or extenders when having direct contact with patients at high risk (eg, those in intensive-care units or operating rooms)."^{23:p123}

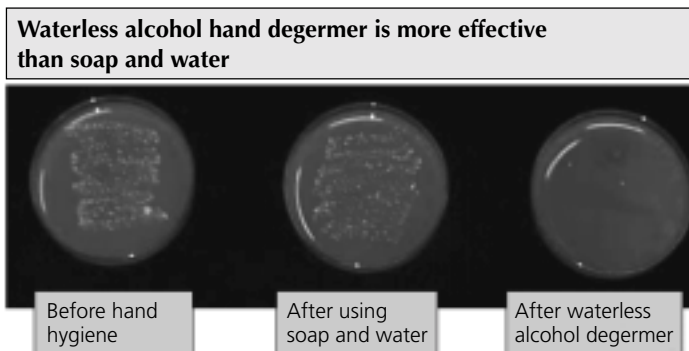


Figure 1. Photograph shows culture results from Infection Control Study done in June 2002 at a KP medical center in Southern California.

Outcome Measures

Outcomes for this National Program were monitored using the following measures: semiannual national observational studies of hand hygiene; quarterly national rates of ICU bloodstream infection (BSI); quarterly rates of MRSA infection at Northern California KP facilities; and quarterly rates of using alcohol-based degermer at KP facilities throughout California.

Results

Encouraged by the Hand Hygiene Program, a KP medical center in Southern California took random hand cultures from employees and physicians at the medical center. Sterile, dry, cotton-tipped applicators were used to inoculate petri dishes with swabs taken from the palm of the hand as well as from subungual and interdigital

areas 1) before completing hand hygiene, 2) after using soap and water on unwashed hands, and 3) after using an alcohol-based waterless skin degermer on unwashed hands. This demonstration of hand hygiene techniques was met with employee enthusiasm and resulted in increased compliance with hand hygiene, especially using the waterless alcohol degermer. Figure 1 shows culture results for each of three hand hygiene scenarios 48 hours after incubation. The number of bacterial colonies decreased approximately 20% when soap and water were used and decreased more than 90% when the alcohol-based waterless degermer was used (Figure 1).

Table 2 presents preprogram (2000) observational data on hand hygiene from studies conducted at seven KP facilities in the California and Northwest Regions. Table 2 also includes postprogram and interprogram data from studies conducted in 2003 at five KP facilities in the Northern California Region, at three KP facilities in the Southern California Region, and at one KP facility in the Northwest Region.

All outcome indicators showed improvement in hand hygiene: As of the first quarter of 2003, the rate of bloodstream infection rate in the intensive care unit (ICU) decreased from 3.9 infections to 2.5 infections per 1000 line days (number of days ICU patients had a central IV catheter inserted) (Figure 2). This result compared favorably with the CDC benchmark of 3.8 bloodstream infections per 1000 central line days and represents a total of 18 infections and an estimated associated cost of \$144,000 (\$8,000 per infection). The mean total number of central line days per quarter was between 20,000 and 30,000 days. Also during the first quarter of 2003, the rate of nosocomial multiple resistant organisms (MRO) decreased from 3.4 infections per 1000 inpatient admissions to 1.4 infections per 1000 inpatient admissions. Observational studies of hand hygiene

Table 2. Preliminary observational compliance results of KP Hand Hygiene Program 2000-2003 ^a			
	Baseline compliance ^a	Compliance after program implemented ^b	Increase in compliance
Nurses	827/1354 = 61%	1178/1465 = 80%	19%
Physicians	156/331 = 47%	215/335 = 64%	17%
Respiratory therapists	67/153 = 44%	94/108 = 87%	43%
Other	171/479 = 36%	252/297 = 85%	49%
Total	1221/2317 = 53%	1739/2205 = 79%	26%

^a measured in 2000.

^b measured in May 2003.

indicate that the rate of compliance with hand hygiene practices increased from 53% before the program started (2000) to 79% during the first quarter of 2003. This study will be repeated during the fourth quarter of 2003. Use of artificial nails—monitored during approximately 400 of the reported observations—was absent in 97% of the postimplementation observations; preprogram data were not available for this measure.

Also providing evidence of success of the Hand Hygiene Program is the utilization rate of alcohol-based waterless degermers: This rate has increased in California from zero to 90% compliance since inception of the program. In May 2003, 19 of 21 KP facilities in California reported use of alcohol-based waterless skin degermers within established benchmark rates.

Discussion

The success achieved through the National Hand Hygiene project has resulted largely from the multidisciplinary nature of the effort and is a testament to the Work Group's project design as well as to the involvement and advocacy of the Infection Control Peer Group (supported by Infectious Disease Chiefs at each facility). Participation by our union and labor partners also provided valuable insight and dimension to the project. Interregional collaboration enabled us to leverage our resources and to share successful practices.

In general, objectives of the National Hand Hygiene program—including education, product implementation, and elimination of artificial nails—have been embraced positively by employees and physicians.

Among the most challenging aspects of implementing the program were the process of eliminating staff use of artificial nails and the Hand Hygiene Program's need to compete with a multitude of growing demands for the time and resources of infection control staff.

Overall, the cost of the Hand Hygiene Program has involved human resources (mostly infection control staff) as needed for providing education to employees and physicians as well as for coordinating installation of handcare product dispensers and accomplishing the outcome monitoring. Consultation with KP personnel from the materials and finance departments has indicated that this initiative is unlikely to be associated with any appreciable increase in product cost, because only the mix of products was changed. Whereas soap and paper towels have always been used, the current initiative will require use of less soap and fewer paper towels as more alcohol-based waterless skin degermer is used. The decreased use of soap and paper towels is also expected to offset the increase in lotion use.

The processes of providing evidence-based education and tools, measuring outcomes, and sharing feedback combined successful elements of behavior change theory in the effort to improve hand hygiene practices, including elimination of artificial nails. Thus, results of swabbing studies comparing handwashing regimens (ie, soap and water versus waterless hand degermer) can help to persuade employees and physicians that the alcohol-based waterless degermer is not only more convenient

... physicians that the alcohol-based waterless degermer is not only more convenient but is also a more effective method of removing bacteria and fungus from hands that are not visibly soiled.

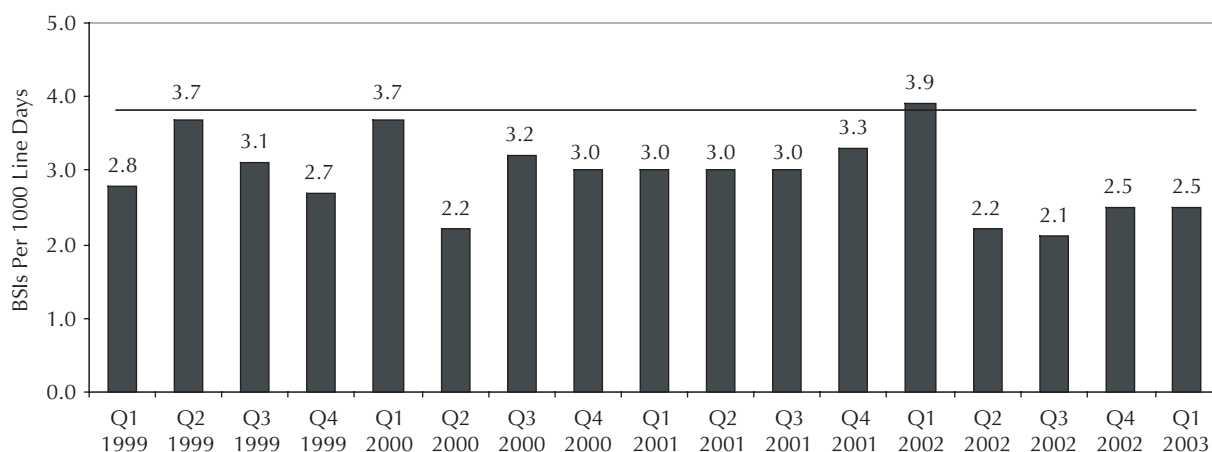


Figure 2. Graph shows rate of ICU bloodstream infections (BSIs) per 1000 central line days at KP medical centers in Northern and Southern California during study period, 1999 to 2003. (For complete report, see "National Reports" at: <http://nursingpathways.kp.org/quality/infection/reports/index/html>.)

but is also a more effective method of removing bacteria and fungus from hands that are not visibly soiled.

The National Work Group is still available for consultation on an as-needed basis. Questions may be directed to your local KP infection control professional or Sue Barnes, RN, Senior Consultant and Work Group Facilitator, at (510) 987-4086 (tie line 427) or e-mail to sue.barnes@kp.org. You can also visit the National Kaiser Permanente Infection Control Web site: http://nursingpathways.kp.org/quality/infection/generaltopics/hand_hygiene.html. ❖

KP Divisions in which work was done: NCal, SCal, NW, HA, GA, OH, MAS, CO.

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