

# APIC IMPLEMENTATION GUIDE



## Guide to Hand Hygiene Programs for Infection Prevention



**APIC**<sup>®</sup>

Association for Professionals in  
Infection Control and Epidemiology

# Guide to Hand Hygiene Programs for Infection Prevention



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APIC's mission is to create a safer world through prevention of infection. The association's more than 15,000 members direct infection prevention programs that save lives and improve the bottom line for hospitals and other healthcare facilities. APIC advances its mission through patient safety, implementation science, competencies and certification, advocacy, and data standardization.

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GOJO is dedicated to helping save lives and improve the well-being of patients and healthcare professionals by supporting innovation, research and education that advances the knowledge and awareness of the role good hand hygiene plays in helping to reduce healthcare associated infections. As an APIC Strategic Partner, GOJO is proud to sponsor the APIC Hand Hygiene Implementation Guide providing a free resource on a topic that is very important in infection prevention. Thank you to APIC, the authors, and contributors for providing this educational resource for the infection prevention community.



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All inquiries about this guide or other APIC products and services may be directed addressed to:  
APIC  
1275 K Street NW, Suite 1000  
Washington, DC 20005  
Phone: 202-789-1890  
Fax: 202-789-1899  
Email: [info@apic.org](mailto:info@apic.org)  
Web: [www.apic.org](http://www.apic.org)

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# Acknowledgments

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## Lead Author

Timothy Landers, RN, CNP, PhD, CIC  
College of Nursing  
The Ohio State University  
Columbus, OH

## Authors

Katherine Ellingson, PhD  
Oregon Health Authority  
Portland, OR

Michael A. Grow, MBA, MT(ASCP)  
St. Vincent Williamsport Hospital  
Williamsport, IN

Anson Kendall, BSc, MBA  
University Health Network  
Toronto, Ontario, Canada

James F. Marx, RN, PhD, CIC  
Broad Street Solutions  
San Diego, CA

Ted Pincock, RN, CIC  
Providence Health Care  
Vancouver, British Columbia, Canada

Shanina Knighton, RN, BA, BSN  
Case Western Reserve University  
Cleveland, OH

Connie Steed, RN, CIC, MSN  
Greenville Health System  
Greenville, SC

## Contributors

Cheryl Bailey, RN, BSN, MBA  
Cullman Regional Medical Center  
Cullman, AL

Dot Barley, RN, CIC  
Baptist Medical Center East  
Montgomery, AL

Emily Aman  
Anthony Dent, BS  
Kristopher Smedes  
Lee Ann Strait, RN, MSA  
College of Nursing  
The Ohio State University  
Columbus, OH

Jason E. Farley, CRNP, PhD, MPH, FAAN  
Johns Hopkins University School of Nursing  
Baltimore, MD

Nura Muhammed, RN, MS  
Gondar University Hospital  
Gondar, Ethiopia

---

## Reviewers

Elaine Larson, RN, PhD, FAAN, CIC  
School of Nursing & Joseph Mailman School  
of Public Health  
Columbia University  
New York, NY

Gertie van Knippenberg-Gordebeke, RN, CCIP  
KNIP Consultancy Infection Prevention  
Venlo-Boekend, Netherlands

Ossama Rasslan, MD, PhD  
Ain Shams Faculty of Medicine, Abbasseia  
Cairo, Egypt

## Editorial Assistants

Gabrielle Delarose, RN, MS  
Kimberly Kopfman, RN  
College of Nursing  
College of Public Health  
The Ohio State University  
Columbus, OH

## APIC Production Team:

Charu Malik, PhD  
Senior Director, Strategic Partnerships  
& Research  
Association for Professionals in Infection  
Control and Epidemiology  
Washington, DC

Caroline H. Fuchs, CAE  
Vice President, Marketing  
and Practice Resources  
Association for Professionals in Infection  
Control and Epidemiology  
Washington, DC

Christina James  
Associate Editor  
Association for Professionals in Infection  
Control and Epidemiology  
Washington, DC

## Cover Design:

Sarah Vickers  
Art Director  
Association for Professionals in Infection  
Control and Epidemiology  
Washington, DC

## Text Design and Layout:

Project Design Company  
Washington, DC

## Printing:

Ironmark  
Annapolis Junction, MD

## Declarations of Conflicts of Interest

Only individuals who have made declarations of potential conflicts have been listed here.

**Jason E. Farley** currently is the 2015-2017 president of the Association of Nurses in AIDS Care (ANAC) and is a 2015 member of the International Editorial Board for the *International Journal of African Nursing Sciences (IJANS)*.

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## Introduction

Hand hygiene is widely recognized as the most important measure to prevent the spread of infection. Despite evidence that improving hand hygiene reduces the risk of infection and improves patient outcomes, compliance with hand hygiene remains low. A key responsibility of the infection preventionist (IP) is to develop, implement, and monitor hand hygiene programs as a critical piece of broader infection prevention programs in healthcare settings.

The purpose of this guide is to provide an overview of hand hygiene programs and their key components. It is targeted toward new IPs or non-IP colleagues who wish to understand how multimodal strategies are applied as part of hand hygiene programs, and experienced IPs who wish to revisit their hand hygiene program. A deliberate effort has been made to summarize the state of the field without duplicating the very valuable resources that are available.

Existing guidelines include Centers for Disease Control and Prevention's *Guidelines for Hand Hygiene in Healthcare Settings*, World Health Organization's *Improving Hand Hygiene*, and statements by the Association of Professionals in Infection Control and Epidemiology, Infection Prevention and Control – Canada, and the Society for Healthcare Epidemiology of America, as well as a host of other national and international agencies. These prior guidelines address standards for hand hygiene, including the timing of hand hygiene, product formulation, and important components of multimodal strategies for hand hygiene. These recommendations stem from research-based findings while others incorporate expert opinion and decades of experience promoting hand hygiene.

Without duplicating the available tools, the goal of the *Guide to Hand Hygiene Programs for Infection Prevention* is to provide an overview of evidence-based strategies for IPs implementing hand hygiene programs in their settings.

As implementation science specialists, infection preventionists have unique expertise and the opportunity to apply this knowledge in diverse settings. It is our aim that this guide helps IPs apply science to advance practice and improve patient outcomes.

This *Implementation Guide* is a collaborative effort among expert infection preventionists with a passion for hand hygiene. In each section, authors synthesize best practice recommendations from research and an in-depth knowledge of the emerging trends with the goal of making the findings relevant for practice.

We are grateful to the peer reviewers who gave us excellent feedback to improve content, and we appreciate their contribution to our work. During the writing of the guide, we talked with many practicing infection preventionists about their observations and experiences with hand hygiene programs. We recognize the many members of APIC who shared their expertise and knowledge and gave us their thoughts and opinions as we were writing. APIC staff members have supported the development of the guide from its inception. Katrina Crist, Marilyn Hanchett, Anna Conger, and Caroline Fuchs each contributed. Charu Malik was a champion of the guide as well as a coach, mentor, and friend. Her many contributions are especially appreciated.

As a professional association, APIC is recognized as the leader in implementation science—taking research findings, best practices, and evidence-based findings and putting them in to practice in real world settings. It is our hope that this *Implementation Guide* will help APIC members apply the science of hand hygiene and create a safer world through the prevention of infection.

Timothy Landers, RN, CNP, PhD, CIC

## Section 1: Hand Hygiene Overview

**Shanina Knighton, RN, BA, BSN**  
Case Western Reserve University  
Cleveland, OH

**James F. Marx, RN, PhD, CIC**  
Broad Street Solutions  
San Diego, CA

**Timothy Landers, RN, CNP, PhD, CIC**  
College of Nursing  
The Ohio State University  
Columbus, OH

### Key Concepts

- The effectiveness of hand hygiene in preventing infection has been demonstrated for more than 200 years.
- Hand hygiene is one of the cornerstones of reducing healthcare-associated infections and preventing occupationally acquired infections.
- The use of hand hygiene programs to prevent infections is based on the “chain of infection” model.
- Healthcare-associated infections and antibiotic-resistant organisms are two major drivers of the need for widely adopted and effective hand hygiene programs.
- Evidence demonstrates that overall hand hygiene adherence is low.

### What Is Hand Hygiene?

Hand hygiene refers to the act of cleansing hands with water or liquids and includes the use of water, soaps, antiseptics, or other substances, including alcohol-based hand rubs.<sup>1</sup>

### Hand Hygiene in Historical Context

Although ritual hand washing had been part of cultural and religious practices for centuries, the scientific evidence of hand hygiene in preventing human illness emerged in the early 19th century.<sup>2</sup>

Early science and medical pioneers did not have knowledge of microbiology or infection transmission but implemented practices based on clinical observation, analysis of these observations, and the prevailing theories about disease transmission. In 1847, Ignaz Semmelweis, an Austrian obstetrician, observed a high maternal mortality among women who succumbed to puerperal fever. Based on the understanding that hands carried “cadaverous particles,” Semmelweis instituted a practice requiring medical students to scrub their hands between leaving the autopsy room and entering maternity rooms. Many years before Semmelweis’s observation and intervention, French chemist and pharmacist Antoine Labarraque had created a chlorinated lime solution as a disinfectant to treat gangrene and process animal intestines used for musical instrument strings. Semmelweis used this chlorinated lime solution in performing hand washing.<sup>3-5</sup> Data collected from these observations provided some of the first compelling evidence that decontamination of hands prevented infection.<sup>5,6</sup> The incidence of puerperal fever was reduced from approximately 20 percent to about 2 percent after requiring antiseptic hand cleansing.<sup>5</sup>

While working in Massachusetts in the 1800s, Oliver Wendell Homes, Sr., MD, hypothesized that doctors carried puerperal fever between patients. His hypothesis was supported by his own clinical observations and anecdotal reports of doctors who became ill and died from puerperal fever after performing autopsies of infected patients.<sup>7</sup>

The prevailing theory of infection transmission in the 1800s was miasma or “bad air.” In 1860, Florence Nightingale, a nursing pioneer, writer, and statistician, stated that personal hygiene and a sanitary environment were essential elements to a healing environment.<sup>8</sup> Without an understanding of bacteriology, infectious agents, or germ theory, Nightingale meticulously documented patients’ symptoms and used the results to develop effective infection prevention strategies based on a system that became known as sanitary science.<sup>9,10</sup>

Advances in microbiology and modern understanding of disease transmission occurred with breakthrough discoveries by Louis Pasteur and Robert Koch. In the late 1800s, Joseph Lister applied the findings of Pasteur and Koch to introduce asepsis and reduce infections in the surgical setting.<sup>4,6</sup>

Despite empirical findings, the work of these early pioneers was mostly rejected by their colleagues, and it was not until after their deaths that their work was recognized and adopted.<sup>4</sup> For example, in the 1900s, the work of Semmelweis was used as a foundational component for developing epidemiological strategies for infection prevention. Nightingale’s landmark statistical techniques applied to puerperal fever and the deaths of soldiers from the Crimean War provided methods to explore healthcare-associated deaths due to a lack of personal hygiene.<sup>8</sup>

Even without the benefit of detailed knowledge of microbiology, pioneers like Nightingale and Semmelweis provided the foundation for hand hygiene programs today. From the early work of these hand hygiene advocates, a body of scientific evidence and practical strategies emerged that continues to develop worldwide. Since the 1960s, researchers, governmental bodies, and professional societies have contributed to the development and implementation of effective hand hygiene programs. A timeline of major milestones is shown in Figure 1.1. However, with the increasing burden of healthcare-associated infections (HAIs), there is a need for more effective integration of hand hygiene practices into practical and readily applicable infection-prevention programs.<sup>11</sup>

*Figure 1.1. Milestones in Development of Hand Hygiene Programs*

1960s	1970s	1980s	1990s	2000 & Beyond
<p><b>1961</b> The U.S. Public Health Service creates a training film demonstrating hand washing techniques for health care workers</p>	<p><b>1970s</b> Public Health Officials acknowledges HAIs as a major problem. Hospitals independently began implementing infection control and surveillance programs</p> <p><b>1972</b> APIC founded by a pioneering group of infection control nurses who recognized the need for an organized approach to preventing nosocomial infections</p> <p><b>1974</b> CDC designs Study on the Efficacy of Nosocomial Infection Control (SENIC)</p> <p><b>1975-1985</b> SENIC study results led to amplification of infection surveillance &amp; control programs.</p> <p><b>1976</b> Joint Commission founded to promote patient-centered outcomes</p>	<p><b>1980</b> The founding of Society for Healthcare Epidemiology of America (SHEA), established “to foster the development and application of the science of healthcare epidemiology”</p> <p><b>1985</b> CDC establishes one of the first hand hygiene guidelines for healthcare workers</p> <p><b>1988</b> CDC publishes two articles on nosocomial infections &amp; the criteria for certain types of nosocomial infections for surveillance purposes</p>	<p><b>1991</b> Occupational Safety &amp; Health Administration (OSHA) releases the Bloodborne Pathogen Standard. As a result, infection control programs are expanded to protect healthcare workers</p> <p><b>1991</b> The Healthcare Infection Control Practices Advisory Committee (HICPAC) was established in to provide advice &amp; guidance to CDC on infection prevention &amp; control strategies</p> <p><b>1995</b> Association for Professionals in Infection Control (APIC) Guidelines Committee. Modified CDC guidelines to include staff adherence levels, barriers, recommendations, and a review of staff hand hygiene practices</p> <p><b>Late 1990s</b> Nosocomial infection was the accepted and commonly use term for healthcare associated infections until the late 1990s</p>	<p><b>2000</b> To Err is Human: Building a Safer Health System draws attention to preventable medical errors, including HAIs</p> <p><b>2002</b> Guideline for Hand Hygiene in Health-Care Settings published by CDC Recommendations of The Hand Hygiene Task Force (HICPAC/SHEA/APIC/IDA)</p> <p><b>2003</b> Hospitals required to demonstrate infection control programs that aligned with the recommended guidelines of CDC or World health Organization (WHO)</p> <p><b>2004</b> The Joint Commission Patient Safety Goal 7 created to address hand hygiene</p> <p><b>2005</b> The CDC’s National Nosocomial Infection Surveillance System replaced by the National Health Safety Network 2005 World Health Organization (WHO) publishes the 5 Moments for Hand Hygiene</p> <p><b>2008</b> Infection control practitioner was replaced by Infection Preventionist</p> <p><b>2009</b> The Joint Commission Hand Hygiene Compliance Monograph Published</p> <p><b>2009</b> WHO Guidelines on Hand Hygiene in Health Care issued</p> <p><b>2014</b> SHEA publishes the Compendium of Strategies to Prevent Healthcare-Associated Infections in Acute Care Hospitals: 2014 Update, Strategies to Prevent Healthcare-Associated Infections through Hand Hygiene</p>

## Hand Hygiene and HAI Prevention

Healthcare-associated infection (HAI) is a “localized or systemic condition resulting from an adverse reaction to the presence of an infection agent(s) or its toxin(s) that was not present on admission to the acute care facility.”<sup>13</sup> Depending on the type of infection, HAIs can occur between 24 to 72 hours after hospital admission, 3 to 10 days following discharge, or within 30 to 90 days after a surgical procedure.<sup>12,14-16</sup>

HAIs increase complexity of treatment, healthcare costs, and poor patient outcomes. It is estimated that in the United States more than 2 million people are affected and more than 100,000 people die annually from HAIs. This makes HAI a leading cause of death in the United States. HAI costs the U.S. healthcare system and taxpayers up to \$45 billion annually.<sup>17,18</sup> Because of the negative impact on patients, increased risks for providers and the escalating costs associated with these occurrences, HAI prevention is a major focal point for patients, healthcare personnel, insurers, governments, and regulatory bodies.<sup>12</sup>

The Centers for Disease Control and Prevention (CDC) definitions for HAIs are widely adopted as standard case definitions to identify and report infections. While some organizations have modified portions of these definitions, the CDC’s National Healthcare Safety Network (NHSN) provides standardized, validated criteria for surveillance purposes. Using standardized definitions permits integration into national quality improvement programs and state mandatory public reporting programs.

## Hand Hygiene and Antibiotic Resistant Infections

Antibiotic resistance and multidrug resistant organisms (MDROs) are increasingly recognized as serious health threats to global health. Along with antibiotic supply shortages and a lack of new antimicrobial agents, increasingly virulent organisms for which there are limited treatment options pose a serious threat. Hand hygiene practices are essential to reducing the spread of resistant organisms and to instituting practices of antibiotic stewardship.

Healthcare personnel are being held accountable for their hand hygiene practices to prevent transmission of MDROs, and healthcare institutions are facing increasing regulation and hand hygiene mandates while being challenged with economic consequences of failing to meet those mandates.<sup>12</sup> Moreover, governing bodies respond to public health threats, as well as media and public pressure from patient advocacy groups and nonprofit organizations that increasingly demand better patient outcomes.

To improve the quality of care and patient outcomes, comprehensive infection prevention programs must address a range of important interventions, including cleaning, disinfection, sterilization, infection monitoring, antibiotic stewardship, and isolation and control measures. And, as the single most important measure to prevent infection, **hand hygiene** continues to be the cornerstone of infection prevention activities.

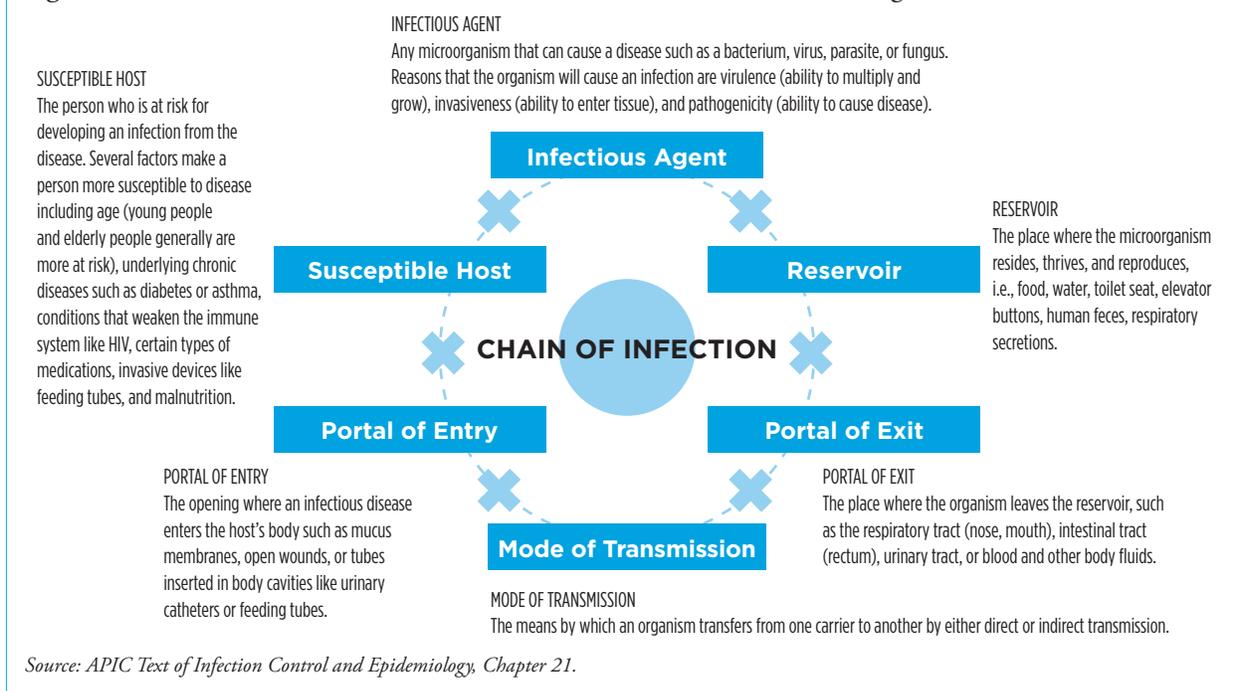
### Evidence Supporting Hand Hygiene

Hand hygiene is a standard practice and one of the most effective infection prevention strategies. Strong evidence supports the role of hand hygiene in reducing the risk of infection and improving patient outcomes.

The evidence for hand hygiene can be arranged according to the “levels of evidence” hierarchy, which rates the quality of research and publications addressing hand hygiene. In this hierarchy, larger research studies that are designed to reduce the risk of bias are considered stronger evidence.

The evidence for hand hygiene stems from multiple levels, but the findings are robust and consistent. Examples of studies from each level are shown in Figure 1.3. The Additional Resources section contains extensive reviews of prior scientific research and formal literature summaries.

Figure 1.2. Chain of infection and elements in transmission of infectious organisms



## Hand Hygiene Fundamentals

At any given moment, 2 million to 10 million bacteria can be found from the fingertips to the elbow of a human being.<sup>26</sup> The skin contains a mixture of both resident bacteria, known as normal flora, and transient bacteria, also known as transient flora.<sup>27</sup> Bacteria on the skin that are not considered part of the normal flora are regarded as transient or potentially disease-causing bacteria.<sup>28</sup>

The number and types of bacteria on the hands increases with contact with the environment, patients or other healthcare workers. Cross-contamination can occur every time healthcare personnel come in contact with a patient, other healthcare personnel, or the environment. While it is not known where infection transmission begins or ends, the chain of infection transmission occurs when the contamination from one surface is transferred to the susceptible host.<sup>14</sup> As shown in Figure 1.2, interruption of any part of the chain of infection is expected to reduce transmission by interrupting the chain of transmission.<sup>30</sup>

## Expert Opinion and Practice Guidelines

Drawing from high-quality evidence, professional societies, regulators, and healthcare organizations develop specific recommendations for hand hygiene. Based on an overall assessment of evidence quality, specific recommendations grade recommendations (see Table 1.1).

Table 1.1. Evaluation of scientific evidence quality

Category	Description
IA	A strong recommendation supported by high- to moderate-quality evidence
IB	Strong recommendation supported by low- quality evidence
IC	Strong recommendation required by state or federal regulation
II	Weak recommendation supported by any quality evidence
No recommendation	Unresolved issue

## Organization of strength of evidence based in scientific studies and published reports.

### Systematic Reviews and Meta-Analyses

Evidence from this level combines findings from published literature and other sources in order to reach a conclusion about a recommendation or practice. For example, in a comprehensive review of studies on hand hygiene from 1879 through 1986, the results of 432 scientific articles were identified supporting the role of hand hygiene in reducing infection.<sup>32</sup> Another systematic review of 96 empirical studies showed an overall hand hygiene compliance rate of 40 percent with lower rates for physicians (32 percent) compared to nurses (48 percent).<sup>22</sup> In a meta-analysis of 30 published studies from 1960 to 2007, hand hygiene practice and education yielded a decrease in the risk of infectious diseases in a community setting.<sup>22</sup> Hand hygiene practices decreased gastrointestinal illnesses by 31 percent and respiratory illnesses by 21 percent.<sup>34-36</sup> Other meta-analyses have examined the ideal components of a hand hygiene program.<sup>33,36</sup>

### Randomized Controlled Trials (RCTs)

Evidence from RCTs reports the impact of a particular intervention on an outcome compared to outcomes in a group of patients who do not receive the intervention. A key feature of RCTs is that subjects are assigned to an intervention or control group (no intervention) based on chance. For example, the impact of dispenser placement on use of alcohol-based hand rubs were have been assessed in studies.<sup>39</sup>

### Controlled Trials Without Randomization

In many studies of hand hygiene, an intervention is conducted and improvements in hand hygiene are compared to rates prior to the intervention. This pre- and post-design does not permit randomization, but permits robust analysis of the impact of an intervention.

### Case-Control and Cohort Studies

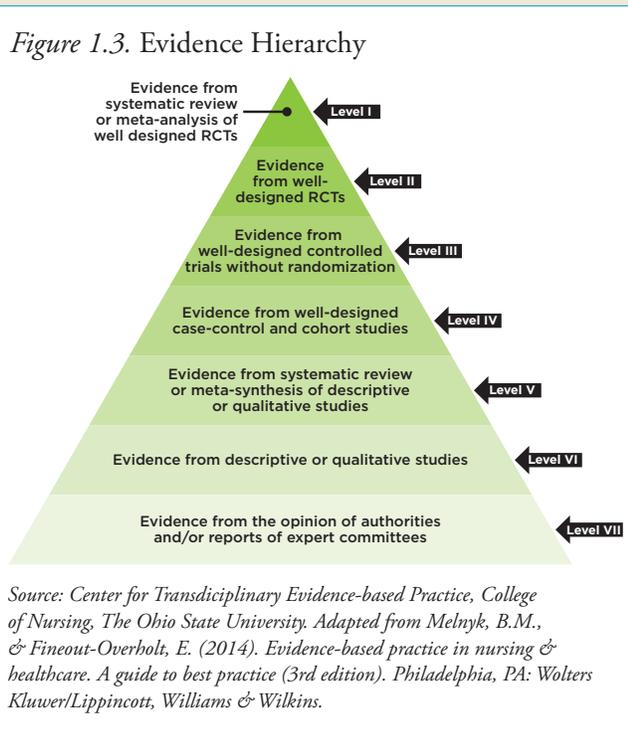
Cohort studies report the outcome among a group over a certain period of time. Case-control studies identify individuals with a particular outcome and compare them to individuals without the outcome.

### Descriptive studies

Descriptive studies report observations about hand hygiene in a particular setting. For example, in one study, *Staphylococcus aureus* infections in newborn babies was eliminated when healthcare personnel disinfected their hands.<sup>29</sup>

### Opinion of Authorities or Expert Committees

Professional organizations, regulatory agencies and institutions often recommend specific practices based on current knowledge. For example, expert panels may make recommendations for control of a new or emerging infectious agent when the results from higher quality evidence are not available.



## The Importance of Hand Hygiene Programs for Infection Prevention

Hand hygiene remains the cornerstone of infection prevention activities and is a critical means of preventing healthcare-associated infections, addressing antibiotic resistance, preventing emerging diseases, and improving patient outcomes. Despite extensive research in to the effectiveness of hand hygiene programs, there remain critical areas in the development of effective interventions and the best-evidence based hand hygiene programs.

The scientific evidence for hand hygiene as a means to prevent infection and improve patient outcomes is clear and convincing.

Hand hygiene before and after specific patient care tasks is strongly recommended by the CDC and WHO. (Category IA/IB).

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### Hand Hygiene Programs in Low-Resource Settings

Hand Hygiene practices vary globally and are influenced by resource availability, patient safety culture, and infection control infrastructure. Differences between highly resourced healthcare systems and low-resource healthcare systems can result in differences in healthcare system design, infection prevention infrastructure, patient safety culture, levels of staff infection control training, and availability of hand hygiene resources.

Variability in settings can also vary widely within a country. For example, a private institution in the poorest countries may have a superb system in place to ensure adequate hand hygiene. Existing literature describes wide variation of health systems resources which impacts hand hygiene programs.

This section describes some crosscutting issues related to hand hygiene and under-resourced healthcare systems in order to identify systems level issue that impact adherence.

**Infection control infrastructure.** In many developed countries of the world, infection control infrastructure is mandated by accreditation standards. Increasingly, accreditation through Joint Commission International (JCI) is being utilized by well-resourced healthcare systems in developing nations. As in the United States, JCI standards include infection control infrastructure. In setting where such infrastructure is not available, hand hygiene practices may be suboptimal. Further, healthcare systems with older buildings may have serious limitations on the availability of sinks/basins to support hand hygiene adherence.

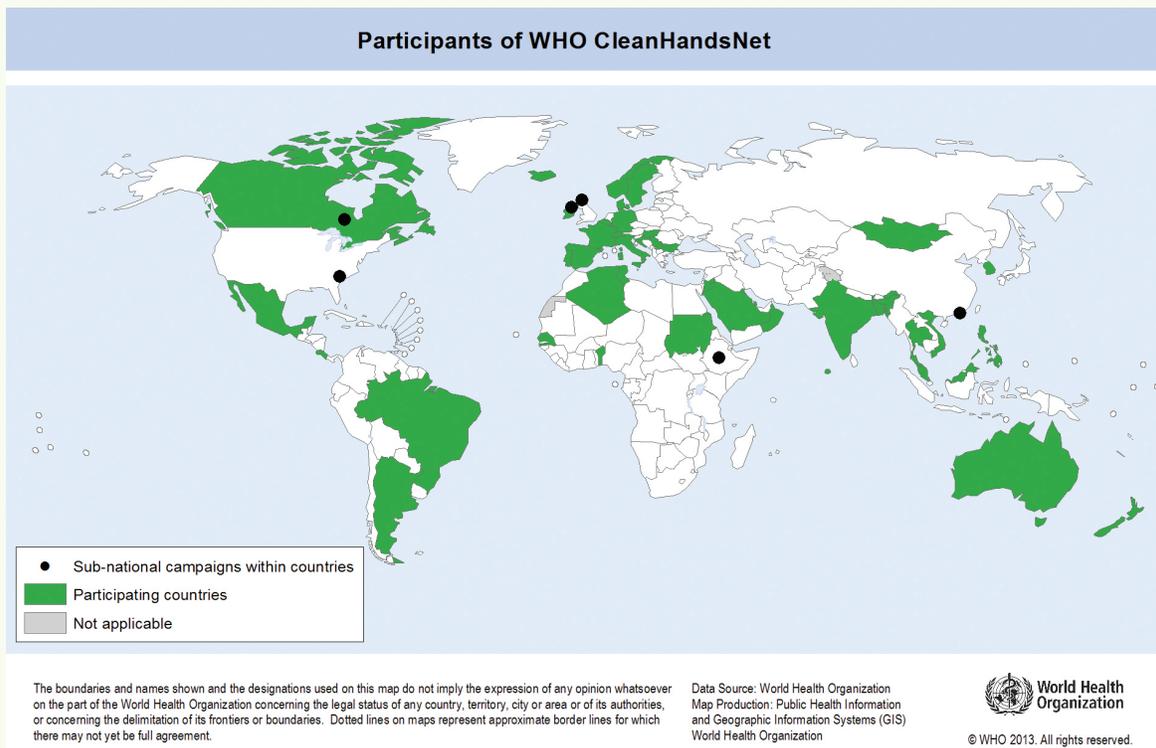
**Patient safety culture.** The use of hand hygiene products, monitoring, and support may be impacted by the health system's culture related to patient safety. If an infection control infrastructure is present, what influence does the group have to make change in the organization? How is hand hygiene monitored and is feedback provided to the workers?

**Healthcare worker infection control training.** Numerous publications in the infection control literature demonstrate that healthcare worker training in infection control is limited. Many health systems may not have the infrastructure to provide ongoing training. Further, formal infection control training to prepare an infection preventionist (IP) is virtually nonexistent in many parts of the world. To understand the types of hand hygiene education a healthcare worker receives, one must start with the educational preparation of the IP.

**Access to clean water.** Access to clean water or running water, for that matter, is not guaranteed in many poorly resourced healthcare systems. In well-resourced settings, water is not only available, but the health system actively attempts to reduce pathogenic micro-organisms in the water supply; poorly resourced settings may rely on water with a heavy micro-organism burden. The need for waterless-based hand hygiene products in such settings is clear, yet in these settings not always financially feasible.

**Soap.** Hand soap (i.e., bar soap, foam, liquid) is a luxury in many under-resourced settings for both healthcare workers and patient areas.

**Hand hygiene products.** The use of alcohol-based and other hand hygiene products in well-resourced environments is likely enabled through an external supplier with some level of guarantee of quality and standardization. In low-resource settings, hand hygiene product may be developed on the grounds of the hospital setting. Lack of standardization limits quality of the product. Further, added features that facilitate adherence to the product, such as emollients, may not be available or used. It is essential for the IP to inspect the supply, distribution, and development of the product to ensure appropriate quality.



*WHO CleanHandsNet participants, 2011.*

## The Future of Hand Hygiene: Improving Compliance

Despite the body of evidence in its favor and a commonly shared understanding of the importance of hand hygiene in preventing infection, including HAIs, and controlling the spread of antibiotic resistant organisms, hand hygiene compliance remains low across healthcare settings. Ongoing research and product development are essential to build on established science and further promote improved patient outcomes through the implementation of hand hygiene programs.

Areas that have emerged as important to advancing science include improved product formulations, use of technology to bolster monitoring of hand hygiene, more rigorous adoption of hand hygiene practices across healthcare settings, and consideration of the patient's role in hand hygiene.

### *Product Formulation and Testing*

Advancements in product type, formulation, and delivery have the potential to increase adoption of hand hygiene. Newer methods of evaluating the antibacterial properties are important to developing highly effective products.

Section 3 reviews the properties of currently available products and provides an overview of trends in product evaluation.

See the Additional Resources section of the Implementation Guide for examples and links to guidelines.

### *Observation Methods*

While recognized as the gold standard, direct observation of hand hygiene by healthcare personnel is labor intensive and may not reflect overall adherence. In healthcare facilities with different treatment environments and thousands of hand hygiene opportunities during a 24-hour period, direct observation is often impractical. Using technology to augment traditional observation can improve data quality and assist in refining hand hygiene programs. Section 4 reviews current monitoring strategies and emerging trends in electronic or technology-assisted monitoring.

### *Impact of Practice Setting*

Much of the current literature has addressed hand hygiene in acute care settings. Increased attention should be paid to hand hygiene practices among different patient populations, including pediatrics and geriatrics. In addition, recommendations for hand hygiene in non-healthcare (e.g., schools, childcare, and food industry) settings should be explored.

### *Patient Hand Hygiene*

In addition to adopting hand hygiene programs aimed at improving hand hygiene among healthcare personnel, these programs should also include techniques and observations aimed at patients, families, and visitors. Available research strongly suggests that hand hygiene among these groups can play an important role in infection prevention.<sup>37</sup> Studies have reported pathogens present on patient hands, the absence of patients utilizing sanitation resources even when readily available, and have explored patients' beliefs and values toward hand hygiene.<sup>38</sup> A recent study that included direct observation (the gold standard of hand hygiene measurement) of facility visitors, healthcare staff, and patients concluded that of the observed categories of individuals, visitors cleaned their hands 4% of the time, while patients were not observed to cleaned their hands at all.<sup>39</sup>

Other areas that deserve further exploration include the ethical principles that guide all prevention programs, such as staff and patient motivation to perform adequate and consistent hand hygiene, the potential unintended transmission of occupationally acquired infections as a result of hand hygiene noncompliance, and a more robust understanding of professional obligations within an organizational culture of safety.

## Conclusion

Over the past 200 years, the scientific literature has contributed to evidence-based practices for hand hygiene programs. Many professions have contributed to the ongoing development of these programs, including nursing, medicine, epidemiology, microbiology, and infection prevention. Private stakeholders, accrediting organizations and the demands of regulatory and governmental agencies have also contributed to the evolution of the need for and practice of hand hygiene. While a hand hygiene program alone cannot absolutely control disease transmission, it remains the cornerstone of all effective prevention programs and the foundation upon which other practices are designed.

Despite the progress made, the prevalence of HAIs, including the escalating threats associated with antimicrobial resistance, result in significant worldwide morbidity and mortality.<sup>40</sup> In this context, hand hygiene continues to offer one of the simplest and most effective solutions to help prevent infections, maximize patient safety, and improve healthcare outcomes across the continuum of care.

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## Section 2: Guidelines, Regulatory Oversight, and Public Reporting

James F. Marx, RN, PhD, CIC  
Broad Street Solutions  
San Diego, CA

### Key Concepts

- Federal and regional governmental authorities provide guidance for hand hygiene programs.
- Accrediting organizations develop specific standards to review healthcare organizations.
- Reporting of hand hygiene compliance is required in certain U.S. states and in Canadian provinces.

### Introduction

Effective hand hygiene programs must be developed, implemented, and sustained within a framework of best practices based on available guidelines, directions from public agencies, and the needs of public reporting. Guidelines should serve as a foundation to develop the policies and procedures used to direct the delivery hand hygiene programs for direct patient care in a specific healthcare facility. In addition, local, regional, and national regulatory agencies issue requirements related to hand hygiene practices. Compliance with local regulatory requirements may vary based on geographic location; so networking with professional colleagues, and especially among infection preventionists (IPs), is important to acquiring complete information. Finally, public reporting of healthcare-associated infection data has emphasized the importance of reducing infection transmission to a much wider audience than at any other time in the past. This chapter, thus, provides an overview of the major guidelines, public agencies, and reporting requirements that must be taken into account when developing and instituting a hand hygiene program.

### National and International Guidelines

There have been many hand hygiene guidelines published in the past 20 years. Most are evidence based and include a rating of strength of the recommendation based on the science available at the time they were written. Along with the advancements in scientific understanding of hand hygiene programs, governmental and professional organizations have developed guidelines to address hand hygiene and its use in infection prevention programs.

Three organizations are most often recognized in the United States and Canada as authorities for hand hygiene guidelines: World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), and Public Health Agency of Canada (PHAC).<sup>1-3</sup> These organizations have developed recommendations on hand hygiene technique, products, timing, methods, and program implementation, but their recommendations for the timing, or indication, for hand hygiene differ from each other. A summary of differences in technique and products is provided in Sections 3 and 4.

See the Additional Resources section of the Implementation Guide for examples and links to guidelines.

## Regulatory Requirements

Compliance with hand hygiene guidelines is most often enforced through government regulatory agencies or accrediting organizations. For example, The Joint Commission, an accrediting organization in the United States, requires that facilities follow either the CDC or WHO guideline to meet the specific patient safety goal. In the United States, four primary agencies provide regulatory oversight for hand hygiene programs: Centers for Medicare and Medicaid Services (CMS), Occupational Safety and Health Administration (OSHA), Food and Drug Administration (FDA), and Consumer Product Safety Commission (CPSC). Although provincial regulation differs in Canada, two national agencies provide guidance on hand hygiene programs: Health Canada and the Canadian Centre for Occupational Health and Safety (CCOHS); provincial agencies provide regulation specific to a Canadian province.

### Centers for Medicare and Medicaid Services (CMS)

The CMS of the United States Department of Health and Human Services provides government reimbursement for program beneficiaries and certified healthcare providers for eligible services. In order to receive reimbursement, healthcare entities must comply with specific requirements. These requirements are called Conditions of Participation or Conditions of Coverage. Each type of healthcare organization has a specific set of conditions. As outlined in Table 2.2, these include acute care hospitals, skilled nursing facilities, ambulatory surgical centers, home health, dialysis centers, and psychiatric hospitals.<sup>9,10</sup>

Table 2.1. CMS Hand Hygiene Regulations

Entity	Section	Requirement
Hospital	A0716	Use of alcohol-based hand rub
	A-0747	The hospital must provide a sanitary environment to avoid sources and transmission of infections and communicable diseases. There must be an active program for the prevention, control, and investigation of infections and communicable diseases.
Skilled Nursing Facility	F441	The facility must require staff to wash their hands after each direct resident contact for which hand washing is indicated by accepted professional practice.
Ambulatory Surgery Center (ASC)	Q0104	Use of alcohol-based hand rub
	Q0242	The ASC must maintain an ongoing program designed to prevent, control, and investigate infections and communicable diseases. In addition, the infection control and prevention program must include documentation that the ASC has considered, selected, and implemented nationally recognized infection control guidelines.
Home Health*	G204-G206	The aide training program must address each of the following subject areas through classroom and supervised practical training...The individual being trained must complete at least 16 hours of classroom training before beginning the supervised practical training, including...basic infection control procedures.
Dialysis Center*	494.30	The dialysis facility must provide and monitor a sanitary environment to minimize the transmission of infectious agents within and between the unit and any adjacent hospital or other public areas.
Psychiatric Hospital*	B106	A provisional or admitting diagnosis must be made on every patient at the time of admission and must include the diagnosis of undercurrent diseases as well as the psychiatric diagnosis.

\*No specific hand hygiene reference in the regulation.

Sources: Department of Health & Human Services Centers for Medicare & Medicaid Services. CMS manual system pub 100-07 state operations provider certification transmittal 37. 2008. Available at: [www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/downloads/R37SOMA.pdf](http://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/downloads/R37SOMA.pdf) and Hospital conditions of participation: Patients' rights. 42 C.F.R. § 482. 2006. Available at: [www.gpo.gov/fdsys/pkg/FR-2006-12-08/pdf/06-9559.pdf](http://www.gpo.gov/fdsys/pkg/FR-2006-12-08/pdf/06-9559.pdf).

### Occupational Safety and Health Administration (OSHA)

OSHA is the U.S. federal agency that oversees employee safety and address potential exposure to pathogens by healthcare personnel. In the late 1990s, OSHA issued the blood-borne pathogen standard, which is the primary document that addresses hand hygiene. Many states also regulate worker safety through a state occupational health agency. State agencies may have different requirements than the federal OSHA requirements; it is important to be familiar with state occupational safety requirements.<sup>11</sup> Table 2.2 provides a summary of hand hygiene requirements.<sup>13</sup>

Federal OSHA standards were written before the widespread accepted use of alcohol-based hand rubs (ABHRs). As a result, clarification letters have been published by OSHA.<sup>12</sup>

Table 2.2. OSHA Bloodborne Pathogens Standard Related to Hand Hygiene

Section	Regulation
1910.1030(d)(2)(iii)	Employers shall provide hand-washing facilities that are readily accessible to employees.
1910.1030(d)(2)(iv)	When provision of hand-washing facilities is not feasible, the employer shall provide either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.
1910.1030(d)(2)(v)	Employers shall ensure that employees wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment.
1910.1030(d)(2)(vi)	Employers shall ensure that employees wash hands and any other skin with soap and water, or flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.

Source: Occupational Safety and Health Administration. Toxic and hazardous substances. Standard number 1910.1030. Bloodborne pathogens. Available at: [www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10051](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051).

### Food and Drug Administration (FDA)

The FDA classifies antibacterial hand soaps as drugs under the Federal Food, Drug & Cosmetic Act (FFDCA). They are categorized as drugs because they are intended and labeled for topical antimicrobial use to prevent disease in humans. Thus, the FDA regulates them as over-the-counter drugs. The FFDCA defines drugs, in part, by their intended use, as “articles intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease” and “articles (other than food) intended to affect the structure or any function of the body of man or other animals.”<sup>14</sup> FDA regulations of hand hygiene products cover any claims made that hand hygiene products treat or prevent disease. Section 3 provides a further discussion of different hand hygiene products and their classification by the FDA.

### Consumer Product Safety Commission (CPSC)

The CPSC regulates products that meet the definition of soaps, including plain and antimicrobial soaps.<sup>15</sup> Because there are no claims about the prevention or treatment of disease, plain soap does not require ingredient labeling.<sup>16</sup> However, if soap is sold as a cosmetic or antimicrobial soap, it then falls under the jurisdiction of the FDA.

### Health Canada

Cosmetics are defined under Section 2 of the Food and Drugs Act and include any substance, or mixture of substances, that is manufactured, sold, or represented for use in cleansing, improving, or altering the complexion, skin, hair, or teeth. This category includes deodorants, perfumes, and soaps.<sup>17</sup>

Table 2.3. Hand Hygiene Requirements by U.S. Accrediting Organizations

The Joint Commission	DNVGL Healthcare
<p>National Patient Safety Goal 07.01.01</p> <ul style="list-style-type: none"> <li>• Comply with either the current CDC hand hygiene guidelines or the current WHO hand hygiene guidelines.</li> <li>• Implement a program that follows categories IA, IB, and IC of either the current CDC or the current WHO hand hygiene guidelines.</li> <li>• Set goals for improving compliance with hand hygiene guidelines.</li> <li>• Improve compliance with hand hygiene guidelines based on established goals.</li> </ul>	<p>Promotion of hand-washing hygiene among all staff and employees, including use of alcohol-based hand sanitizer measures, specific to prevention of infections caused by multidrug-resistant organisms (MDROs). This applies to, but is not limited to, organisms such as methicillin-resistant <i>Staphylococcus aureus</i> (MRSA), <i>Clostridium difficile</i> (C.diff), vancomycin resistant enterococci (VRE), and multidrug-resistant gram-negative bacteria.</p> <p>Notwithstanding any provisions of the 2000 edition of the Life Safety Code to the contrary, a hospital may install ABHR dispensers in its facility if:</p> <ul style="list-style-type: none"> <li>• Use of alcohol-based hand rub dispensers does not conflict with any state or local codes that prohibit or otherwise restrict the placement of ABHR dispensers in healthcare facilities;</li> <li>• The dispensers are installed in a manner that minimizes leaks and spills that could lead to falls. The dispensers are installed in a manner that adequately protects against inappropriate access;</li> <li>• The dispensers are maintained in accordance with dispenser manufacturer guidelines.</li> <li>• If dispensers are stored in corridors, the corridor must be a minimum of 72 inches.</li> <li>• The maximum individual dispenser fluid capacity shall be 1.2 liters (0.3 gallons) for dispensers in rooms, corridors, and areas open to corridors; 2.0 liters (0.5 gallons) for dispensers in suites of rooms.</li> <li>• The dispensers shall have a minimum horizontal spacing of 4 ft (1.2 m) from each other.</li> <li>• Not more than an aggregate 37.8 liters (10 gallons) of ABHR solution shall be in use in a single smoke compartment outside of a storage cabinet.</li> <li>• Storage of quantities greater than 18.9 liters (5 gallons) in a single smoke compartment shall meet the requirements of National Fire Protection Association (NFPA) 30, Flammable and Combustible Liquids Code.</li> <li>• The dispensers shall not be installed over or directly adjacent to an ignition source.</li> <li>• In locations with carpeted floor coverings, dispensers installed directly over carpeted surfaces shall be permitted only in sprinklered smoke compartments.</li> <li>• Where minimum corridor width is 72 inches (1830 mm), projections of maximum 6 inches (152 mm) from the corridor wall, above the handrail, shall be permitted for the installation of hand-rub dispensing units.</li> </ul>

## Canadian Centre for Occupational Health and Safety

The CCOHS publishes information related to hand hygiene, but does not specifically regulate approval of products or practice. Two examples of hand hygiene publications are *Hand Washing: Reducing the Risk of Common Infections* and *Good Hygiene Practices and Reducing the Spread of Infections and Viruses*.<sup>18,19</sup>

## Canadian Provincial Regulation

Although there are no Canadian national hand hygiene guidelines similar to those from the CDC, there are specific provincial requirements. Ontario Guidelines have been used as a model and adapted into other provincial guidelines. For example, in Ontario the statement to “need 70% alcohol” became a standard that was then adapted across the county. Most provinces follow the Four Moments of Hand Hygiene, but some in the western Canada use the Five Moments for Hand Hygiene. Most provincial hand hygiene guidelines in Canada are updated every two to four years. Health Canada’s guideline was last updated in 1998, but the PHAC has various documents for specific areas.

See the Additional Resources section of the Implementation Guide for examples and links to guidelines.

## Accrediting Organizations

Healthcare organizations voluntarily participate in accrediting programs developed to promote overall quality and safety. In the United States, accreditation may also be aligned with federal healthcare reimbursement. Accrediting organizations that receive “deeming authority” from CMS then conduct on site surveys that are the equivalent of a CMS site survey. However, not all accrediting organizations and their respective programs hold such authority. In the United States, the two largest accrediting organizations for hospitals are The Joint Commission (TJC) and *Det Norske Veritas (DNVGL)*.

In Canada, the primary accrediting organization is Accreditation Canada, which publishes Required Organizational Practices, evidence-based practices for healthcare organizations.<sup>20</sup> The practices include a hand hygiene evaluation that has three sections, including (1) self-auditing of hand hygiene compliance; (2) sharing audit results with staff, providers, and volunteers; and (3) using results of the audits to make improvements to its hand hygiene practices. Hand hygiene education is also a requirement, including staff education and training and verification of understanding of how to apply the protocol.

## Conclusion

Hand hygiene programs are a critical component of infection prevention programs for healthcare organizations. Multiple governmental, regulatory, accreditation, and other agencies establish standards for hand hygiene programs.

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## Section 3: Hand Hygiene Products

Timothy Landers, RN, CNP, PhD, CIC  
 College of Nursing  
 The Ohio State University  
 Columbus, OH

### Key Concepts

- Formulations of commercially available hand hygiene products include a range of active and inactive ingredients designed to reduce the number of organisms on skin and improve tolerability.
- Product efficacy claims are regulated by governmental agencies, including the Food and Drug Administration (United States) and Health Canada (Canada), and are tested using standard methods both in a laboratory (*in vitro*) and in test subjects (*in vivo*).
- Format of hand hygiene product includes the type of product and can include liquid soaps and bars as well as hand sanitizer gels, liquids, foams, and wipes.
- Delivery technologies include dispensers and bottles designed to provide a controlled amount of product to the end user.
- Special consideration is required for hand hygiene products in surgical settings and for control of certain infections, including *Clostridium difficile* (*C. diff*) outbreaks.
- It is crucial to perform local testing of product formulation, format, and dispensers to determine preferred characteristics in an individual setting.

A robust and successful hand hygiene program requires products that are effective, well tolerated, and readily available. With a wide range of products currently available, an important component of the role of the infection preventionist (IP) is to assist in evaluating new products and selecting a product best matched to the assessed needs of a particular healthcare setting and its hand hygiene program.

This section reviews the formulation, format, dispenser technology, and current test standards in controlled settings of hand hygiene products in order to assist IPs in evaluating the wide range of commercially available product options and making informed choices for their hand hygiene programs.

In determining the most appropriate products for a particular setting, both the *efficacy* and *effectiveness* of a product must be considered.

Three important characteristics of hand hygiene products that relate to efficacy and effectiveness include:

- Formulation
- Format
- Delivery



effect on pathogens while other agents have persistent activity and continue their antimicrobial activity after application. Concentration of active ingredients is expressed as a percentage of ingredient weight to total weight (w/w) or ingredient volume to total volume (v/v).

The most common active ingredient in hand rubs is alcohol, included as ethyl alcohol, isopropanol, or n-propanol at a concentration of 60 percent to 95 percent. Alcohol exhibits its antimicrobial properties by denaturing bacterial or viral proteins but demonstrates little persistent effect after the product has dried. While alcohol is effective at killing most gram-positive and gram-negative organisms, it has little effect against spore-forming bacteria, such as *C. diff* and non-enveloped viruses. Chlorhexidine (CHG) is another active ingredient in hand hygiene products. At concentrations of 0.5 percent to 4 percent, it disrupts the cellular membrane and kills most non-spore forming bacteria and enveloped viruses. CHG is believed to have limited immediate effect, but it has the benefit of persistent antimicrobial activity for several hours after use.

See the Additional Resources section of the Implementation Guide for examples and links to guidelines.

Povidone iodine is a combination of iodine that produces an antimicrobial effect by altering intracellular processes with povidone, which increases the amount of available iodine in solution. At concentrations of 7.5 percent to 10 percent, povidone iodine solutions are used as surgical hand preparations but may be impractical for routine use because they are staining and can cause skin irritation. Other classes of active ingredients include quaternary ammonium compounds, hexachlorophene, chloroxylenol, and triclosan. Because of concern about environmental toxicity and potential effects on human health, the Food and Drug Administration (FDA) published a 2013 update to a previous notice that it plans to review the benefits of triclosan in consumer products.<sup>2</sup> At this time the FDA is working closely with the Environmental Protection Agency (EPA) regarding the use of triclosan in hand hygiene products.

### Inactive Ingredients

Inactive ingredients are components that include:

- Vehicles, substances that allow the active ingredient to be delivered to the site
- Preservatives to reduce spoilage
- Dyes
- Fragrances to make the product more appealing to the user

After submitting efficacy data or complying with the requirements of a published monograph, manufacturers are permitted to use an FDA-approved label indication to promote the product. Currently approved labeled indications for hand hygiene products are shown in Table 3.1.<sup>3</sup>

Table 3.1. FDA-Recognized Categories of Hand Hygiene Products

Healthcare antiseptics:	Consumer antiseptics:	Food handler antiseptics:
<ul style="list-style-type: none"> <li>• Healthcare personnel handwash</li> <li>• Patient preoperative skin preparation</li> <li>• Surgical hand scrub</li> <li>• Healthcare hand sanitizer</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer antiseptic handwash</li> <li>• Consumer antiseptic bodywash</li> <li>• Consumer hand sanitizer</li> </ul>	<ul style="list-style-type: none"> <li>• Food handler handwash</li> <li>• Food handler hand sanitizer</li> </ul>

Source: Federal Register 59 (116).

Inactive ingredients play an important role in determining the tolerability of hand hygiene products: humectants or emollients may be added to products to moisturize the skin and reduce drying; excipients may be included to add bulk to the product but may also improve efficacy of active ingredients.

Labels for hand hygiene products are required by the FDA to clearly display the active ingredient, inactive ingredients, and indication or intended use.

## Product Format

Format refers to the characteristics of the specific product. Table 3.2 provides a comparison of commonly available hand hygiene product formats. Different product formats may be desirable in different clinical settings.

*Table 3.2.* Comparison of Different Hand Sanitizer Forms

Type	Description	Comments
Liquid	Water-like sanitizer that can be put in to a spray	Rapid dispersal across surfaces, can present concern about dripping
Gel	Jelly-like colloid dispersed in a semi-solid form	Commonly used, well tolerated, can leave “stickiness” on the hands
Foam	A mass of small bubbles formed from the infusion of air in to solution	Created during manual activation of a dispenser or air pressurized canister
Wipe	Small cloth or fabric soaked in antimicrobial solution	Effective at removing dirt and foreign material from the hands

## Product Delivery

Dispensing an appropriate amount of hand hygiene product to the user is accomplished with delivery devices or dispensers. In addition to being able to control the amount of product, dispensers and containers must protect the product from degradation. For example, alcohol-based products can evaporate if not stored appropriately, and the efficacy of other agents can be reduced by exposure to light.

Hand hygiene programs should take advantage of advances made in dispenser technology. No-touch dispensers are believed to reduce cross-contamination by multiple users through an electronic sensor that dispenses product when hands are placed under the unit. Other dispensers allow adjustment of the amount of product dispensed, which may impact efficacy or effectiveness. As outlined in chapter 4, more advanced dispensers integrate monitoring technology and can be used to prompt users when hand hygiene is indicated. Dispenser color, placement, design, and usability should be evaluated as part of developing a hand hygiene program.<sup>4</sup>

While manual dispensers are dependent on adequate pressure on the device, automated dispensers control the volume of product delivered, and this may present an advantage as typical use volumes more closely reflected the volume of product tested in standard protocols. Very low-volume dispensers require multiple actuations to achieve this effective dose.

Point of care dispensers provide the hand hygiene product to healthcare workers within easy reach during patient care activities. The aim of point of care availability is to provide access to hand hygiene products in the “patient zone”—the location where the patient and healthcare personnel and environment intersect. Common approaches to point-of-care hand hygiene include personal carriage and mounting hand hygiene products directly in the patient zone. Personal carriage includes small volumes of hand hygiene products worn or carried by healthcare workers. Products located at the point of care can be mounted to a hospital bed, wall-mounted in an examination room, fixed to mobile patient care devices, or otherwise made available when care is delivered. Best practices for point of care solutions depend on understanding the unique patient care environment and technique to maximize hygiene at the point of care.<sup>9</sup>

See the **Additional Resources** section of the **Implementation Guide** for examples and links to guidelines.

## Product Testing

Efficacy of hand hygiene products is demonstrated by “passing” one of the standardized methodologies for hand sanitizer reduction in bacteria on hands. These methods include both *in vitro* and *in vivo* test standards. *In vitro* test methods are conducted in a controlled setting, such as a laboratory while *in vivo* methods determine effectiveness in actual or simulated real-world conditions.

*In vivo* protocols collect bacteria or viruses from the hands using standardized methods before and after use of a hand hygiene product. This sampling is completed with a standardized, predefined technique. One example of a sampling protocol, the “glove juice” method, is shown in Table 3.3.<sup>5</sup>

*Table 3.3.* Overview of “Glove Juice” Sampling Methods for Product Efficacy Testing

1. Wash hands and lower third of forearms with 5 mL of nonantibacterial soap for 30 seconds and rinse, keeping hands separate and above elbows. Water should be 40°C and flowing at 4 liters per minute. The subject’s hands should not touch the sink after rinsing has begun.
2. Dry hands with a clean paper towel.
3. Within 1 minute after completion of washing, place oversized sterile gloves on subject’s hands.
4. Pour 75 mL of sterile sampling solution into the gloves and secure the gloves at the wrists with a tourniquet.
5. Uniformly massage the subject’s hands for 1 minute.
6. Within 1 minute of completing the massage, a 5 mL sample should be taken from the finger region of the gloves.
7. Perform microbiologic testing on the sample using standard lab techniques, including serial dilutions to determine bacterial concentration.

*Source: Adapted from (ASTM E1115-10).<sup>5</sup>*

An overview of types of currently used testing methods is shown in Table 3.4. Important limitations of test protocols have been identified such that current methods may not reflect clinical efficacy and ongoing research is identifying which protocols most accurately reflect efficacy under real use conditions.

Table 3.4. Examples of Hand Hygiene Product Testing Protocols

Goals of test method	Test type	Organisms used	Examples
Determination of range of antimicrobial action	<i>In vitro</i> testing of known strains of bacterial and minimal inhibitory concentration (MIC) for active agents and formulations	Test set of 20+ organisms, including gram- positive, gram- negative and yeast.	CLSI M07-09 CLSI M100
Evaluate time required for antimicrobial action	<i>In vitro</i> time kill studies evaluating inhibition or killing of bacteria at specified time points	Known organisms in laboratory setting	Time-kill studies
Surgical hand preparations	<i>In vivo</i> assessment of reduction in bacteria and persistent action	Normal and transient flora on the hands of volunteers at baseline and predefined intervals following use	EN 12791 ASTM 1115
Evaluation of hand rubs	Application of solution of bacteria and comparison of log-reduction to control (60% alcohol solution)	E. coli	EN 1500
Evaluation of handwash or hand rubs	Log-reduction in indicator organisms after product use	Serratia	ASTM E-1174
Test reduction in organisms from fingerpads	Fingerpads are contaminated and log-reduction assessed at defined time intervals	Various bacteria or viruses	ASTM E-1838 ASTM E-2276

Source: CLSI: Clinical Laboratory Standards Institute, EN: European Committee for Standardization.

The most commonly used standard for evaluation of healthcare personnel hand wash is ASTM1174. In this protocol, 4.5ml of a solution of *Serratia marcescens* at a known concentration (between  $5 \times 10^8$  –  $1 \times 10^9$  CFU/ml) is applied to test subjects' hands and allowed to dry. Baseline bacterial counts on the hands are obtained using the glove juice method. The test product is applied for 10 cycles and bacteria counts are obtained. The FDA requires a 2-log reduction after the first wash and a 3-log reduction after the 10th wash for healthcare personnel hand wash products. However the importance of measuring log reductions and their potential correlation to the nosocomial transfer of pathogens via the hands of healthcare workers remains controversial and an area of future study.

## Local Testing of Products

Critical components of hand hygiene programs are local testing and evaluation of products in specific settings by end users. The aim of this local evaluation is to determine tolerability, preference, and acceptance of products. Tolerability refers to side effects of product use including skin drying, cracking, redness, or skin irritation. Tolerability can be assessed through surveys or user questionnaires about perceived side effects. Tools are also available that provide more objective determination of the presence of skin irritation.<sup>6</sup>

Acceptability of product refers to user perceptions of product, including aesthetic characteristics, such as appearance, smell, and tactile characteristics. The amount of time required for a product to dry may also impact acceptability and should be included in the evaluation.

The World Health Organization has developed two testing methods for the tolerability and acceptability of products with good descriptions of the required sample size, procedures, and questionnaires to aid in the evaluation process.<sup>7,8</sup>

In these protocols, either a single product (Method 1) or multiple products are evaluated (Method 2).<sup>7,8</sup> At baseline, evaluators are given a brief questionnaire about professional classification, skin condition, frequency of hand hygiene, and barriers to hand hygiene. IPs often participate in the evaluation and selection of hand hygiene products. An example of a hand hygiene product evaluation tool is shown in Figure 3.2. After using a test product, users evaluate the aesthetics and usability of the new product, including the perceived impact of the product on their hands with a trained user then evaluating skin condition for irritation, redness, and cracking. Items are scored from 1 to 7, and the guideline presents proposed criteria for minimum acceptability and tolerability. Due to the range of variables described in this chapter, as well as the number of commercially available products, the IP must carefully and objectively evaluate multiple factors. A summary of recommendations for expediting the product evaluation process is described in Tips for Evaluating Manufacturer Claims.

Figure 3.2. Sample Questions for Local Evaluation of Hand Hygiene Products

**Evaluation of the test product**

What is your opinion of the test product for hand hygiene?

<b>Colour</b>	Unpleasant	<input type="checkbox"/>	Pleasant						
<b>Smell</b>	Unpleasant	<input type="checkbox"/>	Pleasant						
<b>Texture</b>	Very sticky	<input type="checkbox"/>	Not sticky at all						
<b>Irritation (stinging)</b>	Very irritating	<input type="checkbox"/>	Not irritating						
<b>Drying effect</b>	Very much	<input type="checkbox"/>	Not at all						
<b>Ease of use</b>	Very difficult	<input type="checkbox"/>	Very easy						
<b>Speed of drying</b>	Very slow	<input type="checkbox"/>	Very fast						
<b>Application</b>	Very unpleasant	<input type="checkbox"/>	Very pleasant						
<b>Overall evaluation</b>	Dissatisfied	<input type="checkbox"/>	Very satisfied						

Source: World Health Organization<sup>7,8</sup>

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## Tips for Evaluating Manufacturer Claims—Product Efficacy

### *What is the product formulation?*

- Identify inactive ingredients
- What other components could impact efficacy?

### *Understand the test methodology used:*

- What was the general approach of the test protocol?
  - *in vivo* or *in vitro*
  - what test organisms were used?
- On whom was the testing performed? (healthcare workers or surrogates)
- Do the claims use industry-standard methods?
- What product volumes were used in the tests?
- How many applications were performed?
- What were the reductions in bacteria over repeated applications?

### *Request data from third-party evaluation:*

- Were independent labs used to perform testing?
- Were the data reviewed in published literature?

### *Carefully consider dispenser type and impact on clinical use:*

- Do dispensers control volume or are they dependent on the user?
- Which technology issued to deliver the product? (touch vs. no-touch)

### *How do claims about tolerability and acceptance relate to local needs?*

- Are claims of product preferences based on similar populations?

### *Include local testing of products for acceptability and tolerability:*

- See resources on World Health Organization product testing.
- 
- 

## Conclusion

Carefully selecting hand hygiene products is an important part of a well-designed and effective hand hygiene program. Understanding product ingredients and methods of efficacy and effectiveness testing as well as performing local testing is critical to developing comprehensive programs.

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## Section 4: Hand Hygiene Monitoring

Connie Steed, RN, CIC, MSN  
Greenville Health System  
Greenville, SC

Katherine Ellingson, PhD  
Oregon Health Authority  
Portland, OR

### Key Points

- Monitoring hand hygiene is critical to understand current compliance with recommended practices and develop effective programs.
- Hand hygiene compliance can be monitored at specific time points during the course of patient care or upon room entry and room exit.
- Monitoring includes direct observation, product usage, and emerging electronic monitoring strategies.

To obtain a true picture of hand hygiene compliance in a particular facility, it is important to understand current hand hygiene practice and estimates of compliance. This information may be used to—

- Sustain and improve hand hygiene compliance
- Provide comparative data, which is necessary to measure the effects of hand hygiene programs over time
- Compare rates between units and among facilities

In addition, these data may be presented as a measure of healthcare quality. For these reasons, monitoring of hand hygiene practice to collect data and drive compliance is an increasingly important element of a strong hand hygiene program.

The purpose of this section is to review the *timing* for compliance monitoring, the *focus* of monitoring, and *specific techniques* to monitor or measure compliance.

### Timing of Compliance Monitoring

An important consideration in designing a hand hygiene monitoring plan is to identify the timing of hand hygiene observations or when hand hygiene opportunities will be observed and reported. Two main approaches have been used to identify the timing of hand hygiene observations—on room entry and exit (“in and out”) or during key moments (i.e., indications) for hand hygiene during the course of patient care.

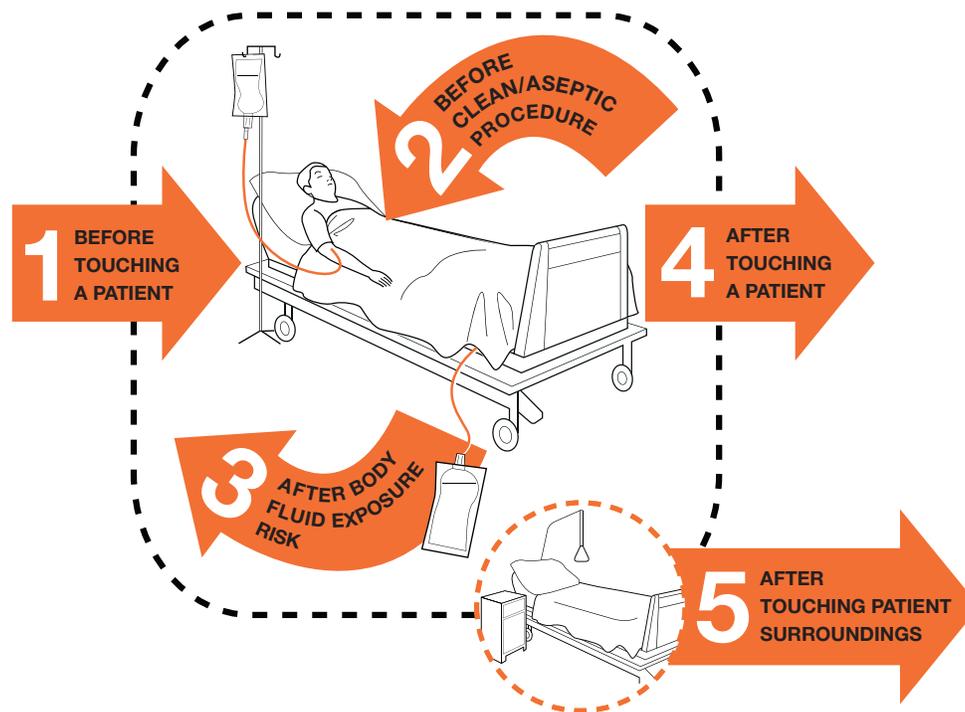
Regardless of the timing of measurement, it is important that a standardized process be used to observe and document compliance.

Table 4.1. Comparison of monitoring timing for hand hygiene: *In and Out* or *Five Moments*?

	<b>“In and Out” Monitoring</b>	<b>Moments Monitoring</b>
<b>Timing</b>	“In and out” monitoring occurs when healthcare workers enter or exit a patient’s room.	Hand hygiene opportunities are based on the risk of healthcare provider’s hands transmitting germs during healthcare delivery, whether by contact with the patients, environment, or body fluids.
<b>Advantages</b>	Commonly used because the observer is not required to enter the patient room and the provider being observed is less likely to be aware of being monitoring.  Requires less training and results may be more consistent among observers.	Can also be used for education of healthcare workers as well as for monitoring hand hygiene.  Provides the most detailed information about hand hygiene compliance relative to specific indications.
<b>Challenges</b>	Fairly easy to implement and requires limited decision making as the observer is looking for room entry and exit.  The location of hand hygiene dispensers, sinks, and gloves in association with the patient space impacts usefulness of information.  Duration and schedule of observations can impact findings.  Does not account for all potential hand hygiene opportunities during direct patient care, and the observer may not be able to readily determine if the healthcare provider cleaned his or her hands at all appropriate indications.  Subject to potential inaccuracies such as hand hygiene that occurs outside the observation range or counting room entry and exit when no patient contact occurs.	Observers require training and the use of standardized observation forms adapted by individual institutions.  The WHO Five Moments methodology suggests that the observer monitor the healthcare personnel inside the patient room or any location in which care is provided, which may be uncomfortable for the patient such as during invasive tasks.  The WHO monitoring tool includes healthcare professional category names that are not standardized throughout the world.  Duration and schedule of observations can impact findings.

Figure 4.1. WHO Your 5 Moments for Hand Hygiene

# Your 5 Moments for Hand Hygiene



<b>1</b>	<b>BEFORE TOUCHING A PATIENT</b>	<b>WHEN?</b> Clean your hands before touching a patient when approaching him/her. <b>WHY?</b> To protect the patient against harmful germs carried on your hands.
<b>2</b>	<b>BEFORE CLEAN/ASEPTIC PROCEDURE</b>	<b>WHEN?</b> Clean your hands immediately before performing a clean/aseptic procedure. <b>WHY?</b> To protect the patient against harmful germs, including the patient's own, from entering his/her body.
<b>3</b>	<b>AFTER BODY FLUID EXPOSURE RISK</b>	<b>WHEN?</b> Clean your hands immediately after an exposure risk to body fluids (and after glove removal). <b>WHY?</b> To protect yourself and the health-care environment from harmful patient germs.
<b>4</b>	<b>AFTER TOUCHING A PATIENT</b>	<b>WHEN?</b> Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side. <b>WHY?</b> To protect yourself and the health-care environment from harmful patient germs.
<b>5</b>	<b>AFTER TOUCHING PATIENT SURROUNDINGS</b>	<b>WHEN?</b> Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched. <b>WHY?</b> To protect yourself and the health-care environment from harmful patient germs.



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### The Hawthorne effect

The Hawthorne effect has been used to describe changes in behavior that occur when an individual knows that he or she is being observed or supervised. In research on the effectiveness of hand hygiene programs, the Hawthorne effect—the impact of being observed—can improve compliance with hand hygiene, but also can present a bias because individuals change behavior based on being observed and not on other elements of the program.

## Focus of Monitoring

### Measuring Product Use

Product consumption is used as one approach to assess overall hand hygiene compliance. This approach consists of calculating the overall volume or quantity of hand hygiene products, such as liquid soap and waterless alcohol-based hand rubs, consumed by healthcare professionals within a certain time frame. The underlying assumption is that changes in product usage reflect changes in hand hygiene activity. Measuring product use is considered time efficient, less expensive than many other methods, can be accomplished either manually or electronically, and supports the ongoing tracking of organization-wide trends. The key to the success of this methodology is the way in which product use is measured and compared. If the facility desires location-based results, there must be a means to determine accurate use within those locations. Since healthcare personnel and visitors move between locations, assuring the accurate measurement for specific locations is difficult. Often only approximate numbers or estimates of hand hygiene compliance are possible.

One commonly used manual method involves collecting empty soap and alcohol waterless agent containers and tallying the sum of containers for each location. Environmental services or assigned employees at each location are typically responsible for collecting this information. Patient bed days are used as the denominator so that the data are reported as liters of hand hygiene product used per 1000 patient days. A challenge with this method is to ensure consistent collection of empty containers for tallying purposes.<sup>1,2,3,8</sup> A year-long, multicenter collaboration study using product use and feedback to staff found improvements in hand hygiene compliance after the intervention period.<sup>14</sup>

## Specific Techniques for Monitoring Compliance

### Direct Observation

Direct observation—in which trained observers follow healthcare professionals and observe their care of patients for a period of time—is considered the “gold standard” for compliance monitoring. Using direct observation, all opportunities for hand hygiene can be explicitly counted, the individuals practicing hand hygiene can be identified, and the reasons for noncompliance can be further explored. In addition, direct observation permits evaluation of hygiene technique.

Concerns related to direct observation include time and labor costs, need for consistency in the selection and training of observers, the representativeness of

### Keys to Direct Observation

The key to successful hand hygiene compliance monitoring by direct observation is to follow a standardized process, which includes

1. designating and training of staff to conduct the monitoring;
2. sampling of areas, opportunities, and healthcare worker types to be monitored;
3. planning for data collection and analysis;
4. validating the data collected;
5. reporting to front line staff; and
6. using the data for action. Ideally, an organization should have a monitoring plan that encompasses all of these processes.<sup>3</sup>

Table 4.2. Direct Observation Hand Hygiene (HH) Sample Monitoring Plan

Program Component	Plan	Responsible Person(s)
1. Who is monitoring hand hygiene (HH)?	<b>Sample Answers:</b> 1. Trained secret shoppers from every unit.	<b>Sample answers:</b> 1. Nurse managers choose secret shoppers. Infection preventionist conducts training. Secret shoppers cannot monitor HH] prior to training.
	2. Full-time equivalent.	2. Director, Infection Prevention hires FTE and facilitates training.
2. What is being monitored?	<b>Sample Answers:</b> 1. HH activity, care provider group, type of HH agent used.	<b>Sample Answers:</b> 1. Monitoring tool developed by HH Team.
	2. HH technique, HH activity, care provider, type of HH agent uses.	2. Five Moments for HH tool modified by HH Team. Hand hygiene technique tool developed by HH Team.
3. How/when is HH to be monitored?	<b>Sample Answers:</b> 1. 1 hour per week on assigned unit. Focus on HH; can't be doing other work. Use established form. Give filled in forms to nurse manager who will send to Infection Prevention.	<b>Sample Answers:</b> 1. Periodic secret shoppers.
	2. Conduct HH observations full-time. A rotating schedule is used to ensure all locations received HH monitoring. All work shifts and work days are to be covered.	2. Full-time direct observer.
4. What kind of data analysis is performed?	<b>Sample Answer:</b> Successful HH opportunities (number of compliant event/total number of HH opportunities observed X 100) by location and rolled up into organization rate.	<b>Sample Answer:</b> Data are tabulated in Excel spreadsheet by location by Infection preventionist/ data professional in quality department.
5. How are data communicated to staff?	<b>Sample Answer:</b> Compliance rate placed on monthly unit report card and posted on unit bulletin board.	Nurse manager or designee.
6. How are monitoring results validated?	<b>Sample Answers:</b> 1. Observer will be validated after training and prior to performance of the task.	1. Educator validates at time of training.
	2. "Expert" rounds with observers once a quarter to conduct inter-rater reliability.	2. Designated infection preventionist.

small observation samples compared to all hand hygiene opportunities. In order to provide more accurate estimates and also avoid the Hawthorne effect, it is common to try to conduct direct observations without the knowledge of the healthcare worker.

Essential components of direct monitoring are consistency, regular observation periods, use of validated instruments, and feedback to staff, managers, and leaders as part of a multimodal hand hygiene program. Many hospitals use different observers for each location being assessed. Healthcare personnel who have clinical roles or other patient-care related job responsibilities but are simultaneously asked to perform monitoring (often in conjunction with the organization’s process improvement program) must have dedicated work time to focus on hand hygiene observation.<sup>3</sup> For greatest success, the observers are instructed to focus on hand hygiene monitoring for a period of time when that is their only task. Observations should not be made when the observer is performing other duties as this many times results in observation variation.

Observers undergo training prior to participating in the monitoring process and are intermittently assessed (or their tabulations validated) in some way to ensure their observations are consistent with expectations. The WHO has detailed instructions and downloadable training tools that address many of the required components of the Five Moments for Hand Hygiene.<sup>11</sup> The organization should formally outline training requirements and appoint responsible person(s) to conduct the training and communicate in an ongoing basis. Some organizations use full-time observers who focus solely on hand hygiene.<sup>5,6</sup>

Figure 4.2. WHO Hand Hygiene Observation Tool

### Observation Form

Facility:		Period Number*:		Session Number*:	
Service:		Date: (dd/mm/yy)	/ /	Observer: (initials)	
Ward:		Start/End time: (hh:mm)	: / :	Page N°:	
Department:		Session duration: (mm)		City**:	
Country**:					

Prof.cat			Prof.cat			Prof.cat			Prof.cat		
Code			Code			Code			Code		
N°			N°			N°			N°		
Opp.	Indication	HH Action									
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A variety of documentation strategies can be used to record hand hygiene observations and analyze data. In addition, smartphone applications have been used to reduce the cost associated with direct observations.

### *Patient Observers*

Asking patients to actively participate in hand hygiene observational monitoring has been proposed. For example, a basic approach begins by asking patients when they arrive at the registration desk if they are willing to observe hand hygiene practices by staff during their appointment or episode of care. If the patient agrees, he or she is briefly educated about the importance of hand hygiene and the monitoring process by a trainer. The patient is given an observation card and pencil. The card is simple and includes the clinic name and visit date and indicates by check mark who (doctor, nurse) rendered care. The patient then marks “yes,” “no,” or “unsure” for whether hand hygiene was performed; this feedback is usually anonymous. The card is dropped in a secure box on the way out.<sup>13</sup>

## Evolving Techniques for Monitoring Compliance

### *Electronic Hand Hygiene Monitoring Systems*

Technically sophisticated electronic monitoring systems for hand hygiene compliance are now available and may be placed into three broad categories: hand hygiene dispenser-associated monitoring systems, real-time locating systems (RTLS) to track employees and hand hygiene activity, and video surveillance of hand hygiene.<sup>8</sup> Other considerations would be if the system is individual- or group-based.

The advantages of using electronic surveillance systems in hand hygiene programs for monitoring compliance are the decreased dependency on staff to act as observers, the ability to capture more hand hygiene opportunities, and reduction of the Hawthorne effect. While the advantages are clear and there have been many reports of success with such systems, it is worthwhile to note at this point that more data are needed to substantially assess the impact of electronic technology on hand hygiene monitoring, compliance, and outcomes.

### *Dispenser-Associated Systems*

Measuring the frequency of product use with electronic counting devices has offered a practical alternative for monitoring hand hygiene compliance at a unit level.<sup>2</sup> The counting devices are attached to dispensers and collect the number of activations. A limitation with this method is the acquisition cost of electronic counting devices, as well as the potential need to rotate them among all available dispensers in setting where resources prevent using them in all available locations. Another concern is that the process does not readily include a denominator (e.g., number of hand hygiene opportunities) needed to calculate a compliance rate. As with the manual method, patient bed-days could be used to calculate a surrogate rate. Organization-wide product utilization rates have also been calculated and tracked over time. In this instance, the rate is expressed as the number of product liters used per 1,000 patient days. The key to the success of this method is accurate product-use data.<sup>14</sup>

See the **Additional Resources** section of the **Implementation Guide** for examples and links to guidelines.

Dispenser-associated monitoring systems include a sensor that counts activations as a proxy for successful hand hygiene events. These data are then transmitted via wireless technology to a website for aggregation

and analysis. Other monitoring systems integrate technology into employee name badges and/or motion-detecting devices (located at doorways, sinks, dispensers, and patient beds) to capture and record the number of hand hygiene events, usually in and out of room, so that a surrogate compliance rate can be calculated.<sup>15</sup> While most dispenser-associated systems use “in and out of room” activity to approximate the number hand hygiene opportunities, one monitoring system uses the Five Moments for Hand Hygiene as the denominator for opportunities and uses dispenser activations (hand hygiene events) with a formula that calculates a hand hygiene compliance index by location.<sup>16</sup>

Another system uses electronic technology to track when a healthcare professional enters and exits a room, as well as monitoring hand hygiene occurrences utilizing sensors attached to sinks and hand hygiene product dispensers.<sup>17,18</sup> “In and out of room” activity is used to calculate a denominator for a hand hygiene compliance rate. For those organizations that desire to know the compliance rate for a specific healthcare provider, a badge with an identifying chip has been developed so that the hand hygiene activity of an individual can be monitored. Some electronic monitoring programs provide voice prompts, or audible noise if hand hygiene is not performed.<sup>17-19</sup> Another system uses a green light to acknowledge that a hand hygiene opportunity has taken place. When the healthcare professional is close to the patient, a bed monitor recognizes whether the badge is green or not. If the badge is not green, the badge will vibrate as a reminder to clean hands. This particular technology brings into account a patient zone by using a bed monitor.<sup>20</sup>

### **Real-Time Locating Systems**

Healthcare provider badges can be used to communicate wirelessly with dispensers and sensors strategically located in patient rooms and other locations. The communication to the dispensers can be accomplished by using hard-wired or wireless technologies. Some badge based systems use real time locating systems (RTLS). Some use other technology that can be integrated into existing communication or nurse call systems. Hand hygiene compliance rates for “in and out of room” are estimated for each healthcare provider and can also be reported by the nursing unit. An advantage of an RTLS is that the technology can be used to track equipment, work flow of employees, and patients. Infection preventionists (IPs) may want to check whether an RTLS is used in the organization for other types of tracking activities. If so, it may be possible to expand existing or other communication technology to include hand hygiene surveillance. The potential to build upon an existing system may present savings that are essential when discussing the costs and benefits of major technology projects with leadership.<sup>21</sup>

### **Video Surveillance**

The use of video cameras offers an alternative to data collection by employees or volunteers. Video surveillance is conducted by placing cameras at sinks or hand-sanitizer dispensers and the video feed is then analyzed by an outside reviewer. Video observers assign a “pass or fail” designation depending on the performance of the healthcare worker.<sup>22</sup> This approach is appealing because the cameras can be inconspicuously placed, are less obtrusive, and may permit more frequent monitoring. Potential concerns of video monitoring include the cost of technology and individuals needed to review and analyze the video footage. Although direct observation is considered the gold standard, electronic monitoring systems are emerging that may make the collection of compliance data routine. Before implementing a monitoring program, methods for hand hygiene monitoring must be identified, validated, and agreed upon by the consensus of the stakeholders who will be involved in its use, and implemented in a consistent and ongoing matter. Second, the information produced by the preferred method must be actionable, that is, it must be reported in a way that facilitates organizational improvements and enhanced performance by the employees. Both of these factors are necessary for the IP to coordinate an effective hand hygiene program and to facilitate sustainable change within any healthcare facility.

Two issues that require frequent clarification include how to handle hand hygiene monitoring during “no touch” events when in-and-out opportunities are being observed and measuring hand hygiene compliance when the healthcare worker is wearing gloves.

### “Non-Touch” Activity Monitoring

Questions frequently arise as to whether “non-touch” activities should be monitored for hand hygiene compliance. This is a decision that should be made by the facility and discussed in the hand hygiene monitoring directions. A clarification should be made as to what “non-touch” means and organism transmission risk. Does “non-touch” mean no patient contact and/or no patient environment contact? Activities that do not require contact with a germ reservoir do not have a transmission risk and consequently there is no rationale to monitor (e.g., walking into room without touching patient or environment). Contact with patient surroundings does pose a risk of germ transmission and in the Five Moments for Hand Hygiene methodology would be monitored. With the use of the “in and out” methodology, there is no means to know what occurs after the patient room is entered unless the observer is standing at the door looking into the room. Thus, the only way to address non-touch activity is to define it (e.g., food tray delivery) and include it in “in and out” observations. In this case, there is no guarantee that there will be no touching after entering the room because in-room activity is not being monitored.

### Hand Hygiene Monitoring and Glove Use

Another important topic is the performance of hand hygiene related to the use of nonsterile or sterile gloves. While protocols often separate monitoring of hand hygiene and glove use, both are important to preventing infection and protecting healthcare workers. Hand hygiene is recommended prior to patient contact and gloves are indicated when exposure to blood or body fluids is expected or when the patient is placed in contact precautions. After patient care, it is possible that hands can become contaminated during glove removal; thus, it is recommended that hand hygiene be performed before patient care and after glove removal and that gloves be used in accordance with recommendations for isolation precaution.

## Conclusion

Monitoring is an important part of hand hygiene programs. A variety of methods have been used to monitor hand hygiene including direct observation. Advances in the use of technology for monitoring hand hygiene may be useful in improving data quality and consistency. When considering an electronic monitoring system, always try to evaluate whether the system is integrated with other technology in use or if it is a stand-alone system.

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## Section 5: Implementing Hand Hygiene Programs

Ted Pincock, RN, CIC  
Infection Prevention and Control  
Providence Health Care  
Vancouver, British Columbia, Canada

Timothy Landers, RN, CNP, PhD, CIC  
College of Nursing  
The Ohio State University  
Columbus, OH

### Key Points

- A multimodal approach is considered the best strategy for implementing hand hygiene improvement programs.
- A comprehensive multimodal approach includes plans of action that are integrated and coordinated.
- Components of this approach include (1) hand hygiene culture change, (2) program support from organizational leaders, (3) education and training, (4) compliance monitoring, (5) multidisciplinary teams, (6) accessible hand hygiene products, (7) reminders in the workplace, and (8) outcome monitoring.

Effective hand hygiene programs adopt multiple approaches. These include elements that are cooperative and synergistic. Multidimensional hand hygiene programs have become a cornerstone in accrediting standards, governmental regulation, and professional society recommendations.

The purpose of this section is to review the multimodal approach to hand hygiene and address specific components of this approach.

### The Standard of Care for Hand Hygiene Programs

Multimodal programs are now recognized as the standard of care because single strategies are not likely to result in sustained behaviour change. Recommendations from major public health organizations, regulatory standards, and professional societies advocate use of a multimodal approach.

Over the past decade, such bodies as the Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), and the Public Health Agency of Canada have used evidence to develop guidelines for hand hygiene in healthcare.

Regulatory agencies, such as the Joint Commission and Accreditation Canada, have responded by modifying standards for infection control programs to reflect the need for a multimodal approach to hand hygiene. Recent revisions to Accreditation Canada standards for infection prevention programs include dedicated hand hygiene education and training. The standards require evidence that hand hygiene is an organizational priority; that multiple media are used in hand hygiene promotion among patients and visitors, as well as healthcare personnel, service providers and support staff; and that hand hygiene products are available at the point of care. In addition, governmental bodies—local, state, provincial, and federal—have begun mandating public reporting of hand hygiene and healthcare-associated infections (HAIs).

See the **Additional Resources** section of the **Implementation Guide** for examples and links to guidelines.

Governmental agencies and professional societies have developed a wide range of model programs; a recent review suggested that the most successful multimodal models included enhanced access to alcohol-based hand rub (ABHR), education, reminders, feedback, and administrative support. The WHO Implementation Guide follows a multimodal approach, providing standardized materials on systems/infrastructure change (including availability of ABHRs), education, evaluation and feedback, reminders, and institutional safety climate (including administrative support). New guidelines have outlined the multiple strategies to be implemented in such programs, and large scale international trials have demonstrated sustained improvements in hand hygiene using the multimodal approach.<sup>1</sup> The key to this approach is the coordination among components of the program.

## Examples of Coordinating and Interacting Components of a Multimodal Strategy

### **Workflow and dispenser placement:**

- Increasing the number of dispensers can improve access to hand hygiene products. Having the care team study their work flow and provide advice on dispenser placement can improve the frequency of use.

### **Access to hand hygiene products and the supply chain:**

- Leadership should commit to the provision of hand hygiene resources, to support sufficient hand hygiene product at the point of care.

### **Matching educational content to the learner's needs and current performance:**

- Education and training must be tailored to meet the learning and functional levels of healthcare personnel.

### **Administrative support versus leadership engagement and program participation:**

- Commitment of senior administration can be demonstrated through reminders that can improve involvement in hand hygiene promotion.

### **Linkage between the organizations goals and values and reminder messaging:**

- Hand hygiene reminders must reflect the identified goals, but the message should be changed to hold the personnel's attention.

Implementing effective hand hygiene programs can be challenging. Commitment of resources is required for each component, and a range of strategies must be implemented simultaneously. Coordination of the components often requires different levels of expertise and varying contributions from individual members of a multidisciplinary team.

Key elements of a multimodal hand hygiene program are outlined in Table 5.1.

When integrated into a multimodal strategy for hand hygiene compliance, surveillance data can play a role in identifying multiple issues related to hand hygiene compliance. Lack of access to products may indicate the need to modify placement of dispensers, or ensure more timely replenishment of product. Patterns of transmission may indicate spatial relationships that identify specific practice or environmental issues.

When properly targeted and implemented, the integration of HAI monitoring and feedback of patient outcomes becomes a valuable component of the multimodal approach.

Table 5.1. Components of multimodal hand hygiene strategy

Component	Description	Examples
1. Establish ongoing monitoring and feedback on infection rates	The fundamental purpose of hand hygiene is infection prevention. Therefore, monitoring pathogen transmission and HAI rates must be a priority as a feedback mechanism for the effectiveness of prevention strategies. Although necessary, HAI monitoring is not a simple endeavor and would benefit from scientific and technological support to help simplify and standardize approaches.	Benchmark and monthly/quarterly tracking and internal reporting of: <ul style="list-style-type: none"> <li>• HAI incidence and transmission of HAI-associated pathogens</li> <li>• Tracking of endemic and emerging drug resistant pathogens</li> <li>• Data on transient or setting-specific outbreaks</li> </ul>
2. Establish administrative leadership and support	An effective hand hygiene bundle contributes to a hospital-wide culture of safety but requires support from the most senior administrators. Possibly integrated with a comprehensive hospital-wide quality improvement program, the bundle should be a regular topic at department meetings and promoted by senior executives both publicly and internally as an organizational priority.	Administrative leadership and support must be visible and vocal and include: <ul style="list-style-type: none"> <li>• Hospital board, senior executives, and all administrative and clinical leaders</li> <li>• Clear policies/procedures that support the hand hygiene initiative</li> <li>• Budgetary support for hand hygiene products, monitoring, and training</li> <li>• Culture change that directly links hand hygiene with patient safety</li> </ul>
3. Establish a multidisciplinary design and response team	Bundle implementation requires the leadership of a multidisciplinary team. Coordinated by an infection preventionist and including administrative, clinical and front-line staff, the team guides component strategies to evaluate and adjust interventions, target objectives, establish timelines, and improve compliance outcomes.	*Membership and co-leadership by IP, CE, and QA staff as well as: <ul style="list-style-type: none"> <li>• A key senior administrator to emphasize the organizational priority</li> <li>• Area specific clinical and administrative managers</li> <li>• Front-line clinical and support staff</li> </ul>
4. Provide ongoing education and training for staff, patients, families, and visitors	As a key patient safety initiative, all service providers, volunteers, and staff, as well as patients, families, and visitors, must receive education on the importance of proper hand hygiene, as well as training on how and when to perform it. Education and training are not one-time exercises, but rather ongoing, dynamic efforts that reinforce positive behavior and a culture of safety.	Multimedia presentations, including: <ul style="list-style-type: none"> <li>• Mandatory Web-based learning modules</li> <li>• Presentations; group discussions, classes, lectures, and grand rounds</li> <li>• Role modeling and mentoring including start of shift team huddles</li> <li>• Instructive posters, pocket cards, and brochures</li> </ul>

Table 5.1. Components of multimodal hand hygiene strategy (continued)

Component	Description	Examples				
5. Ensure hand hygiene resources are accessible facility wide and at the point of care	Evidence-based best practice dictates the need for accessible hand hygiene resources throughout health care facilities. At the point of care—where the risk of cross-contamination and infection transmission is high—appropriate hand-hygiene resources (soap, paper towels, ABHR) must be within arm’s reach. These supplies should be available in consistent and predictable locations.	<p>Accessibility begins at facility entrances, key thresholds, and between clinical areas</p> <ul style="list-style-type: none"> <li>• In patient care corridors, at the entrance and exit of patient rooms</li> <li>• In prescribed areas corresponding to the moments for hand hygiene</li> <li>• Within “arm’s reach” at the point of care whenever possible</li> <li>• Personal carriage of ABHR if dispenser placement is impractical</li> </ul>				
6. Reinforce hand hygiene behavior and accountability	When all components of the hand hygiene bundle are in place, support for appropriate hand hygiene behavior is optimal and the organization has done its part. At this point we are individually responsible to behave appropriately. Both positive and negative reinforcement can be used to help us improve compliance.	<table border="1"> <thead> <tr> <th>Positive reinforcement</th> <th>Negative reinforcement</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>• Contests</li> <li>• Incentives (eg, gift cards, bonuses)</li> <li>• Recognition programs</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>• Tickets</li> <li>• Notice letters</li> <li>• Personnel action</li> </ul> </td> </tr> </tbody> </table>	Positive reinforcement	Negative reinforcement	<ul style="list-style-type: none"> <li>• Contests</li> <li>• Incentives (eg, gift cards, bonuses)</li> <li>• Recognition programs</li> </ul>	<ul style="list-style-type: none"> <li>• Tickets</li> <li>• Notice letters</li> <li>• Personnel action</li> </ul>
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7. Provide reminders throughout the health care setting	Equipped with knowledge and even with the best of intentions, we all have moments of forgetfulness, and certainly more so when we are attempting to change behavior and build new habits. Reminders, provided in multiple ways and at different times, can help, and there is a range of ways to provide them.	<p>In addition to posters and displays, reminders include:</p> <ul style="list-style-type: none"> <li>• Real-time feedback by observers, coworkers, patients and visitors</li> <li>• Role models (hand hygiene champions in every clinical area)</li> <li>• Electronic alerts</li> </ul>				
8. Establish ongoing monitoring and feedback of hand hygiene compliance	If infection rates are a measure of outcomes, then compliance monitoring is a measurement of process. As an essential component, compliance monitoring evaluates this process while regular timely feedback of results facilitates the improvement of hand hygiene behavior. As with HAI measurement, scientific study and technological advancement will help simplify and standardize approaches.	<p>A range of measurement tools and feedback mechanisms are available:</p> <ul style="list-style-type: none"> <li>• Monthly/quarterly postings of compliance data on hospital units and hospital Web site, with regular discussion of data at staff meetings.</li> <li>• Direct observation, product use surveys, and electronic monitoring are in current use. Combinations of these tools may be efficacious.</li> </ul>				

\*CE, clinical educator; IP, infection preventionist; QA, quality assurance.

Source: Pincock, et. al. *Bundling hand hygiene interventions and measurement to decrease healthcare-associated infections.*<sup>15</sup> Used with permission

## Hand Hygiene Programs and Culture Change

Healthcare organizations have a complex social structure composed of diverse groups, many with unique subcultures of their own. While promotion of a safety oriented “hand hygiene culture” at the organizational level can have broad impact, affecting change requires time and should be considered a long-term goal. Changing the culture of an organization requires coordination, oversight, and leadership.

Efforts to achieve culture change need to align with the organization’s goals and values as well as resonate with staff. Communications specialists may be engaged to assist in developing a vision of culture change. Staff should be able to identify with the organization’s vision of change and be able to see the value of culture change within their own group, unit, or team. Culture change may be more easily affected in smaller groups. Once several groups have adopted a change, they may be connected to exert a more noticeable hand hygiene culture change.

## Support from Organizational Leaders

The support of senior administration in the improvement of hand hygiene culture is critical. A firm commitment from the organization’s most senior officials is paramount to ensure the success of the initiatives. Hand hygiene compliance must be a visible organizational priority across all levels of management, and it must be supported with clear policies and procedures. Leadership’s commitment to hand hygiene must be visible and engaging—to the organization and the public through formal communication, hand hygiene education, promotions, and event sponsorship.

See the **Additional Resources** section of the **Implementation Guide** for examples and links to guidelines.

### *Educational Support*

Education and training must be accessible in a range of formats for different audiences, including patients/families and visitors as well as HCPs, service providers, support personnel, and volunteers. The message must be congruent across the organization. The WHO guideline on hand hygiene in healthcare has produced success globally. It offers standardized content and training components. Having hand hygiene principles incorporated into local medical and nursing educational curricula can also strengthen hand hygiene programs.

Program content should be concise, factual, and engaging while reinforcing the science behind hand hygiene practice and its practical application at the point of care. It should impart an understanding of specific opportunities, or “moments,” for hand hygiene in the context of current guidelines.

### *Training Modules*

Skills training is an integral component of learning appropriate hand hygiene technique and should include a variety of methods, such as supervised activities, self-directed group sessions, mentored one-on-one instruction, or short web-based modules. Skill testing may be advisable to assess the effectiveness of training.

### *Opportunities for Learning*

The orientation of new healthcare team members is an important opportunity for hand hygiene education. This includes new employees and should also include students who will be working or interacting with patients. Orientation provides the opportunity to set expectations of standards and performance and is the perfect time for impressing on team members the importance of hand hygiene.

Routine in-service training and recertification of staff, service providers, and volunteers is another opportunity to increase knowledge, skill, and awareness. Annual mandatory completion of hand hygiene modules, with signoffs of recertification, can demonstrate that the organization views hand hygiene as a priority.

It is important that training and education sessions be well planned, skillfully conducted, and contain the most up-to-date information. Creative and practical examples of the value of hand hygiene can be engaging and encourage staff participation. The results of monitoring may demonstrate a lack of awareness of hand hygiene strategies. Implementation of new products, observed variation in technique, or changes in recommendations may necessitate additional training and education.

### ***Educational and Promotional Presentations***

When presenting to larger groups or when attempting to amplify a presentation's impact, having one or more members of the organization's hand hygiene team or an administrative sponsor attend can highlight the significance the organization places on hand hygiene. Whenever possible, beginning the presentation with a brief message from senior leadership that expresses the importance of hand hygiene culture change and the need for practice improvement. The presence of senior leaders underlines the organization's support of the hand hygiene team, the program, and the relationship of hand hygiene to the institution's philosophy and position statement.

Personal, relatable stories can produce greater impact than merely stating policy and help to encourage behavioral change. Examples of bad outcomes, patient/client suffering, loss, and extended length of stay help show the importance of hand hygiene in proper patient care. Keep the stories short and to the point to make the presentation memorable and provide a compelling message.

In summary, effective education and training programs need to connect individual existing knowledge with the organization's policies, compliance expectations, and hand hygiene culture. Education, training, and promotional efforts must underscore the organization's expectations on an individual basis regarding compliance, practice improvement, and personal accountability.

### ***Compliance Monitoring***

Monitoring can increase and sustain engagement, resulting in increased compliance and commitment to process improvement. Measurement of hand hygiene performance is important at the individual, unit, management, and administrative levels, and for organizations to perform internal and external benchmarking. The results of hand hygiene monitoring can be used to plan additional education and training opportunities, identify additional resources needed, and can contribute to organizational change. As outlined in Section 2, monitoring and reporting of hand hygiene is required in many jurisdictions for funding and regulatory requirements.

However, as part of a hand hygiene program, measurement and reporting should support other parts of the program and should be designed as one component of the multimodal approach. From this perspective, monitoring strategies must be designed to be motivational and supportive of behavior change at the individual, unit, program, or facility level. Those engaged in monitoring should ensure appropriate sample size, monitoring techniques, and scoring methods are used so that these observations can be used to motivate behavior change.

### ***Reinforcement and Accountability for Hand Hygiene Behavior Change***

There is no "quick fix" for changing hand hygiene behavior. Successful programs have the following characteristics: They take a long time; they engage unit level staff as well as administrative and clinical leaders; they are respectful and nonpunitive; they help to transfer "ownership" of behavior change and performance improvement from the infection prevention staff to frontline healthcare teams, thereby changing hand hygiene culture.<sup>13</sup>

Behavior change strategies reviewed in Section 6 can be useful to promote hand hygiene programs. In general, the aim of behavior change programs should be to decrease frustration, motivate behavior change, encourage frontline engagement, and ensure that feedback regarding hand hygiene is timely, non-punitive, and tailored.

### Multidisciplinary Team Support

Leadership for the program is provided by a multidisciplinary committee composed of administrative and clinical managers, patient care staff, as well as infection prevention and quality improvement personnel. Stakeholders and decision-makers should be included in the development of multidisciplinary teams. Clear program objectives, timelines, standardized measures, reporting guidelines, and follow-up points are key aspects of an effective program.<sup>12</sup>

Patient care staff can provide insight into barriers to hand hygiene that may exist on their unit or at a facility level and recommend strategies to address these barriers. Clinical staff can be key in promoting hand hygiene programs and serve as “hand hygiene champions.” Administrative staff can assist in obtaining resources and leadership support for hand hygiene programs. Purchasing staff can assist in product recommendations. Education staff can assist in developing high-quality education programs.

### Accessible Hand Hygiene Products

System change entails more than an organization’s ability to provide soap, water, paper towels, alcohol-based hand rub, or ensuring appropriate placement of dispensers. Providing accessible resources is a necessary component of any hand hygiene improvement strategy. Senior management must demonstrate an organizational priority not only on providing adequate resources, but also promoting the attitude that an empty, defective, or missing dispenser reflects poorly on the organization’s attitude and commitment to patient safety.

Section 3 provides important considerations in the selection of hand hygiene products. Providing effective products that are strategically located is a cornerstone of a multimodal hand hygiene program. Products must be well tolerated and have demonstrated efficacy against major pathogens. They should be evaluated by end users who should have input into product selection.

### Reminders in the Workplace

Effective hand hygiene programs use targeted messages that are focused on improving hand hygiene practices. These should be regularly updated and changed to remain effective. Appropriate behavior change strategies, including reminders in the workplace, can trigger knowledge to action and motivate individual practice improvement.

One of the most valuable components of a promotional campaign is the use of effective reminders in the workplace. However, to be effective, reminders should prompt people to do something they already know how to do. Education and training play an important role in reinforcing knowledge of how, when, and why to perform hand hygiene. Properly placed reminders can trigger recall of this knowledge at the right moment and serve to reinforce proper practice. Common reminders include visual prompts, such as signs, pins, and stickers.

Some monitoring systems include auditory prompts, such as buzzes or voice reminders, or tactile prompts, including vibrations to trigger hand hygiene.

When including reminders, it is important to consider information overload or alarm fatigue. This can occur when signs, notices, and bills are commonplace and workers no longer notice these important cues.

Figure 5.1. Hand Hygiene Reminder



Source: [www.apic.org](http://www.apic.org)

Typically, reminders are only in view for a few seconds, so they must be short, easy to read, and direct to facilitate rapid recognition. Changing reminders to provide novel visual stimuli and providing reminders that are engaging and relatable can increase attention to the message. The design, size, and placement, of signs greatly influence their attractiveness and therefore their effectiveness in communicating the message. Because hand hygiene reminders are intended to trigger action, it is important to ensure the availability of hand hygiene products within proximity to the visual cue. Ensuring that hand hygiene can actually occur is the best way to connect the visual cue of the reminder with the act of hand hygiene.

Commonly recognized icons, such as the “STOP” sign, have been used to promote hand hygiene. It is important to consider that whatever the intended message of the sign, it should resonate with the organization. The use of reminders in the workplace should be seen as a focal point for synergy within a hand hygiene improvement bundle. When effectively linked by a central theme, reminders should cause healthcare personnel to remember their personal, professional, and organizational commitment to preventing infections; the current team and organizational metrics on HAI and hand hygiene compliance; and their commitment to self-efficacy and safe patient care. Branding the central message of your hand hygiene program with a slogan, logo, or icon can help integrate “the what”—i.e., clean your hands—with the “who,” “when,” “where,” and “why” of hand hygiene.

## Campaigns that Promote Hand Hygiene Behavior Change

Important campaigns include “Clean Hands For Life” (NHS Great Britain), “STOP— clean your hands” (CPSI Canada), and the “Global Patient Safety Challenge” (World Health Organization and practice guidelines from APIC, SHEA, and Centers for Disease Control and Prevention).<sup>6-11</sup> The Additional Resources section provides further reading and information on these campaigns. As previously mentioned, the process of behavior change is a long term endeavor. Launching and driving a hand hygiene improvement campaign can revitalize the process of behavior change. Doing so, however, is a strenuous process requiring administrative support, promotional resources, and a motivated team. Finding new and innovative ways to maintain momentum is critical and recruiting and training interested participants e.g., infection control link nurses from the frontline can breathe new vigor into any campaign.<sup>14</sup>

Social contracting is another method that can be employed to initiate, revive, or maintain hand hygiene improvement efforts. Social contracts either written or verbal illicit a commitment to specific behaviors and can be important in promoting a safety climate and engaging people in behavior change. Social contracting is also an effective way of branding a campaign. Graphics can be used to emphasize the importance of hand hygiene.

Figure 5.2. Hand Hygiene Reminder



Source: *Infection Control Symbol Package*<sup>17</sup>

See the Additional Resources section of the Implementation Guide for examples and links to guidelines.

Some campaigns use pledges such as the “Ask Me If I’ve Washed My Hands” campaign that shares the responsibility for reminders with patients and healthcare workers. In other campaigns, such as the “Please Remind Me” campaign, a unit based pledge board and promotional poster were developed to engage staff.

In this initiative, healthcare workers were encouraged to sign the pledge board only when clearly understanding that they were not simply pledging to clean their hands. The distinguishing factor was that by signing, healthcare workers openly consented to allow others to remind them to clean their hands if another healthcare worker, patient, or visitor noticed they had forgotten to do so.

Integrating slogans and logos of national and international campaigns has been common practice in recent years and many organizations provide access to their conceptual and educational materials. However, it is important to ensure that there is congruence between the materials used and the organization’s messaging.

## Conclusion

Effective hand hygiene programs require multiple elements that interact synergistically. Model national and international programs provide examples of key program elements that should be planned and implemented together by an interdisciplinary team.

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Figure 5.3. Prompts Can Serve as a Reminder to Encourage a Culture of Hand Hygiene



Source: Joint Commission Resources.<sup>16</sup>

9. Association for Professionals in Infection Control and Epidemiology (APIC). *Hand hygiene for healthcare workers*. 2014. Available at: [www.apic.org/Resource\\_/Educational\\_BrochureForm/370c41f0-380f-4d4d-aa33-67ca4407f3ef/File/Hand-Hygiene-Healthcare-Workers-Brochure.pdf](http://www.apic.org/Resource_/Educational_BrochureForm/370c41f0-380f-4d4d-aa33-67ca4407f3ef/File/Hand-Hygiene-Healthcare-Workers-Brochure.pdf).
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## Section 6: Strategies for Behavior Change

Anson Kendall, BSc, MBA  
University Health Network  
Toronto, Ontario, Canada

James Marx, RN, PhD, CIC  
Broad Street Solutions  
San Diego, CA

### Key Points

- Hand hygiene is a complex behavior influenced by knowledge, attitudes, values, and beliefs.
- The organizational climate is an important driver of hand hygiene practices.
- Comprehensive hand hygiene programs should include specific strategies aimed at behavior change.
- Examples of two strategies that are useful in encouraging behavior change are positive deviance and frontline ownership.

### Introduction

The seemingly simple act of hand hygiene is part of extremely complex behavior that requires knowledge, self-awareness, and action. Despite many recent technological breakthroughs in healthcare delivery and the availability of tools to improve hand hygiene, human behavior remains the largest source of variance in health-related outcomes.<sup>1</sup>

Successful hand hygiene programs must include behavioral change strategies.<sup>2,3</sup> This section reviews behavioral and social sciences change theory related to hand hygiene programs and provides suggestions on including behavior change strategies as part of a comprehensive hand hygiene program.<sup>4</sup>

Understanding behavior change requires more than insight into the prime human motivator: “What’s in it for me?” To change behavior for improved hand hygiene practice, infection preventionists (IPs) must determine and address staff motivation on a personal, peer, professional, and organizational level. Beyond initiating change, sustaining behavior change relies on an ability to choose improvement strategies that engage staff, patients, and visitors in meaningful ways. ***The starting point in stimulating thought and motivating behavior change is to understand the complex factors and interactions associated with hand hygiene.***

Making very clear the need for hand hygiene and its contribution to preventing infection is the first step in creating a good habit and influencing behavior change. Acknowledgment of the need for hand hygiene alone is inadequate. In order for hand hygiene behavior to occur at the appropriate time, there should be a prompt at the right moment that results in a habit—the routine act of hand hygiene as part of the natural work flow. This is not a simple process.

Training and education can contribute to knowledge about the role of hand hygiene in infection prevention, but, as outlined in Section 5, a multimodal strategy is essential to sustaining behavior change. Prompts

should be provided at the right moment and products should be available. In addition, behavior changes must be supported by a strong organization climate.

Especially in the presence of competing priorities for time and tasks, the act of hand hygiene is a complex action. For example, it would not be possible for most people to consciously remember each and every action that should be taken. While some behaviors might be conscious and deliberate, even simple tasks, such as tying shoelaces, might become overwhelming if thought is needed for each movement of the fingers, or the many steps and actions required to brush your teeth. For these actions, such thought and mental effort is not necessary because we have created action habits and they have become intrinsic behaviors. These routine behaviors are triggered by a stimulus and are performed proficiently without thinking about the actual movements involved.

## Strategies for Behavior Change: Creating Motivation

After assessing hand hygiene culture and looking at current healthcare personnel practices, it is clear that health habits are not changed or modified solely by the desire to change or an act of will.<sup>8</sup> These habits

### Strategies for Behavior Change

- ✓ Social Proof
- ✓ Positive Deviance
- ✓ Frontline Ownership

require motivational and self-regulatory skills. Self-management operates through a set of psychological sub functions, including self-monitoring, understanding the situations in which behavior occurs, and using goals to guide behavior. Healthcare personnel have to learn to monitor their behavior, to understand the circumstances under which it occurs, and to use proximal goals to motivate themselves and guide their behavior.<sup>8</sup>

Controlled motivation includes external regulation—actions motivated solely by external reward, avoiding punishment, or complying with social pressures.<sup>9</sup> Those who recognize the importance of hand hygiene might

create external regulation by suggesting incentives or contingencies or by trying to motivate by authority alone. However, external regulation alone is often not adequate to begin and continue behavior change.<sup>7</sup>

Many health-related behaviors are not intrinsically motivated or inherently enjoyable activities and, in the case of hand hygiene, negative consequences occur much later than the lapse in behavior so that the impact of the behavior lapse on negative outcome is not reinforced. However, if such behaviors are to be successfully maintained, individuals must come to value the behaviors and personally endorse their importance.<sup>9</sup>

### Strategies for Behavior Change: Social Proof

One effective method for stimulating change is social proof. The concept of social proof involves the actual or perceived behavior of peers. Often, feedback to individuals regarding their compliance rated relative to those of their peers stimulates the desired behaviors. The literature suggests that one mechanism for successful change is through interpersonal influence by professional and social networks, as well as links to opinion leaders.<sup>13</sup> The credibility of communication both external to and within the organization are important. People are more likely to adopt values and behaviors promoted by those to whom they feel connected and in whom they trust.

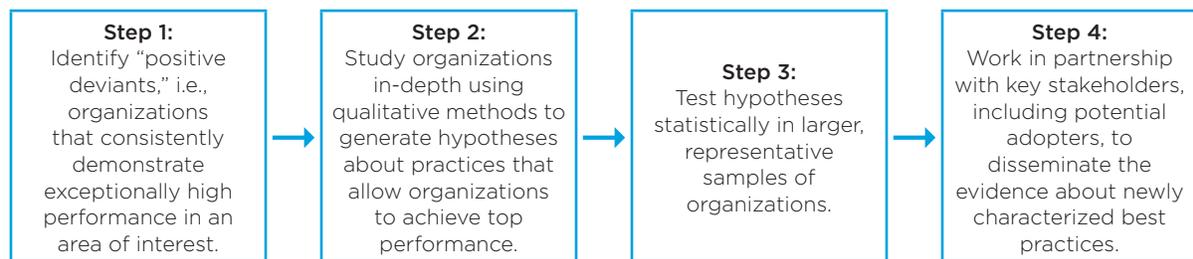
### Strategies for Behavior Change: Positive Deviance

Positive deviance (PD) does not rely on individual acceptance of an idea followed by implementation of best practices. Instead it relies on the underlying premise that the solutions to problems that face a group often exist within that group.<sup>14</sup> Some members of a group or community have discovered the solutions to these problems and have gained knowledge and insights that can be generalized to improve the performance of others. These members, or “positive deviants,” have succeeded even though they have the

same constraints as others.<sup>10</sup> No additional resources are required because many of these strategies rely on resources that already exist, which helps to increase adoption and sustainability. The key to PD is that the group or community must make the discovery itself. The community determines how change can be disseminated peer-to-peer through the practice of new behaviors.<sup>14</sup>

A particular benefit of the PD approach is its ability to integrate organizational context (culture, norms of behavior, intergroup relationships) into the understanding of what works.<sup>13</sup> Alexandre Marra et al. (2009) utilized a PD strategy in two 20-bed step-down units at a tertiary care private hospital.<sup>15</sup> They were able to realize a significant increase in hand hygiene compliance that subsequently led to a decrease in the overall incidence of HAIs.

Figure 6.1. Steps of the Positive Deviance (PD) Approach



Source: Bradley EH, Curry LA, Ramanadhan S, et al. *Research in action: Using positive deviance to improve quality of health care*. *Implement Sci* 2009; 4:25-25.

Figure 6.2. Uncommon Sense and approaches to behavior change

TRADITIONAL APPROACH TO CHANGE	POSITIVE DEVIANCE APPROACH TO CHANGE
<b>Leadership as Path Breaker</b> Primary ownership and momentum for change come from above.	<b>Leadership as Inquiry</b> Leader facilitates search; community takes ownership of the quest for change.
<b>Outside In</b> Experts identify and disseminate best practices.	<b>Inside Out</b> Community identifies preexisting solutions and amplifies them.
<b>Deficit Based</b> Leaders deconstruct common problems and recommend best-practice solutions. Implication: "Why aren't you as good as your peers?"	<b>Asset Based</b> Community leverages preexisting solutions practiced by those who succeed against the odds.
<b>Logic Driven</b> Participants think into a new way of acting.	<b>Learning Driven</b> Participants act into a new way of thinking.
<b>Vulnerable to Transplant Rejection</b> Resistance arises from Ideas imported or imposed by outsiders.	<b>Open to Self-Replication</b> Latent wisdom is tapped within a community to circumvent the social system's reaction.
<b>Flows from Problem Solving to Solution Identification</b> Best practices are applied to problems defined within the context of existing parameters.	<b>Flows from Solution Identification to Problem Solving</b> Solution space is expanded through the discovery of new parameters.
<b>Focused on the Protagonists</b> Engages stakeholders who would be conventionally associated with the problem.	<b>Focused on Enlarging the Network</b> Identifies stakeholders beyond those directly involved with the problem.

Source: Pascale RT, Sternin J. *Your company's secret change agents*. *Harv Bus Rev* 2005; 83(5):72.

PD has been shown to produce positive outcomes to very complex problems on a global level. These include successfully sustaining reduction in *Staphylococcus aureus* (MRSA) infections and other health and wellness outcomes.<sup>16-18</sup>

**Strategies for Behavior Change:  
Frontline Ownership**

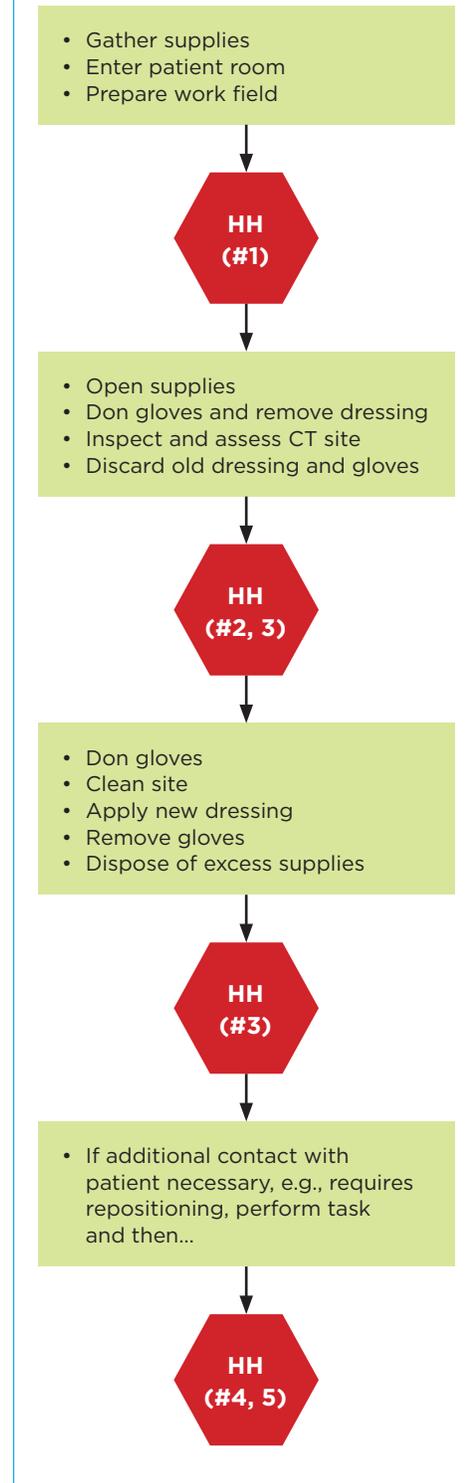
The frontline ownership (FLO) approach is based on principles of positive deviance and draws on complexity science, but uses *liberating structures* to engage staff and to get healthcare personnel interacting in innovative ways that help create new outcomes.<sup>14,19</sup> Liberating structures are defined as a series of facilitation tools that use simple rules to encourage inclusion, listening, and engagement.<sup>14</sup> These are simple and quick-to-learn tools that enhance relational coordination and are designed to be largely self-facilitated and entertaining.<sup>14</sup>

The FLO approach is a departure from the prevalent healthcare culture, where leaders lead, sell, or promote ideas to frontline personnel so that they will buy in and follow the lead or implement the plans. In short, buy-in and ownership are opposite concepts. Ownership involves those doing the work developing the ideas, making the decisions, and designing and acting on the plans; buy-in involves agreeing to follow practices that are externally imposed.<sup>14</sup>

Top-down polices generally originate from leaders who often do not understand the realities of frontline work and ignore the challenges of changing human behaviors and habits. These approaches are unlikely to create sustained improvement.

The FLO approach along with liberating structures methodologies were used to engage staff across a large teaching hospital in Toronto, Ontario, Canada.<sup>20</sup> This approach maintained the best practices of hand hygiene compliance but also invited and encouraged staff to come up with their own solutions in order to remove barriers and improve compliance with hand hygiene. When this new approach was employed, the organization set very specific goals for hand hygiene. In this case, it was a minimum of 80 percent compliance. Local variation in practice was encouraged. How one unit across the organization reached that 80 percent goal differed considerably from another unit. As long as the minimum specifications (“min specs”) were adhered to,” a unit could implement whichever solutions it believed would work to reach the 80 percent goal. FLO has demonstrated the ability to improve hand hygiene compliance, reduce infection rates, and result in qualitative changes in organization structure.<sup>14</sup> Acknowledging the complexity of hand hygiene and recognizing that each area in the hospital

Figure 6.3. Sample patient care work flow include recommendations for hand hygiene according to the 5 moments.



is unique, allowed staff to implement solutions that worked *for them*. The solution on one unit might not necessarily work for another department or unit.

Figure 6.2 contrasts the traditional approach to change with the positive deviance approach to change. Traditional change efforts are typically top-down, outside-in, and deficit-based. They focus on correcting what is wrong or not working. They also assume a reasonable degree of predictability and control during the change initiative. Unintended consequences are rarely anticipated. Once a solution is chosen, the change program is communicated and rolled out to frontline caregivers. The positive deviance and frontline ownership approach to change, by contrast is, bottom-up, inside-out, and asset-based. It powers change from within by identifying and leveraging innovators. This method diminishes the social distance that often blocks acceptance.<sup>10,8</sup>

## Technology, Behavior, and Compliance

Advanced compliance monitoring technologies can assist with data collection and can serve to remind staff to perform hand hygiene. Compliance-monitoring technology may include prompts, such as using vibrations or audio or visual indicators, to remind staff to wash their hands. Collection of data on alcohol-based hand rub usage by volume and by dispenser placement and segregation of compliance data by unit/ward/floor can be used to analyze workflow as well as compliance. Other technology tools have used strategies from smoking cessation programs to develop an individualized approach to assist healthcare providers to change their own hand hygiene compliance. Individualized interactivity does help to enhance the impact of health promotion programs.<sup>8</sup> Social support and guidance during the early stages of individual change and maintenance increase long-term success.<sup>8</sup>

It should be noted that interactive technologies present only one available tool and may not be the single solution to bring about permanent change. The technology is useless if individuals are not motivated to take advantage of what the technology has to offer. Systems need to be structured in ways that not only build motivation and self-management skills, but also guide habits. Unfortunately, those who need the guidance most may use the tools the least.<sup>8</sup>

## Conclusion

The gap between what we know and what we do is well documented. FLO and PD approaches can contribute to the development and sustainability of hand hygiene programs. In turn, improved hand hygiene behaviors among hospital personnel could have a considerable impact on HAIs, healthcare costs, and staff safety but, more important, on patient safety and patients' quality of life.<sup>4</sup>

Implementing change is usually not a single action but involves a well-planned, stepwise process, including a combination of interventions targeted at specific obstacles to change.<sup>7</sup> However, behavioral change strategies have been successfully used in the change process to increase hand hygiene compliance. Evidence supporting the effectiveness of a behavioral change approach has been established in many studies, particularly when feedback and reminders are continual and directly connected to patient outcomes.

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## Section 7: Hand Hygiene within the Organizational Culture

Michael A. Grow, MBA, MT(ASCP)  
St. Vincent Williamsport Hospital  
Williamsport, IN

### Key Concepts

- Effective hand hygiene programs must include organizational commitment and a supportive corporate culture.
- The importance of hand hygiene programs can be demonstrated using a “business case” outlining expected costs and benefits.

A key component of hand hygiene programs is that they exist within an organizational culture. At the same time, hand hygiene practices can impact the culture by emphasizing patient safety. This section reviews the importance of organizational culture to infection prevention and provides tools to articulate the benefits of a hand hygiene programs (a business case for hand hygiene) to key leaders within healthcare organizations.

### What Is Organizational Culture?

Also referred to as the corporate culture, organizational culture is a set of shared beliefs and ideals that guide the actions and define appropriate behavior for all staff. The shared values, attitudes, beliefs, customs, and underlying assumptions of its members determine the unofficial rules of conduct establishing the organizational culture.<sup>1</sup> The organization’s expectations, philosophy, and values are expressed by the way the organization conducts business, treats its employees and customers, and involves itself with the community.<sup>2</sup> This culture also establishes how power and information flows throughout the organization. It determines the amount of freedom allowed for personal expression, development of new ideas, and decision-making potential within the organization. An organization’s culture is unique to it and often differs from its official mission and vision. For all of these reasons, it can be very difficult to influence and change organizational culture.

Most healthcare leaders are aware of the staggering costs of healthcare-associated infections (HAIs), as well as the important role that hand hygiene plays in reducing these costly, and many times preventable, infections. At the same time, one of the major challenges that healthcare leaders face is maintaining an economically viable operation. In order to implement an effective, sustainable hand hygiene program, infection preventionists (IPs) need to take into account fiscal realities as well as the need to secure leadership support and change organizational culture. By demonstrating appreciation of this, IPs show a desire to contribute to both better quality and cost-effectiveness. This understanding can be demonstrated using a business case, which is standard practice in the public and private sectors to justify a project. A well-crafted business case, with a concise and compelling implementation plan will help leaders understand the costs and potential benefits of an infection prevention initiative to the organization.<sup>3,4</sup> Engaging leaders with a well-designed business case will not only outline areas of responsibility and action, it also helps convince leadership that the program will work.

In order to institute and maintain a successful hand hygiene program, IPs must partner at all levels of the organization. Partnership and engagement at all levels ensures the implementation and sustainability of a successful program. Tying the infection prevention initiative to the healthcare organization's goals is also a powerful way to convince the organization as a whole of the importance of hand hygiene initiatives and engage various stakeholders. Because organizational dynamics are different for each healthcare facility, IPs must thoroughly understand the culture of their organization in order to develop the most effective hand hygiene program.

Understanding organizational culture is important to the IP because it is not usually officially codified and it determines to a great extent how employees act. The more deeply ingrained the organizational culture, the harder change is to affect. While larger healthcare systems tend to rely on more formal ways of communication, and decisions take a long time, in smaller facilities, the communication is usually less formal and decisions can be made more quickly. Initiatives and programs may be easier to implement in smaller organizations that are not afraid of change and desire new technology, but implementation is not the same as sustainability. Unless the organization's culture supports the program, it is destined to fail unless the culture is changed as well. Understanding the organizational culture and working closely with it are imperative to the development, implementation, and sustainability of any infection prevention effort, including hand hygiene improvement programs.

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## Case Study: Hand Hygiene Culture

### Issue

Hospital leadership must endorse and consistently reinforce the importance of quality and safety initiatives programs. Unit level leadership is critical to the successful adoption of a hand hygiene monitoring technology.

### Project

Three hospitals within the same healthcare network installed a radio frequency identification (RFID) hand hygiene compliance monitoring technology. Two of these facilities directly involved nurse managers in the performance feedback mechanism with individual compliance scores for their staff and were personally involved in dissemination of those data. They were also involved with setting performance expectations at the unit level and ensuring accountability to those expectations. The third facility relied primarily on the IP to communicate expectations and results and to ensure performance at the unit level.

### Results

The two hospitals that had heavily engaged nurse managers achieved dispensing increases of 70.8 percent and 130.2 percent and hand hygiene compliance rate increases of 33.6 percent and 50.4 percent respectively. The hospital with only peripheral nurse manager involvement saw a dispensing increase of only 2.8 percent and a 43.6 percent decrease in compliance. Using an electronic proxy for HAI, researchers identified 8.7 percent and 17 percent HAI reductions in units with nursing leadership involvement and a 50 percent HAI increase in the unit with less unit leadership involvement.

### Lesson Learned

The most rapid improvements in hand hygiene adherence are obtained when expectations are set by clinical leadership at the unit level. IP involvement is important for education and support, but the engagement of clinical leaders directly responsible for staff adherence is a key accelerator of performance. Clear communication of performance expectations and consistent, unit-level reinforcement of desired frontline caregiver activity are key components in successfully increasing hand hygiene compliance and reducing HAIs.

*Barley & Chapman, Importance of Culture in Successful Implementation of a Hand Hygiene Compliance Monitoring System, APIC 2013.*

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### Case study: Executive and management support “Push Package”

Organizational commitment is essential to establishing effective hand hygiene programs. Obtaining leadership commitment to hand hygiene in and maintaining these programs is important to their overall success. One method to obtaining leadership support is an “executive push package.”

Enhanced executive involvement can include executive rounds and direct staff feedback. On the pilot unit with executive engagement, hand hygiene compliance increased from 21% to 56% and was associated with an increase in dispensing rates of 91 percent. HAI rates decreased by 25% with an estimated direct cost savings of \$53,376 and prevented 49 days of hospitalization. HAI rates decreased by 25% with an estimated direct cost savings of \$53,376 and prevented 49 days of hospitalization.

The results demonstrate the importance of executive involvement, leadership and management as part of a comprehensive, multimodal strategy.

*Source: Bailey, The effects of executive involvement, goal setting, targeted education and caregiver recognition on hand hygiene performance, AJIC 41 (6).*

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## What Is Needed to Bring about Change within an Organizational Culture?

### Engage Leadership

In order to implement, and sustain, any change in an organization, especially organization-wide changes that require expenditure of monetary and personnel resources, the leadership must be approached, engaged, and convinced of the need for the change. Wasted resources, whether monetary or personnel, threaten the organization that the leaders have the duty to protect. Not only do the leaders provide needed funds for any project, engaging leaders will provide effective advocates to help drive the infection prevention program or initiative. IPs can engage organizational leaders by demonstrating an awareness of the challenges they face: economic, cultural, personnel, and physical plant. By demonstrating understanding of these challenges as they propose a hand-hygiene program, IPs convey their objective as helping to contribute to a quality organization and not only to their parochial interests. A business case with a concise and compelling presentation will help leaders understand the cost, quality, and service of an infection prevention initiative to the organization.<sup>3,4</sup>

### Create a Successful Business Case

Because money is scarce, and many attractive projects are available, convincing leaders to fund an infection prevention project can be challenging. In creating a business case for an infection prevention initiative or project, the IP should recognize that executives must effectively manage the resources of their organization. Just because a hand-hygiene improvement program is a good idea does not mean it will be readily obvious to leadership or accepted immediately. The IP is the expert to whom leadership looks for a logical plan. The business case for a hand hygiene program, for example, needs to determine the cost of increased HAIs to the organization, the cost of the program, both in terms of hardware and supplies, as well as human resources. Realistic assessment of the organizational culture needs to be addressed, as does the amount of involvement required by leadership. Projected realistic benefits will help determine what can be done and how much time, effort, and resources can be dedicated. If alternative funding or other resources are available, they should be noted. The main objective of a business case is to persuade senior management to invest the organization’s money, time, and resources to the proposed project. Although business cases

come in all sizes and shapes, a business case is essential to document and advance the initiative. The organizational structure and culture determines the complexity of the business case. A business case is more than just a financial justification. It is a plan that demonstrates how the project will help the organization meet its goals.

A successful business case should withstand challenges from those who do not support the initiative, and should address the concerns of decision-makers and contain the information they expect and need. Key components of a business plan include an executive summary, description of the business opportunity, alternatives, benefits, cost, financial analysis, assumptions, constraints, market analysis, organizational considerations, sensitivity analysis, project description, implementation plan, and recommendations.

A business case presents an issue or need and provides a proposed solution and a plan to advance the organization. The executive summary provides a concise summary of the project for the decision-makers, including a synopsis of the key points that outline the benefits of the project in helping the organization attain its mission. A business case describes the project and identifies at least three alternatives and provides the benefits and a cost analysis of the plan. It also describes the implementation plan and recommendations. Appendices are very helpful and give the plan authority and substantiate the document. A business case approval page provides a buy-in of the leadership. A reference page provides documentation of the best evidence practices of the project and the underlying rationale for the planned course of action. See Table 7.1 for key terms used in the document to avoid any ambiguity or misunderstanding.

It is important to know what information is necessary and how to present it to obtain acceptance of the proposed project. The necessary topics to include in the business plan are only those that are needed to convince the decision-makers of the importance and efficiency of the proposed project. Developing a business case is an important process to undertake to establish and maintain effective hand hygiene programs. The business case establishes the authority of the program, provides desired improvement and outcomes, avoids any possible roadblocks, and creates sustainable change in advancing the organization. Several resources on presenting a business case for infection control programs are given at the end of this section.<sup>3-5</sup>

*Table 7.1.* Glossary of Business Terms Useful in Hand Hygiene

Term	Definition
Cash Flow Statement	A record of cash and cash equivalents that are entering and exiting a company. It helps to understand a company's operation by explaining from where the money comes and where it goes.
Discount Rate	The rate at which future dollars are brought back to the present.
Payback Period	The length of time required to recover the cost of an investment.
Net Present Value (NPV)	The difference between the present value of cash inflows and the present value of cash outflows. NPV compares the value of the dollar today to that same dollar in the future taking inflation and returns into account.
Internal Rate of Return	The rate of breaking even. It is the discount rate at which the present value of all future cash flow is equal to the initial investment.
Return on Investment (ROI)	A performance measure used to evaluate the efficiency of an investment or to compare investment alternatives. To calculate the ROI, the benefit of the investment is divided by the cost of the investment and expressed as a ratio or a percentage. The formula is: $ROI = (\text{Gain from Investment} - \text{Cost of Investment}) / \text{Cost of Investment}$ .

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## Case Study: Business Example

The following business case example is only a guide in the developing an effective business case. Understanding the organizational culture determines what is necessary to justify the project.

TITLE PAGE

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This business case recommends purchasing of XYZ's hand hygiene monitoring system. This system will save ABC hospital \$23,400 in labor costs over three years and the potential savings of \$60,675 and 34 excess hospital days by reducing the potential of three healthcare-associated infections (HAIs) over the same three-year period.

The increased efficiency and more reliable data obtained from XYZ's hand hygiene monitoring system will improve the productivity of the infection preventionist (IP), provide better hand hygiene data, and improve patient safety and satisfaction.

The XYZ's hand hygiene monitoring system will cost \$13,500 over three years and will replace the current manual process. It will replace the labor intensive and inefficient current system for a savings of \$6,000 in labor costs.

The return on investment (ROI) is 173 percent with a payback period of 1.9 years.

### *Introduction*

ABC hospital has an opportunity to save 260 hours of infection prevention office labor hours annually by automating time-consuming and error-prone manual tasks. This opportunity aligns with ABC hospital's objective to provide a safe patient environment while improving performance and quality of patient care.

### *Alternatives And Analysis*

The infection prevention team evaluated three leading hand hygiene monitoring systems. Two of them were eliminated from consideration because they cost from \$40,000 to \$60,000 over three years. Both systems offered the same benefits of XYZ company's hand hygiene monitoring system. XYZ company's hand hygiene monitoring system scales well and is a viable alternative for healthcare systems much larger than ABC hospital.

### *Benefits*

XYZ company's hand hygiene monitoring system will provide much improvement in the capabilities and benefits of ABC hospital's current labor-intensive and error-prone manual data-collection techniques.

XYZ company's hand hygiene monitoring system will eliminate the \$2,000 annual labor costs associated with current manual collection techniques.

XYZ company's hand hygiene monitoring system will solve two problems that are currently require five hours of each work week by the IPs:

- Automatic data collection, updating, and real-time display of hand hygiene compliance
- Elimination of errors associated with manual collection techniques, e.g., missed hand hygiene opportunities, Hawthorne effect.

### *Automatic hand hygiene compliance data*

IPs at ABC hospital spend an average of three hours each week collecting and inputting hand hygiene compliance data. XYZ company's hand hygiene monitoring system will automate this labor-intensive process.

Automatically collecting, updating, and displaying real-time data XYZ company's hand hygiene monitoring system will save ABC hospital an estimated \$4,680 annually in labor costs.

### Elimination of Errors

The automatic collection of XYZ company's hand hygiene monitoring system eliminates the errors associated with the current manual hand hygiene collection techniques. The system is able to collect every hand hygiene opportunity as opposed to the random collection currently conducted by the IPs' surveillance. The errors associated with the Hawthorne effect are also eliminated by this automated system.

XYZ company's hand hygiene monitoring system will save an estimated \$3,120 annually in labor costs by eliminating these errors.

### Costs

XYZ company's hand hygiene monitoring system purchase price: \$10,000

Estimated life cycle: three years

Installation fee: \$2,000

Annual maintenance contract: \$500

Financial Analysis

### Cash Flow Statement (three years)

	Year 0	Year 1	Year 2	Year 3
Costs	1-1-14	1-1-15	1-1-16	1-1-17
Equipment purchase	(10,000)	0	0	0
Installation fee	(2,000)	0	0	0
Maintenance fee	(500)	(500)	(500)	0
Subtotal	(12,500)	(500)	(500)	0
Savings				
Labor	0	7,800	7,800	7,800
Subtotal	0	7,800	7,800	7,800
Cash Flow	(12,500)	7,300	7,300	7,800

ABC hospital's discount rate as of August 1, 2013, is 0.05.

Return on investment (ROI): 173 percent

Net present value (NPV): \$7,440

Internal rate of return (IRR): 35 percent

Payback period: 1.9 years

### Implementation Plan and Recommendations

When the business case is approved, the IP will coordinate with ABC hospital's information technology department to schedule installation with XYZ company. The installation will occur on the intensive care unit (ICU) and be completed in one week. XYZ company will also provide training to the IT and infection prevention teams. The first month will be used to test the equipment and gather baseline data. Education and training will be provided to all staff that accesses the patient rooms on the ICU.

XYZ company's hand hygiene monitoring system will be installed during the week of October 21, 2013.

Training and education of staff regarding the new hand hygiene program will be performed by meeting with the staff in several meetings scheduled during the week of October 28, 2013.

Hand hygiene compliance data will begin being collected on November 4, 2013. The data collected during November will serve as a baseline and help to identify further areas of future education regarding hand hygiene.

This schedule will help ABC hospital to realize this project's net present value of \$7,440 by January 1, 2017.

APPENDIX A: Business Case Approval

APPENDIX B: References

### Create Sustainable Change

Education, competition, active involvement, and excitement seem to be common factors of successful programs. The success of any program is due to the ownership felt by those implementing and performing the daily tasks. In addition, leadership should be actively involved in all facets of the project. Involving and empowering partnerships at all levels within an organization is what creates the sustainable change within the organization.

Successful programs are ones that are easily understood and are easy to use. Successful hand hygiene programs include all staff with a focus on those who provide daily patient care. Education is an important element to the program's success, and these frontline people should be given detailed information on how the system works and why the organization needs it. An educated and informed staff will understand and desire to do the right thing for the right reason. Involving senior leaders in the educational process helps tremendously. They can provide one-to-one education or provide group instruction regarding the hand hygiene program. Just their presence on the units brings authority to the program. Providing the resources needed for an effective hand hygiene program, including education, personnel, and funds, should be a key goal of engaging senior leadership.

Successful programs find that competition between groups creates a lively environment and improves the efforts of the staff. This builds active involvement and improvement in the hand hygiene program. The ultimate goal of organizational change for hand hygiene programs is to encourage engagement and ownership of the program. When people take ownership of any program, they seek to improve and help the organization. When everyone is directing his or her efforts toward the common goal, success is inevitable.

Organizational commitment is essential to establishing effective hand hygiene programs. Obtaining leadership and management support and outlining the business case for hand hygiene programs are critical to establishing and maintaining these programs.

### Conclusion

Engagement of organizational leadership and demonstrating the business case is critical to develop and maintaining an effective hand hygiene program.

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## Additional Resources

In addition to recommendations, policies and guidelines, these sources provide specific tools and techniques for implementing a hand hygiene program.

### APIC Resources

[www.apic.org](http://www.apic.org)

The following are APIC resources on hand hygiene for healthcare professionals.

#### Implementation guides and tools

- Strategies to Prevent Healthcare-Associated Infections through Hand Hygiene—Society for Healthcare Epidemiology of America (APIC collaborated with SHEA and other organizations on development of this resource)
- How-to guide: Improving hand hygiene—Joint guide with Institute for Healthcare Improvement
- Wash or clean your hands—Infection Prevention and You
- APIC Text
  - Chapter 27, “Hand Hygiene”
  - Chapter 28, “Standard Precautions”
  - Chapter 29, “Isolation Precautions (Transmission-Based Precautions)”

#### Education & training

APIC offers a comprehensive collection of clinical education and professional development programs. The following are educational opportunities related to hand hygiene.

Visit the Education & Certification page for more educational opportunities.

- 2013 International Infection Prevention Week Presents: Global Hand Hygiene—APIC Webinar
- Hand Hygiene Update—APIC Webinar
- Creative Hand Hygiene for Staff, Visitors and Patients—APIC Webinar
- Search the Annual Conference website for hand hygiene education



### *Prevention Strategist* articles

The following links include articles on hand hygiene from APIC's *Prevention Strategist* magazine.

- Improving hand hygiene: State of play and challenges for U.S. hospitals—Spring 2014
- 5 moments for hand hygiene—Winter 2014

### *AJIC* articles

Search the *American Journal of Infection Control* website for more articles on hand hygiene. To access these articles, you need to first login to the APIC website.

- *AJIC* hand hygiene collection

## Domestic Resources

### Centers for Disease Control and Prevention (CDC)

[www.cdc.gov](http://www.cdc.gov)

- Guidelines for Hand Hygiene in Healthcare Settings
- Hand hygiene recommendations and tools.

### The Joint Commission

[www.jointcommission.org](http://www.jointcommission.org)

- Measuring Hand Hygiene Adherence: Overcoming the Challenges
- [www.centerfortransforminghealthcare.org](http://www.centerfortransforminghealthcare.org)
- Hand Hygiene Project
- Description of approaches to improving hand hygiene.

### VA National Center for Patient Safety

[www.patientsafety.va.gov](http://www.patientsafety.va.gov)

- Hand hygiene information and tools.

### Ambulatory Surgery Centers (ASC) Quality Collaboration

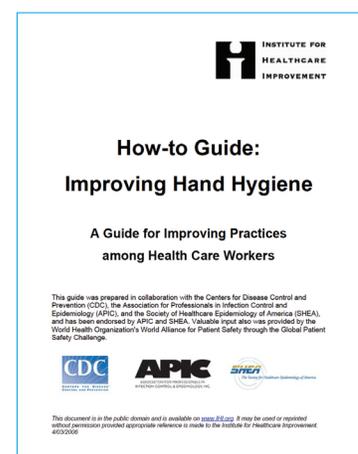
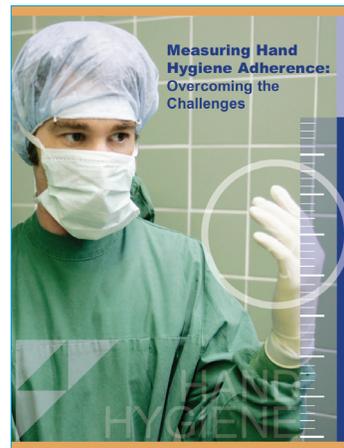
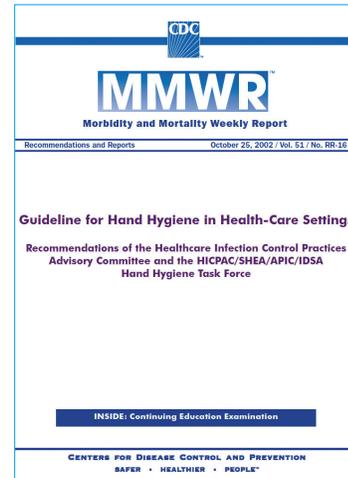
[www.ascquality.org](http://www.ascquality.org)

- Hand Hygiene Observation Record
- Recommendations and tool for monitoring hand hygiene.

### Institute for Healthcare Improvement (IHI)

[www.ihl.org](http://www.ihl.org)

- How-to Guide: Improving Hand Hygiene
- Strategies and techniques for monitoring and improving hand hygiene.



## International Resources

### World Health Organization (WHO)

[www.who.int](http://www.who.int)

- WHO Guidelines on Hand Hygiene in Health Care
- Hand Hygiene guidelines and protocols. Includes WHO Hand Hygiene Self-Assessment Framework.

### Public Health Agency of Canada

[www.phac-aspc.gc.ca](http://www.phac-aspc.gc.ca)

- Hand Hygiene Practices in Healthcare Settings
- Recommendations and guidelines for hand hygiene.
- Tools and templates for hand hygiene programs.

### Hand Hygiene Australia

[www.hha.org.au](http://www.hha.org.au)

- Hand Hygiene Australia manual
- Guidelines for developing and implementing hand hygiene programs.

### Infection Prevention Society (UK)

[www.ips.uk.net](http://www.ips.uk.net)

- Collection of hand hygiene guidance including manuals and tools from the UK and Ireland.

### Health Protection Surveillance Centre, Ireland

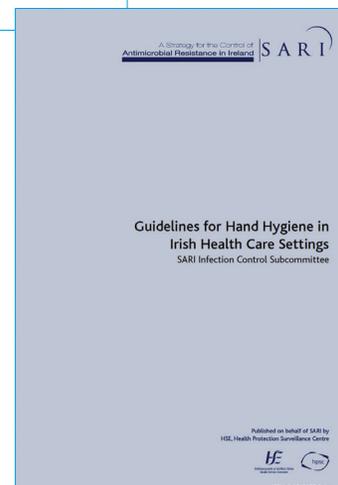
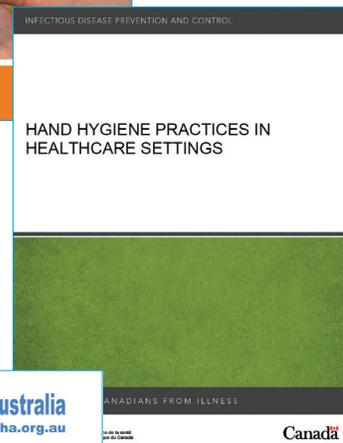
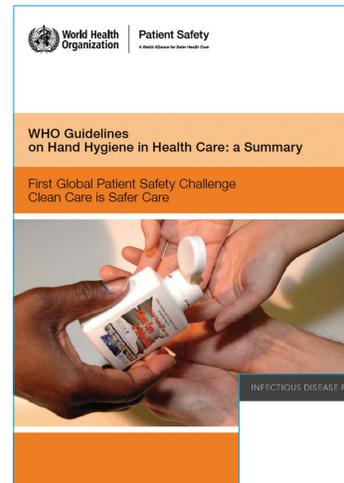
[www.hpsc.ie](http://www.hpsc.ie)

- Guidelines for Hand Hygiene in Irish Health Care Settings
- Recommendations for hand hygiene programs and product selection.

### Health Quality and Safety Commission New Zealand

[www.hqsc.govt.nz](http://www.hqsc.govt.nz)

- Guidelines on Hand Hygiene for New Zealand hospitals.





## About the Implementation Guide series

APIC Implementation Guides help infection preventionists apply current scientific knowledge and best practices to achieve targeted outcomes and enhance patient safety. This series reflects APIC's commitment to implementation science and focus on the utilization of infection prevention research. Topic specific information is presented in an easy-to-understand-and-use format that includes numerous examples and tools.

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Association for Professionals in  
Infection Control and Epidemiology

1275 K Street NW, Suite 1000  
Washington, D.C. 20005  
Telephone: 202-789-1890  
Toll free: 1-800-650-9570  
Fax: 202-789-1899  
[www.apic.org](http://www.apic.org)

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