

HAND HYGIENE

Best Practices for 2006

By Carolyn Twomey, RN

Most of us don't doubt the importance of handwashing in establishing good hand hygiene. The biggest disconnect in what is best practice and what we actually do comes in being handwashing compliant. A second factor is the type of active ingredient in the handwashing product we use.

The Great Handwashing Debacle: A Look Back at History

A report from the National Institute of Medicine in 2000 rocked the nation with its finding that preventable "adverse health events" as well as hospital-acquired, or nosocomial, infections are responsible for 44,000 to 98,000 deaths per year at a cost of \$17-\$29 billion.¹

But a look back at history shows we've known the potential impact for some time. In Vienna in 1846, Dr. Ignaz Semmelweiss was working in maternity wards, where he observed the mortality rate in the wards cared for by physicians and medical students were as much as three times greater than those wards where care was provided by midwives. He found that the students were coming straight from the pathology lab without washing their hands. He believed that they were carrying infections from the lab to their patients. When he implemented a handwashing protocol, his mortality rate dropped to less than one percent.^{2,3}

At almost the same time, Dr. Oliver Wendell Holmes had concluded that puerperal fever was transmitted by healthcare practitioners. He described ways to control this cross-contamination, but his words fell on deaf ears.

The studies of Semmelweiss and Holmes are considered the seminal studies for the identification of handwashing as one of the most important measures to be taken by healthcare practitioners to reduce cross-contamination.⁴

While our knowledge of microscopic pathogens and resulting disease has grown exponentially since the early 20th century, compliance with handwashing has not seen the same success.

Handwashing Compliance: Who's Compliant and Who's Not?

At the Fourth Decennial International Conference on Nosocomial and Healthcare Associated Infections held in March 2000, Dr. Robert Weinstein, chairman of the Division of Infectious Disease at Cook County Hospital, spoke on improving hand hygiene compliance. One study that he quoted truly summarizes the healthcare hand hygiene situation. In this study, healthcare providers were surveyed regarding their

handwashing practices, and 85 percent stated they washed their hands according to infection control recommendations.

The surveyors then interviewed these same practitioners and asked them about the handwashing habits of their peers, and the response was that 50 percent of them believed their peers followed infection recommendations.

They then inserted unidentified observers into the system, and the data reported that only 26 percent of healthcare workers were washing according to infection control recommendations.⁴

In fact, many studies conducted on handwashing compliance in a number of healthcare settings report that healthcare practitioners practice appropriate hand hygiene only 25 percent to 50 percent of the time.⁴ In certain surveys, gender influences have been noted, with female healthcare workers washing more frequently than their male counterparts. When broken down into professions, the results showed that female healthcare workers were 33 percent more likely to wash their hands than their male counterparts.⁴ However, they also found that when the males did wash, they washed more effectively.

Hand Hygiene Product Ingredients

What is available on the hand hygiene market today? The primary active ingredients addressed in the 2002 Centers for Disease Control and Prevention (CDC) Guideline for Hand Hygiene in Healthcare Settings are alcohols, chlorhexidine gluconate (CHG), iodophors, parachlorometaxylenol (PCMX), and Triclosan. Let's look at a comparison of the characteristics, efficacy, and indications for each.

1. Alcohols

Characteristics

- Excellent germicidal
- Volatile and flammable
- Needs emollients to prevent drying
- Must be allowed to dry to work
- Once evaporated (dry), the effect is gone; there is no appreciable persistent activity

Efficacy

- Excellent bactericidal (G+ and G- bacteria, including multi-drug resistant pathogens)
- Excellent against Mycobacterium tuberculosis (TB)
- Good virucidal (certain enveloped viruses: herpes simplex, influenza, respiratory syncytial virus (RSV), HBV somewhat less susceptible, HCV likely killed)
- Good fungicidal
- Most rapid onset *Indications*
- Surgical hand scrubs and rubs, less for preps

- Not recommended when soil and debris are present⁸

2. Chlorhexidine gluconate (CHG)

Characteristics

- Broad spectrum
- Binds to the corneum stratum
- Substantial residual activity (persistence)
- Effectiveness increases with use (cumulative effect)
- Considered non-toxic, however, may be ototoxic, and may cause corneal damage
- Not for use past the superficial layers of skin
- Less irritating than many preparations; allergic reactions uncommon

Efficacy

- Excellent antiseptic
- Immediate activity occurs more slowly than alcohols
- Excellent bactericidal: stronger against G+ than G-
- Effective against enveloped viruses: herpes simplex virus, HIV, cytomegalovirus, minimal against tubercle bacilli
- Preparations with 2 percent CHG are slightly less effective than preparations with 4 percent CHG

Indications

- Predominantly used for hand scrubs
- Used for hand antisepsis in high-risk practice areas such as ER and ICU
- Used as a skin prep
- Activity can be reduced by anionic surfactants found in many hand lotions⁸
- Influenza and RSV 3. Iodophors

Characteristics

- Molecular iodine in a carrier solution, the amount of free iodine determines the level of antimicrobial activity
- The antimicrobial activity of iodophors can be affected by pH, temperature, exposure time, concentration of free iodine
- The antimicrobial activity of iodophors can be affected by the presence of organic and inorganic compounds
- Cause less skin irritation and fewer allergic reactions than iodine, but more contact dermatitis than other antiseptics commonly used for hand hygiene

Efficacy

- Broad spectrum
- Bactericidal against G+ and G- bacteria

- Active against mycobacteria, viruses, and fungi
- Activity is substantially reduced in the presence of organic matter
- Demonstrates poor persistent activity

Indications

- Surgical hand scrubs and skin prep⁴

4. PCMX (Parachlorometaxyleneol)

Characteristics

- Non-allergic
- Concentrations vary
- Not as rapid activity as CHG or iodophors

Efficacy

- Good bactericidal: good against G+, fair against G- bacteria
- Fair against tubercle bacilli, some fungi, and certain viruses
- Persistence less pronounced than CHG
- Minimally affected by organic matter

Indications

- Surgical scrubs
- Handwash
- Neutralized by anionic surfactants⁴

5. Triclosan

Characteristics

- Ideal concentration not known, 1 percent to 2 percent
- Activity affected by pH, surfactants, emollients, and the ionic nature of the formulation
- The majority of formulations containing less than 2 percent Triclosan are well tolerated and seldom cause allergic reactions

Efficacy

- Better against G+ than G- bacteria
- Reasonable activity against mycobacteria
- Limited against filamentous fungi
- Relative broad-spectrum activity against viruses
- Intermediate rapidity
- Has persistence on the skin

Indications

- In 1994, the FDA Tentative Final Monograph (TFM) stated, “Triclosan less than 1 percent: insufficient data exists to classify this agent as safe and effective for use as an antiseptic handwash.” (further evaluation by the FDA underway)⁴
- Handwash
- Consumer products⁴

Antimicrobials and Antibacterials

Many experts, led in part by Dr. Stuart Levy of Tufts University, author of the series of books, “The Antibiotic Paradox,” are attempting to get antimicrobials banned in household products. Antimicrobials are an acknowledged part of pathogen control in the acute care and long-term care facilities where pathogens exist. Several years ago there were few household products containing antimicrobials. Today, that number exceeds 700, including soaps, toothbrushes, lotions, children’s toys, high-chair tables, and now chopsticks and mattresses. Like antibiotics, overuse of antimicrobials (most commonly Triclosan) can be expected to foster resistant strains. In fact, at the American Society for Microbiology meetings in May 2000, a number of papers described the isolation of bacteria resistant to Triclosan or to other antibacterial agents.”⁴

Media reports over the last several months that use of antibacterial soaps may be ineffective in fighting illness fail to differentiate between consumer antibacterial soaps and medical market antibacterial soaps (those used in hospitals and medical settings). Antibacterial soaps referred to in these news articles do not equate to antibacterials and antiseptics being used in medical settings.

The purchase and use of antibacterial soaps from the grocery store is far different from the purchase and use of scrub and prep solutions - those containing chlorhexidine gluconate (CHG), hexachlorophene, alcohols, povidine iodine, PCMX or combinations thereof, in medical settings. Not only are the points of purchase and use different, the applications listed on the labels, active ingredients, spectrum of kill, efficacy, and concentration of active ingredients are different. Healthcare workers get maximum benefit by washing with antiseptic/antimicrobial cleansers with a persistent effect, meaning that microbes are being killed long after handwashing.

Persistence and Cumulative Effect

Why is persistence important? Persistence is the ability of the agent to continue to reduce the number of bacteria after the initial application period is over.⁴ Consider alcohol; once the alcohol has dried/evaporated, the activity is over and re-growth of microbes can begin. Also consider the situation of a glove-barrier breach in the operating room. Would you, as a healthcare provider, appreciate continued log reduction of pathogens on your hands over a period of time? And what if you were the patient; wouldn’t you appreciate your perioperative practitioner using an agent with persistence if a barrier breach occurred during your case?

Of course, the answer to both of these questions is yes. Continued protection for both the patient and practitioner, in the case of CHG for up to six hours,⁴ would be a significant risk reduction tool for acquired occupational exposure or for a surgical site infection.

And what about the cumulative effect? CHG is the one agent you will find, to date, described as having the characteristic of cumulative effect. When one reads about CHG it is expressed as “a progressive decrease in the numbers of microorganisms recovered after repeated application of a test material.”⁴

Studies have shown that when CHG is used over time (for example, daily scrubbing for a week), the log reduction of pathogens continues to increase throughout the week.⁴

The CDC’s Hand Hygiene Guideline For Health-Care Settings

On Oct. 25, 2002 the CDC released the much-anticipated “Hand Hygiene Guideline in Health-Care Settings.” A limited recap of the recommendations include:

Handwashing and Hand Antisepsis

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When hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled, wash hands with either a non-antimicrobial soap and water or an antimicrobial soap and water.

- If hands are not visibly soiled, use an alcohol-based hand rub for routinely decontaminating hands.
- Antimicrobial-impregnated wipes/towelettes may be considered as an alternative to washing hands with a non-antimicrobial soap and water.⁴

Surgical Hand Antisepsis

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Surgical hand antisepsis using either an antimicrobial soap or an alcohol-based hand rub with persistent activity is recommended before donning sterile gloves.

- When performing surgical hand antisepsis using an antimicrobial soap, scrub hands and forearms the length of time recommended by the manufacturer.
- When using an alcohol-based surgical handscrub product with persistent activity, before applying the alcohol solution, prewash hands and forearms with non-antimicrobial soap and dry hands and forearms completely. After application of the alcohol-based product as recommended, allow hands and forearms to dry thoroughly before donning sterile gloves.⁴

Choosing Hand-Hygiene Agents

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To maximize acceptance of hand-hygiene products by healthcare workers, solicit input from these employees for any products under consideration. The cost of hand-hygiene products should not be the primary factor influencing product selection.

- When selecting non-antimicrobial soaps, antimicrobial soaps, or alcohol-based handrubs, solicit information from manufacturers regarding any known interactions between products used to clean hands, skincare products, and the types of gloves used in the institution.
- Before making purchasing decisions, evaluate the dispenser systems of various product manufacturers or distributors to ensure that dispensers function adequately and deliver an appropriate volume of product.⁴

Hand Hygiene Product Cost vs. Nosocomial Infection Cost

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If one takes into consideration the cost of a nosocomial infection, “the excess hospital expense associated with four or five nosocomial infections of average severity is equal to the entire annual budget for soap and alcohol products used for hand hygiene in inpatient care areas. A single severe surgical site infection, lower respiratory tract infection, or bloodstream infection may cost the hospital more than the entire annual budget for antiseptic agents used for hand hygiene.”^{4,5}

A Final Thought

As one considers the plethora of research on hand hygiene, it is sobering to realize that despite the research, despite the product innovation and technology, despite the continued increased rate of surgical site infection and the cost to the patient as well as the healthcare system — it all comes down to us, and whether or not we choose best practice and wash our hands.

I challenge each one of you to make a difference in the lives of our patients, our families and ourselves by being that standard, that model for hand hygiene, against which everyone else is compared. One person can make a difference.

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