The CDC Guideline for Hand Hygiene in Health-Care Settings: An Overview

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# Table of Contents

GUIDELINE FOR HAND HYGIENE IN HEALTHCARE: AN OVERVIEW ..................1  
**COURSE OVERVIEW** ......................................................................................................... 1  
**ABOUT THE AUTHOR** ........................................................................................................ 2  
**LEARNING OBJECTIVES** .................................................................................................... 2  
**INTRODUCTION** ................................................................................................................ 3  
**WHY NEW HANDWASHING GUIDELINES?** ........................................................................ 4  
**HAND HYGIENE AND NOSOCOMIAL INFECTION** ............................................................... 4  
**SKIN AS A BARRIER** ............................................................................................................. 5  
**NORMAL RESIDENT FLORA AND TRANSIENT ORGANISMS** .......................................... 6  
**HAND HYGIENE AND NOSOCOMIAL INFECTION** ............................................................... 6  
**HISTORICAL DATA** .............................................................................................................. 7  
**RECENT STUDIES** .............................................................................................................. 8  
**PLAIN (NON-ANTIMICROBIAL) SOAP** .............................................................................. 8  
**ANTIMICROBIAL SOAP** ....................................................................................................... 9  
  * Chlorhexidine Gluconate ....................................................................................................... 9  
  * Iodine .................................................................................................................................. 10  
  * Para-Chloro-Meta-Xylenol (PCMX) ................................................................................ 10  
  * Quaternary Ammonium Compounds .................................................................................. 11  
  * Triclosan ............................................................................................................................. 11  
  * Other Agents ...................................................................................................................... 12  
**ALCOHOL-BASED HAND RUBS** .................................................................................... 12  
  * Alcohols ............................................................................................................................. 12  
**SECTION REVIEW** ............................................................................................................ 14  
**NEW CDC GUIDELINE RECOMMENDATIONS** .................................................................. 16  
  * Traditional Wash ................................................................................................................ 16  
**ALCOHOL-BASED HAND RUB** ....................................................................................... 18  
**SURGICAL SCRUB TECHNIQUE - GENERAL** ................................................................. 18  
**SURGICAL SCRUB TECHNIQUE – ANTIMICROBIAL SOAP** ............................................. 18  
**SURGICAL SCRUB TECHNIQUE – ALCOHOL-BASED HAND RUB WITH PERSISTENT ACTIVITY** .................................................................................................................. 19  
**SELECTION OF HAND HYGIENE AGENTS** .................................................................... 19  
**SKIN CARE** ....................................................................................................................... 20  
**OTHER ASPECTS OF HAND HYGIENE** .......................................................................... 20  
  * Use of Gloves ........................................................................................................................ 20  
**FACTORS AFFECTING HAND HYGIENE** ........................................................................... 21  
**ADMINISTRATIVE ISSUES** ............................................................................................... 21  
**REFERENCES** .................................................................................................................... 22  
**REVIEW QUESTIONS** ....................................................................................................... 23  
**POST TEST** ....................................................................................................................... 25
Guideline for Hand Hygiene in Healthcare: An Overview

Welcome to Guideline for Hand Hygiene in Healthcare: An Overview. This course has been designed to review the new guidelines for hand hygiene. The content is designed to meet the needs of the infection control practitioner and other healthcare professionals.

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Course Overview

This course contains the following topics:

- About the Author
- Introduction
- Why New Handwashing Recommendations
- Hand Hygiene and Nosocomial Infections
- Skin as a Barrier
- Normal Resident Skin Flora and Transient Organisms
- Historical Data
- Recent Studies
- Plain Soap
- Antimicrobial Soap
- Alcohol Based Rubs
- Surgical Scrub Techniques
- Selection of Hand Hygiene Agents
- Skin Care
- Use of Gloves
- Administrative Issues
- References
- Post Test
About the Author

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Learning Objectives

Upon completion of this course, the learner will be able to:

1. Describe the relationship between hand hygiene and nosocomial infection.
2. Identify situations when a traditional soap and water (plain or antimicrobial soap) is appropriate to decontaminate hands vs. an alcohol-based hand rub.
3. Demonstrate proper hand hygiene technique for both a traditional soap and water including plain or antimicrobial soap hand wash and waterless alcohol rub.
4. Identify the characteristics of an alcohol based hand rub that make it the recommendation for most patient care activities.
5. Recognize the importance of using hospital-approved lotion for skin health and skin integrity.
6. Discuss the latest recommendations for surgical scrub technique and surgical prep products.
7. List the factors affecting hand hygiene and hand washing behavior.

Definition

nosocomial = a hospital acquired infection
**Introduction**

This course is designed to review the new handwashing recommendations in the Centers for Disease Control/Healthcare Infection Control Practices Advisory Committee (CDC/HICPAC) guidelines. As in previous CDC/HICPAC guidelines, each recommendation is categorized on the basis of existing scientific data, theoretical rationale, applicability, and economic impact. For additional information, visit the CDC website at [www.cdc.gov](http://www.cdc.gov).

The CDC/HICPAC system for categorizing recommendations is as follows:

- **Category IA**: Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiological studies.
- **Category IB**: Strongly recommended for implementation and supported by certain experimental, clinical or epidemiological studies and a strong theoretical rationale.
- **Category IC**: Required for implementation, as mandated by federal or state regulations or standards.
- **Category II**: Suggested for implementation and supported by suggestive clinical or epidemiological studies or a theoretical rationale.
- **No Recommendation (NR)**: Unresolved issue: Practices for which there is insufficient evidence or consensus regarding efficacy issues.

At the conclusion of this course, participants are urged to check with their Hospital’s Infection Control Department for hand hygiene procedures specific for their facility.
Why New Handwashing Guidelines?

The new CDC Guidelines were published in October of 2002. The last CDC Guidelines on handwashing came out in 1985, and the latest APIC Guidelines came out in 1995. The advent of alcohol-based products, hand lotions and even artificial nails are addressed in the new guidelines. Researchers have begun to look at these products in an attempt to determine their efficacy in the healthcare setting.

Despite the effort in the past to get healthcare workers to wash their hands, compliance rates have not improved. The new CDC Guidelines attempt to address this important issue by focusing on product shortcomings rather than behavioral shortcomings. The goal is to introduce new products that address the “bad” things about handwashing such as the time required to properly wash and the elimination of products that cause skin irritation.

Hand Hygiene and Nosocomial Infection

The practice of skin hygiene, particularly of the hands, is one of the most important infection control measures to minimize the transmission of infectious agents. It is estimated that 50% of all hospital-acquired (nosocomial) infections are related to poor hand hygiene. Nosocomial infections are a huge problem in the healthcare system, killing more people than road accidents – 80,000 die each year in the U.S. alone.
Skin as a Barrier

To understand hand hygiene it is important to know a little about the physiology of skin. The skin functions mainly as a barrier. It protects against mechanical injury, infection, and prevents water loss from the body. The outermost layer of the skin, the stratum corneum, is composed of flattened dead cells (corneocytes or squames) attached to each other to form a tough horny layer of keratin mixed with several skin lipids.

This horny outer layer is analogous to a brick wall. The bricks (corneocytes) and mortar (lipids) serve as the primary protective barrier against pathogens. Lipids are an important component in maintaining hydration, pliability, and barrier effectiveness of the skin. Studies of the stratum corneum measure transepidermal water loss (TEWL) as an indicator of its barrier function. The stratum corneum, composed of 15 layers, forms a new layer almost daily and is almost completely replaced every two weeks. Physical abrasion as well as chemical irritation, however, can compromise the effectiveness of the stratum corneum as a barrier.

It is interesting to note that healthy skin disseminates $10^7$ particles into the air each day. Ten percent of these skin squames contain viable bacteria.
Normal Resident Flora and Transient Organisms

There is a difference between normal resident flora and the transient flora that are associated with infection. Normal resident flora lives harmlessly on the skin. Transient skin flora are bacteria, viruses and other organisms that are picked up on the hands. Both are associated with transmission of infection. Some healthcare workers are carriers and are persistently colonized with a pathogen. Staphylococcus aureus is an example of a bacterium that is considered part of the normal flora for some people, but can be detrimental if transmitted to an immunocompromised patient.

Hand Hygiene and Nosocomial Infection

Proving the connection between hand hygiene and nosocomial infection is a complicated process. Four elements are involved:

- Organisms must be present on the patient or surface
- Organisms must be able to survive on the hands of the healthcare worker
- Hand hygiene must be inadequate or absent
- Organisms must be transferred to another person

The first three elements are relatively easy to understand and have been documented through numerous studies. The last element, the transfer of organisms to another person is the hardest to study. Obviously, it would be unethical to purposefully contaminate a healthy individual to observe microorganism transfer. Therefore, most studies regarding the transmission of organisms from the hands involve the contamination of fomites (inanimate objects). Patient care
equipment such as urinary catheters and fabrics are used to demonstrate inadequate handwashing. These materials do not come in contact with another person so microorganism transfer can be observed without purposely infecting an individual. One interesting point to note is that organisms may be transferred in much larger amounts if hands are wet than if they are dry.

**Historical Data**

Despite the fact that there are few studies that statistically demonstrate the relationship between nosocomial infection and handwashing, we can look at historical data to help define the parameters that we cannot test today.

The best intervention study was conducted by Ignaz Semmelweis, a doctor who was concerned about the high incidence of puerperal fever in an obstetric clinic in Vienna, Austria in 1847. At the time, there were two wards for the delivery of babies, the difference being that medical students attended births in one ward while the second was staffed by midwives. Semmelweis noted that women were much more likely to die if they were delivered in the first ward, attended by medical students, than if they were attended by midwives.

Semmelweis investigated the procedures in each ward and noted that interns moved freely between the classroom.
where they performed autopsies on the women who died, and the ward where they delivered babies. His investigations led him to conclude that medical students were carrying “cadaveric material” on their hands from the dissecting classrooms to the birthing ward, and it was this material that led to the deadly infections. The introduction of hand washing in chlorine water (after dissection and before moving to the delivery ward,) dropped the mortality rate dramatically.

**Recent Studies**

Studies performed today typically involve product comparison. One example is plain soap and water vs. an antimicrobial product. Other studies investigate the relationship between understaffing and higher rates of nosocomial infections.

**Plain (Non-Antimicrobial) Soap**

Plain hand soap is very effective for the mechanical removal of transient microorganisms. It is typically less irritating than antimicrobial formulas and is very economical. Plain soaps are available in liquid, bar, tissue and leaflet forms.

During a 15 to 30 second hand wash bacterial amounts can be reduced by 1 or 2 log\textsubscript{10} (10 or 100 colony forming units--single bacterial cells that rapidly divide and multiply). It is interesting to note that hand washing studies involving plain soap can actually increase the numbers of bacteria recovered from hands. This can be explained as an “uncovering” of the resident flora.

Non-antimicrobial soaps may lead to skin irritation and dryness, which emphasizes the need for skin conditioners such as emollients and humectants, especially in preparations used by healthcare workers. The potential for contamination is cited in the CDC Guidelines as a disadvantage in using plain hand soap since it does not contain the added protection of an antimicrobial active ingredient. Resistance to contamination is dependent on the preservative system of the formula, as well as product packaging and dispensing.
Antimicrobial Soap

Antimicrobial soap is soap (i.e. detergent) containing an antiseptic agent. Antiseptic agents are substances that are applied to the skin to reduce the number of microbial flora. Examples include alcohols, chlorhexidine, iodine, para-chloro-meta-xylenol, quaternary ammonium compounds and triclosan. Antiseptics should not be confused with antibiotics, which are antimicrobial substances that are ingested or applied topically in cases of illness or surgery to reduce the number of microbial flora. Examples of antibiotics include penicillin, tetracycline, vancomycin, etc.

Chlorhexidine Gluconate

Chlorhexidine gluconate (CHG) is a well-known antimicrobial active ingredient in healthcare personnel handwash products as well as surgical scrubs. CHG has been incorporated into a number of hand-hygiene preparations, typically at levels of 2% or 4%. The addition of CHG to alcohol-based products is typically at a lower concentration (0.5% - 1.0%).

An advantage of the antimicrobial activity of CHG is that it is minimally affected by organic material such as blood and other proteinaceous soils. However, because of its cationic nature, it may be inactivated by other skin preparations such as lotions containing anionic emulsifying agents. Cationic molecules carry a positive charge, while anionic chemicals carry a negative charge. If “mixed” together, these molecules may cancel each other out. The CHG molecule relies on its cationic charge to attach to bacterial cells. CHG is commonly found in surgical scrub formulations. It provides excellent broad-spectrum antimicrobial and residual efficacy, meaning that it continues to provide protection from the re-growth of bacteria several hours after application.
Chlorhexidine gluconate may be irritating to the skin, depending on the concentration and the other components of the formulation. CHG products should not be used around eyes or ears, as conjunctivitis, corneal damage, and ototoxicity have been reported. Carefully read the label directions for use and precautions.

Iodine
Iodine and iodophors have a long history of antimicrobial efficacy, and have been used for several years as surgical scrubs and preoperative preparations. This chemical is a fast-acting and effective killer of microorganisms. Temperatures, neutral pH, longer exposure time, and higher concentrations than other formula components can increase the antimicrobial activity of iodine.

The majority of iodophor preparations used for skin care contain 7.5% - 10% povidone-iodine. Iodophors may cause more irritant contact dermatitis than other antiseptics commonly used for hand hygiene. Thorough rinsing is always recommended with this type of product.

Para-Chloro-Meta-Xylenol (PCMX)
PCMX has been used both as a preservative and an active agent in antimicrobial soaps. PCMX has good activity against gram-positive bacteria and fair activity against gram-negative bacteria.

PCMX is minimally affected by organic matter and is usually well-tolerated. Allergic reactions are uncommon.
Quaternary Ammonium Compounds

Quaternary ammonium compounds have been used widely as preservatives in skin care formulations, and to a lesser extent, as an active ingredient. In the last 15-20 years these compounds have become less available as active ingredients because they typically prevent the growth of bacteria and fungi rather than kill the organisms, and have the potential to become contaminated. However, newer formulations such as alcohol-quaternary combinations have recently been introduced with positive microbiocidal results. Further study is needed to determine their effectiveness in healthcare settings.

Triclosan

Triclosan is effective against a wide variety of organisms. It is not affected by organic soil such as blood and other body fluids, and has been shown to have persistent activity—meaning it continues to provide protection from the re-growth of bacteria several minutes to hours after application.

Surfactants, emollients and the pH of the formula affect Triclosan’s activity in skin care formulations. Formulations containing less than 2% triclosan are generally well accepted and seldom cause allergic reactions. Certain studies indicate that triclosan-containing products have led to decreased methicillin-resistant Staphylococcus aureus (MRSA) infections in neonatal intensive care units. In one of these studies, MRSA was eliminated 7 months after introduction of a new hand antiseptic (1% triclosan); all other infection-control measures remained in place. (Webster J, 1994). In another study, the MRSA outbreak was not controlled until a new antiseptic was added (0.3% triclosan); all previously used control measures remained in place. (Zafar AB, 1995).
**Guideline for Hand Hygiene in Health-Care: An Overview**

**Other Agents**

**Hypochlorite** is an effective antimicrobial; however, it is seldom used in skin preparations because of the irritation potential and strong odor. Unique chemistries such as silver-containing polymers and different concentrations of traditional antiseptics such as low concentrations of iodophors are currently being considered by the Food and Drug Administration (FDA). Further studies are warranted before they are recommended for use by healthcare workers.

**Alcohol-Based Hand Rubs**

**Alcohols**

Alcohols in the form of ethanol, isopropyl alcohol, and n-propanol are gaining popularity due to their efficacy and convenience for hand antisepsis. Typical approved concentrations are between 60 and 95 percent in alcohol hand-rub preparations. Concentrations higher than 95 percent are actually less effective, since some water is needed for the alcohol to denature proteins. For the most part, the type of alcohol does not make a difference in the efficacy. However, there may be a cosmetic difference in the formulation or an odor specific to a product.

Alcohol is widely used in Europe for hand hygiene. Since no water is required it increases handwashing compliance. People do not need to take the extra time to go to the sink and wash their hands. Hand washing experts promote alcohol products because they leave the skin more intact than traditional soaps, preventing the shedding of skin cells and the normal resident skin bacteria from the hands. Many alcohol formulas contain emollients that have a conditioning impact after multiple applications, encouraging frequent use by healthcare workers. Alcohol is also changing trends in surgery. In multiple studies, bacterial re-growth was slower with alcohol-based solutions than with plain soap and water, or even some antimicrobial soaps and detergents.

Alcohols alone do not have persistent (i.e., residual) activity, meaning, they do not continue to provide protection from the re-growth of bacteria several hours after application. However, the re-growth of bacteria does occur slowly after application of an alcohol-based hand rub, due likely to its

**Definition**

hypochlorite = ingredient in household bleach; used as an oxidizer, deodorant, and disinfectant
Guideline for Hand Hygiene in Health-Care:
An Overview

...efficacy against some skin bacteria. Protection from the re-
growth of bacteria several hours after application may be
achieved in alcohol-based hand rub formulas by the addition
of chlorhexidine, quaternary ammonium compounds,
octenidine, or triclosan.

The ideal amount of product applied to the hands varies for
different formulations. The manufacturer should be
consulted for the recommended amount.

An important study compared the use of an alcohol handrub
to a traditional soap and water wash. Over two weeks of
testing, the self-score that personnel gave their own skin
demonstrated that skin felt much drier with the soap and
water regimen, while the alcohol product allowed the skin to
improve slightly. To confirm the self-scores, measurements
of epidermal water content using electrical capacitance
measurements showed the very same reaction: the soap
and water hands were dry while the alcohol hands stayed
the same or increased in moisture slightly. (Boyce, 2000)
Section Review

Complete the following questions to check your knowledge.

1. The percentage of hospital-acquired (nosocomial) infections related to poor hand hygiene is: C
   a. 25%
   b. 30%
   c. 50%
   d. 75%

2. The functions of the skin include all but one of the following: B
   a. Protects against mechanical injury
   b. Preserves the stratum corneum
   c. Prevents water loss from the body
   d. Protects against infection

3. True or False
   *Staphylococcus aureus* is considered part of the normal flora for some people but can be detrimental if transmitted to an immunosuppressed patient. (True)

4. True or False
   Some studies have shown healthcare workers will transfer less organisms if their hands are wet than if they are dry. (False)

5. The reason the number of bacteria actually increase after washing with plain soap is: A
   e. Resident bacteria are “uncovered”
   f. Lipids are broken down
   g. Soap encourages *staphylococcus aureus* growth
   h. None of the above

6. One of the disadvantages of chlorhexidine gluconate (CHG), is an antimicrobial soap, is: C
   a. It is an anionic chemical
   b. It functions as a broad-spectrum antibiotic
   c. It is cationic and may be inactivated by other skin preparations such as lotions.
   d. None of the above
7. An antimicrobial commonly used as a preoperative preparation and known to cause contact dermatitis is:
   a. Para-chloro-meta-xylenol (PCMX)
   b. Triclosan
   c. Quaternary ammonium compounds
   d. Iodine

8. An antimicrobial that provides persistent activity and has led to decreased methicillin-resistant *Staphylococcus aureus* (MRSA) infections in neonatal intensive care units in some studies: A
   a. Triclosan
   b. Hypochlorite
   c. Iodine
   d. Para-chloro-meta-xylenol (PCMX)

9. True or False
   An alcohol hand-rub preparation in a 95% concentration is more effective than a 65% concentration. (False)

10. According to studies which has been shown to have a greater effect on slowing bacterial growth: C
    a. Plain soap
    b. Antimicrobial soaps
    c. Alcohol-based solutions
    d. Detergents

11. After applying an alcohol hand rub, your hands feel dry after rubbing them for 10-15 seconds. This means: B
    a. Apply lotion
    b. An insufficient amount of product was applied
    c. Switch to traditional soap and water
    d. You have developed an allergy
Guideline for Hand Hygiene in Health-Care: An Overview

New CDC Guideline Recommendations

The following section discusses the new CDC Guideline recommendations. Each recommendation is highlighted in yellow followed by a discussion.

Hand Hygiene utilizing a traditional wash is indicated for visibly soiled hands, before eating, after using a restroom, or if spores are suspected.

Traditional Wash

When hands are visibly dirty or contaminated with proteinaceous material or visibly soiled with blood or other body fluids, wash hands with either a non-antimicrobial soap and water or an antimicrobial soap and water (IA). Before eating and after using a restroom, wash hands with a non-antimicrobial soap and water or with an antimicrobial soap and water (IB). If exposure to Bacillus anthracis is suspected or proven, wash hands with non-antimicrobial soap and water or with antimicrobial soap and water. The physical action of washing and rinsing the hands under such circumstances is recommended since alcohols, chlorhexidine, iodophors and other antiseptic agents have poor activity against spores (II).

When washing hands with soap and water, wet hands first. Apply the amount of product recommended by the manufacturer. Rub hands vigorously for at least 15 seconds, covering all surfaces of the hands and fingers. Rinse hands with water and dry thoroughly with a disposable towel. Use a towel to turn off the faucet (IB). Avoid using hot water, because repeated exposure to hot water may increase the risk of dermatitis (IB).
If hands are not soiled, use an alcohol-based hand rub or traditional handwash.

If hands are not visibly soiled, use an alcohol-based hand rub for routinely decontaminating your hands (IA). Alternatively, wash your hands with an antimicrobial soap and water (IB). Antimicrobial-impregnated wipes are not a substitute for using an alcohol-based hand rub or antimicrobial soap (IB). No recommendation can be made regarding the use of non-alcohol based hand rubs (NR).

Hands should be decontaminated:

- **Before having direct contact** with patients (IB)
- **Before donning sterile gloves** when inserting a central intravascular catheter (IB)
- **Before inserting indwelling urinary catheters, peripheral vascular catheters, or other invasive devices that do not require a surgical procedure** (IB)
- **After contact with a patient’s intact skin** (e.g., when taking a pulse or blood pressure, or lifting a patient) (IB)
- **After contact with body fluids** or excretions, mucous membranes, non-intact skin, or wound dressings if hands are not visibly soiled (IA)
- **If moving from a contaminated body site** to a clean body site during patient care (II).
- **After contact with inanimate objects** (including medical equipment) in the immediate vicinity of the patient (II)
- **After removing gloves** (IB)
**Alcohol-based Hand Rub**

When decontaminating hands with an alcohol-based hand rub, apply the amount of product recommended by the manufacturer to the palm of one hand and rub your hands together. Cover all surfaces of the hands and fingers until your hands are dry (IB). Remember, you are dealing with a flammable liquid. It takes only a short time for your hands to air dry, thus eliminating the potential for ignition.

**Surgical Scrub Technique - General**

Rings, watches and bracelets should be removed before beginning a surgical scrub (II). Debris should be removed from underneath fingernails using a nail cleaner under running water (II). 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 procedures (IB).

**Surgical Scrub Technique – Antimicrobial Soap**

When performing surgical hand antisepsis using antimicrobial soap, scrub your hands and forearms for the length of time recommended on the label, usually 2-6 minutes. Long scrub times (e.g., 10 minutes) are not necessary (IB).
**Surgical Scrub Technique – Alcohol-based Hand Rub with Persistent Activity**

When using an alcohol-based surgical hand scrub product with persistent activity, follow the manufacturer’s instructions by carefully reading the label. Before applying the alcohol solution, pre-wash your hands and forearms with a non-antimicrobial soap and dry your hands and forearms completely. After application of the alcohol-based product, allow your hands and forearms to dry thoroughly before donning sterile gloves (IB).

**Selection of Hand Hygiene Agents**

New recommendations for selecting any type of hand hygiene product should address potential skin irritation (IB). If the soap irritates the skin it will not be consistently used by medical personnel. Choose a product that the staff accepts by performing a product trial (IB), and solicit information from manufacturers regarding any product interactions (II). The evaluation of the dispenser should be considered; choose a product on the basis of dispenser integrity and durability (II). Do not add soap to top off a partially empty dispenser. This can lead to bacterial contamination of the soap. (IA).
Skin Care
Skin care is promoted beyond hand hygiene. Providing a hospital-approved lotion is emphasized in the CDC guidelines because lotions help preserve the skin, thereby promoting more frequent hand hygiene (IA). Check manufacturer specifications to verify that the lotion does not affect the efficacy of a hand hygiene product in use such as CHG (IB). Also check to make sure the product is compatible with latex gloves.

Other Aspects of Hand Hygiene
Fingernails, specifically artificial nails are addressed in the new CDC hand hygiene guidelines. It is recommended that no artificial nails or extenders be allowed if a health provider has direct contact with high-risk patients (e.g., those in intensive-care units or operating rooms) (IA). Several studies clearly demonstrate that artificial nails can be a reservoir for gram-negative bacteria. Natural nails should be less than a quarter inch long (II).

No recommendation is made regarding hand jewelry such as rings. This subject will need to be researched further to see if hand jewelry harbors bacteria (NR).

Use of Gloves
The following are recommendations for the use of gloves:

- Should be worn when contact with blood and other potentially infectious material, mucous membranes, and non-intact skin could occur (IC).
- Should be removed after caring for a patient. Do not wear the same pair of gloves for the care of more than one patient, and do not wash gloves between uses with different patients (IB).
- Should be changed during patient care if moving from a contaminated body site to a clean body site (II).
Factors Affecting Hand Hygiene

Healthcare workers should be educated regarding the indications for hand hygiene and the advantages and disadvantages of various methods used to clean their hands (II). Performance monitoring and feedback is recommended to motivate healthcare workers (IA), and to encourage patients and family members to remind healthcare workers to decontaminate their hands (II).

Administrative Issues

Hand hygiene adherence should be an institutional priority with corresponding support and financial resources (IB). Alcohol-based hand rubs are recommended to improve hand hygiene, particularly in areas of high workload and high intensity patient care. Products maybe available at the entrance of a patient’s room, at the bedside, or in other convenient locations. Products should be in individual pocket-sized containers (IA). Because of the flammability of alcohol-based products, supplies should be stored in cabinets or areas approved to house flammable materials (IC).
Guideline for Hand Hygiene in Health-Care:
An Overview

References


Nishioka K, et.al. The results of ingredient patch testing in contact dermatitis elicited by povidone-iodine preparations. Contact Dermatitis 2000 Feb; 42(2):90-94


Zafar AB, et.al. Use of 0.3% triclosan (Bacti-Stat©) to eradicate an outbreak of methicillin-resistant Staphylococcus aureus in a neonatal nursery. Am J Infect Control 1995; 23:200-208

Boyce, JM et. al. Skin irritation and dryness associated with two hand-hygiene regimens: soap and water hand washing versus hand antisepsis with an alcoholic hand gel, Infection Control and Hospital Epidemiology, 2000; 21(7):442-448.
Review Questions

Complete the following questions to check your knowledge.

1. The hands should be rubbed vigorously for at least _______ when washing with soap and water. C
   a. 1 minute
   b. 30 seconds
   c. 15 seconds
   d. 5 seconds

2. If exposure to Bacillus anthracis is suspected hands should be washed with_________. C
   a. An alcohol hand rub
   b. Only Chlorhexidine can be used
   c. Non-antimicrobial soap and water or an antimicrobial soap and water
   d. Only an iodophor can be used

3. True or False
   An antimicrobial-impregnated wipe is as effective and can be used as a substitute for an alcohol-based hand rub or antimicrobial soap.
   (False)

4. Hands should be decontaminated in all but one of the following situations: B
   a. Before direct contact with patients
   b. When moving from a clean body site to a contaminated body site
   c. Before inserting an indwelling urinary catheter, a peripheral vascular catheter, or invasive devices that do not require a surgical procedure
   d. After removing gloves

5. The length of time recommended to perform a surgical scrub is usually: A
   a. 2-6 minutes
   b. 7-10 minutes
   c. 15 minutes
   d. 20 minutes
6. The surgical scrub technique using an alcohol-based hand rub with persistent activity includes all but one of the following: C
   a. Pre-wash arms and forearms
   b. Use a non-antimicrobial soap
   c. Use an antimicrobial soap such as CHG
   d. Don sterile gloves after hands and forearms are thoroughly dry

7. Adding soap to top off a partially empty dispenser may: B
   a. Contaminate the soap
   b. Is not considered an acceptable practice according to the new CDC guidelines
   c. None of the above
   d. A and B

8. Two reasons the CDC guidelines emphasize hospital approved lotions are: B
   a. Lotions have a synergic effect when used with antimicrobials
   b. Lotions preserve the skin and promote more frequent hand hygiene
   c. Lotions make gloving easier, thereby encouraging more frequent use of gloves
   d. Lotions stimulate the olfactory senses and hasten the healing process

9. The CDC guidelines state all but one of the following regarding fingernails: B
   a. Artificial nails are not to be worn by a healthcare provider if they have contact with high risk patients
   b. Artificial nails are a reservoir for gram positive bacteria
   c. Natural nails should be less than one quarter inch long
   d. Artificial nails are a reservoir for gram negative bacteria

10. True or False
    Alcohol-based hand rubs are recommended to improve hand hygiene, particularly in areas of high workload and high intensity patient care. (True)
**Post Test**

1. If hands are not visibly soiled, they should be decontaminated by: (IA, IB) D  
   a. Alcohol-based hand-rub  
   b. Alcohol-based hand-rub with added ingredients for persistence  
   c. Antimicrobial soap and water  
   d. All of the above are acceptable; alcohol-based hand-rub is preferred

2. When hands are visibly dirty or contaminated with proteinaceous material they should be decontaminated by: (IA) C  
   a. Alcohol-based hand-rub  
   b. Alcohol-based hand-rub with added ingredients for persistence  
   c. Soap and water (non-antimicrobial or antimicrobial)  
   d. All of the above are acceptable; alcohol-based hand-rub is preferred

3. If hands are thought to be contaminated with spores (i.e. *Clostridium difficile, Bacillus anthracis*), they should be decontaminated with: (II) C  
   a. An alcohol-based hand-rub  
   b. An alcohol-based hand-rub with added ingredients for persistence  
   c. Soap and water (non-antimicrobial or antimicrobial)  
   d. All of the above are acceptable; alcohol-based hand-rub is preferred

4. Research has shown that alcohol-based hand rubs: A  
   a. Leave hands in a better condition, take less time and are more effective than the traditional soap and water  
   b. Dry hands out more quickly than soap and water  
   c. Do not kill germs as effectively as soap and water  
   d. Take more time to use than the traditional soap and water hand wash
5. When in direct contact with a high risk patient (i.e. intensive care, operating room): (IA) B
   a. Artificial nails are OK, as long as they’re not in your way
   b. Artificial nails and extenders are not allowed; natural nails are OK if the tips are less than ¼ inch long
   c. Artificial nails are not allowed, but extenders are OK
   d. Any kind of nails are OK as long as you wash your hands

6. Between patients or when moving from a contaminated site to a clean site on one patient: (IB) C
   a. The same pair of gloves can be used
   b. Gloves should be washed
   c. Gloves should be removed and hands decontaminated before donning a new pair
   d. Gloves should be removed and a new pair used without hand decontamination, only if there were no breaks in the glove

7. Healthcare workers might be motivated to wash hands: (IA, II) D
   a. If they are educated on the subject
   b. If they are monitored and given performance feedback
   c. If patients and their families ask them to wash
   d. All of the above

8. The reason hospital-approved lotion should be used is: (IA, IB) D
   a. Lotions high in mineral oil may degrade latex gloves
   b. If the lotion formula is anionic in nature, it may compromise the persistent efficacy of the antimicrobial soap
   c. The lotion may be easily contaminated if shared or if the bottle is re-used
   d. All of the above
9. A surgical scrub: (IB, II) A
   a. Requires the removal of debris from underneath fingernails using a nail cleaner under running water
   b. Requires that a brush be used
   c. Requires at least a 10 minute scrub
   d. Requires that only a traditional antimicrobial soap and water be used

10. Hands do not have to be decontaminated: (IA, IB, II) C
    a. After contact with a patient’s intact skin
    b. After removing gloves
    c. After entering a patient’s room to speak with him or her (no contact with patient or inanimate items)
    d. All of the above