Alcohol Hand Sanitizer: The New Age of Hand Hygiene

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Alcohol Hand Sanitizer: The New Age of Hand Hygiene
Study Guide #9

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Description of Study Guide Topic

Alcohol handrubs were strongly recommended to be considered a significant option in the arsenal of hand hygiene products in 2002 when the "Guideline for Hand Hygiene in Health-Care Settings" was published. The recommendation to use alcohol handrubs to decontaminate hands that are not visibly soiled was driven by the lack of compliance to traditional handwashing practices and lack of understanding of cross-contamination in healthcare settings. This study guide reviews the Guideline's recommendations for the use of alcohol handrubs in healthcare settings, compares the alcohol handrub to traditional handwashing practices and describes implementation programs to promote acceptance and compliance.

Overall Purpose of the Study Guide

To discuss the alcohol handrub technique and methods to incorporate alcohol handrubs into a hand hygiene program that encourages acceptance and compliance.

Objectives

Upon completion of this study guide program, the participant should be able to:

1. Discuss basic facts regarding the importance of good hand hygiene.
2. Review the recommendations for use of alcohol handrubs in a hand hygiene program.

Intended Audience

This study guide is a self-study program intended for use by nurses, central service personnel and other healthcare professionals interested in this topic.

Handwashing Compliance

Compliance with recommended hand hygiene practices by healthcare workers has been poor. In observational studies conducted to evaluate the rate of compliance with recommended hand hygiene procedures, the average rate of compliance was 40% (Boyce, 2002).

Many factors contribute to this poor adherence to good hand hygiene practice. One of the most cited reasons for non-compliance has been lack of time. Lack of time can be attributed to the nursing shortage, understaffed healthcare departments, increased patient caseload, as well as an increase in the number of more acutely ill patients. Studies have demonstrated that compliance is worse when the demand for handwashing is high (Pittet, 2001). Other factors that contribute to non-compliance with proper hand hygiene practices are environmental issues such as a lack of soap and towels, inconveniently placed sinks and dry, irritated skin associated with the use of harsh hand hygiene products. Educational issues including a lack of knowledge on the appropriate handwashing technique and how the transmission of pathogens occurs, as well as the mistaken belief that wearing gloves creates less of a need for handwashing all lead to the lack of proper hand hygiene practices with many healthcare workers. Studies have also demonstrated that a healthcare facility that does not have a vested interest in hand hygiene and does not have sanctions against those who are non-compliant struggle with increasing the observance of good hand hygiene practices.

In this new millennium, the need to increase hand hygiene practices is urgent. There are continuous improvement initiatives to reduce healthcare-associated infections (HAIs), to eliminate multiple, drug-resistant organisms (MDROs) and to provide an environment of safety for both patients and healthcare workers. All of these initiatives depend on healthcare workers to be vigilant in performing appropriate hand hygiene practices.

Healthcare-Associated Infections (HAI)

HAIs are infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting. There are approximately two million HAIs that occur each year in the United States. HAIs are one of the top 10 leading causes of death in the United States with between 60,000-90,000 deaths directly related to these infections. The significance of HAIs is not measured by the number of cases each year, but by the clinical impact of the increased incidence, which in turn prolongs hospitalization. The cost of HAIs to healthcare facilities, patients and caregivers is estimated to be between $17 billion to $29 billion.

Risk Factor for HAIs

The sources for a healthcare-associated infection can be complex. Patients can become infected from exposure to pathogenic organisms frequently found in healthcare facilities through a variety of methods of transmission.

Patients, who are immunocompromised due to chronic illnesses, are hospitalized frequently and who receive frequent administrations of antibiotics or immunosuppressive drugs are the most vulnerable to the risk of infection. A chance encounter with contaminated hands or medical equipment can put them in a life or death situation, whereas a healthier individual exposed to the same cross-contamination may not develop an infection.

Patients who are healthy and are admitted for elective surgery can develop an HAI if they are exposed to dirty or inadequately sterilized surgical instruments, inadequately scrubbed hands, or improperly prepped incision sites during surgery.

There is also a risk in sharing a hospital room with an infected patient if the room is not properly cleaned and disinfected. There is a risk of cross-contamination from the hands of a caregiver who has performed patient care for the infected patient and the caregiver does not wash his or her hands.

Multiple Drug Resistant Organisms (MDROs)

There is a constant competition between microorganisms that infect patients and the drugs (antibiotics) used to treat the infections. Antibiotic resistance actually began with the development of one of the first antibiotics, penicillin. In the 1950s, there were reports from Canada and Australia about penicillin-resistant *Staphylococcus aureus* infections that included skin lesions, sepsis and pneumonia in children and young adults. In the same time period, the United States reported penicillin-resistant *Staphylococcus aureus* infections in newborns, obstetrical and surgical patient populations. One study demonstrated that approximately 25% of newborns in the United States developed pyodermas with the resistant *Staphylococcus aureus* (Siegel, 2006).

Progress was made in developing antibiotics to treat penicillin-resistant *Staphylococcus aureus* infections, which gave rise to an optimistic view that all infections could be conquered by developing more potent antibiotics. However, the optimism was short-lived. Healthcare workers now need to be aware of the dangers posed by methicillin-resistant *Staphylococcus aureus* (MRSA), community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA), vancomycin-resistant enterococci (VRE), vancomycin-resistant *Staphylococcus aureus* (VRSA) and extended spectrum beta-lactamase (ESBLs) gram-negative bacteria. HAIs associated with MDROs increase hospital lengths of stay, costs and mortality. A recent study documented an increase in lengths of stay, costs and mortality associated with an outbreak of ESBL-producing *Klebsiella pneumonia* in a neo-natal intensive care unit (Stone et al., 2003).

Vancomycin resistance has been reported to be an independent predictor of death from enterococcal bacteremia (Siegel, 2006). To illustrate how dangerous these resistant organisms can be, VRE is discussed in more detail.

Enterococci bacteria are the leading cause of blood infections in hospitalized patients. Although these bacteria tend to attack only the sickest patients, this disease constitutes a serious threat in healthy patients. In the past, most infected patients were successfully treated with an antibiotic called Vancomycin. Through years of exposure to Vancomycin, some enterococci have been able to alter their genetic structure, thus rendering the Vancomycin powerless to destroy the bacteria. The rate of isolated enterococci becoming more resistant to Vancomycin has increased tremendously in the past decade. Nosocomial transmission of VRE can occur two ways: directly via patient-to-patient contact, or indirectly from the hands of healthcare workers or contaminated environmental surfaces.

There is sufficient epidemiologic evidence to suggest that MDROs are carried from one person to another via the hands of the healthcare worker (Siegel, 2006). Healthcare workers' hands can become contaminated through providing patient care and coming in contact with contaminated hard surfaces that are in the vicinity of the patient. Therefore, adherence to good hand hygiene practices becomes important in the healthcare environment that is contending with multiple, drug-resistant organisms.

Skin: The Body's Protection

To understand the importance of proper hand hygiene and pathogenic spread, the anatomy of the skin must be discussed. The skin is an amazing structure of the body representing the integumentary system. It offers protection from the environment or pathogenic invasion, provides temperature regulation and fluid control, responds to changes in the external environment and reflects changes in the internal environment. Skin is composed of three main layers: the epidermis, dermis and the subcutaneous tissues.

The **epidermis** is avascular with an outer, dead cornified portion and a deeper, living cellular structure. The epidermis is divided into several layers consisting mostly of keratinocytes (cells that produce keratin). Epidermal cells slowly move outward to the skin surface while going through a change process. During this migration they are sloughed as cornified flakes.

Starting from the most inner aspect of the epidermis, these transitional layers are the basal cell layer, the prickle cell layer, the granular layer, the clear cell layer and the cornified layer. These layers together measure approximately 0.5 to 1.1mm in thickness (Mosby, 1994). Pigment-containing cells (melanin and carotene) are found in the epithelial layer and are responsible for the skin color.

Formed by the communication with the underlying dermis are the epidermal appendages including, hair, nails, eccrine sweat glands, apocrine sweat glands and sebaceous glands. The hair and nails are really keratinized appendages and have no real function in human beings. Hair ascends from an ingrowth of epidermal cells or follicle that pushes itself down into the dermis during development. Nails are epidermal structures that consist of specialized hardened keratin protein. Care of the fingernails focuses on the nail bed (the pink background behind the nail), the base of the nail (the junction site of the skin and the exposed fingernail) and the area under the exposed tip of the fingernail (Rodgers, Sullivan, & Hamann, 1998).

The eccrine sweat glands are found in many areas and are responsible for dissipating body heat when sweat is produced and evaporates.

The apocrine sweat glands are mostly found in the axilla and in some general areas and may open into the hair follicles. The sweat that these glands produce decomposes when contaminated by bacteria, which is responsible for the characteristic body odor. The sebaceous glands usually emanate from hair follicles and produce sebum that lubricates the hardened outer layer of the epidermis to help resist dehydration.

The **dermis**, which is underneath the epidermis, makes up the bulk of the skin. It consists of tough connective tissue with lymphatics, glands, sensory receptors and related nerves and blood vessels. The dermis not only supports the epidermis, it nourishes it.
The subcutaneous layer (or hypodermis) lies immediately under the dermis and is characterized by its fat storage. This subcutaneous layer is instrumental in temperature insulation.

Skin, even though quite simple, can be a very complex organ of the human body. Healthy skin provides a critical barrier to possible abrasion, chemical irritants, ultraviolet radiation and most importantly, infectious agents. On the other hand, skin can be the vehicle of transmission of pathogenic microorganisms if not cared for appropriately by using good handwashing techniques.

Transient vs. Resident Organisms

Microorganisms can be found on almost everyone's hands. Depending on the site and the method of sampling, human skin may contain between 4,000 to 400,000 organisms per square centimeter. Human skin is not considered to be totally covered with infectious organisms. There are two types of flora found on human skin. These include resident organisms and transient organisms.

Resident flora (also known as colonizing flora) are microorganisms that are considered permanent residents of the skin and not readily removed by mechanical friction. These microorganisms can be consistently isolated from the skin of most people. An example of a microbe that resides without harm on the skin surface and is considered normal is *Staphylococcus epidermidis*.

Flora that are not native to a given site and appear suddenly are termed transient. **Transient flora** (also termed contaminating or noncolonizing flora) are microorganisms found on the skin, but are not demonstrated to be consistently present in a majority of persons. Transient organisms can accumulate easily on the hands of healthcare workers after patient contact and patient care activities. They must be removed by mechanical friction with soap and water, or destroyed by the application of an antiseptic handrub (alcohol, for instance). If adequate and proper hand hygiene is not performed, then the chance of pathogenic transmission to other persons (patients or co-workers) can occur.

Chain of Infection

Healthcare professionals must understand the chain of infection so that practices can be implemented to control the transmission of pathogens, such as handwashing. The three main components in this chain of infection are: the agent, route of transmission and the host (Association for the Advancement of Medical Instrumentation [AAMI], 1996).

The **causative agent** of infection can be a bacterium, virus, fungus, or parasite. This pathogen must be virulent, invasive, infective and have the appropriate reservoir to survive and transmit disease as described below:

> Virulence is the degree of pathogenicity or the ability of a microorganism to cause disease. As a microorganism becomes more virulent, the resulting disease becomes more severe and communicable

- The invading organism must be able to penetrate the host's defensive barriers (invasive) to cause disease
- An infective dose of the pathogen must be present, which is the number of organisms needed to cause an infection. This number varies with the organism and the host
- An appropriate reservoir must be present to allow the organism to metabolize and multiply. Different microorganisms require different reservoirs which may be animate or inanimate

The **route of transmission** of an organism can be through direct contact (blood transfusions, direct contact with body fluids, sexual contact), vectors (insects that can transmit disease), or indirect contact (exposure to contaminated food, water, air, surgical instruments).

The **host** must be susceptible to the infective pathogen for disease to occur. Factors, such as age, physical condition and nutrition can affect the host's susceptibility.

In summary, the chain of infection requires a causative agent that multiplies in a reservoir. A portal of exit allows the pathogen to escape and be transmitted to a susceptible host through a portal of entry. Hence, disease is transmitted. Proper handwashing can break this chain of infection by minimizing or eliminating the transmission of the pathogen. Compliance with an accepted handwashing protocol is mandatory to control the spread of disease.

CDC Recommendations for Hand Hygiene Protocols

Studies have shown that one third of all hospital infections are preventable (Pittet, 2001). Since a substantial portion of nosocomial infections are from cross-contamination or transmission by the contaminated hands of a healthcare worker, proper handwashing is mandatory (Pittet, 2001).

The Centers of Disease Control and Prevention (CDC) convened a group of experts to address the escalating rate of infection in healthcare environments. This task force called the Healthcare Infection Control Practices Advisory Committee (HICPAC), included members from the Society for Healthcare Epidemiology of America (SHEA), the Association for Professionals in Infection Control and Epidemiology (APIC) and the Infectious Diseases Society of America (IDSA).

This group reviewed the traditional handwashing practice that is employed to prevent cross-contamination by removing dirt and loose transient flora. The definition (CDC, 2005) of an antiseptic handwash is "washing hands with water and soap or other detergents containing an antiseptic agent." The basic practice of handwashing currently involves the following steps:

- Use a non-antimicrobial or antimicrobial soap
- Wet hands first with warm water
- Apply 3-5 ml of soap
- Rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers
- Rinse hands with warm water and dry thoroughly with a disposable towel
- Use towel to turn off the faucet

Even though these steps appear very simplistic, healthcare workers continue to have problems with compliance, thus leading to an increased infection rate. Through a thorough review of the evidence dealing with handwashing and hand asepsis, specific recommendations have been proposed by the HICPAC to promote improved hand hygiene practices to reduce the transmission of pathogenic organisms by healthcare workers. The proposed "Guideline for Hand Hygiene in Healthcare Settings" favors the use of an alcohol handrub. This is a radical departure from traditional handwashing practices. Since this CDC recommendation doesn't reflect what is already in practice, it represents one of the most revolutionary changes that have ever been addressed by the CDC. The CDC (2005) defines antiseptic handrub as "applying a waterless antiseptic agent to all surfaces of the hands to reduce the number of microorganisms present."

The HICPAC members reviewed numerous studies and were very impressed with the research results from other countries. Alcohol handrubs have been used in Europe for years. In northern Europe, the alcohol handrub has become the standard of care, as it is used 90% of the time when hands are not visibly soiled (HIC, 2002). Alcohol dispensers have even been installed between patient beds and at the nursing stations for better accessibility and compliance.

The consensus among the HICPAC members was to develop a hand hygiene recommendation draft with the goals being: To improve compliance with hand hygiene practices and to reduce the transmission of pathogenic microorganisms. The task force (CDC, 2005 & HIC, 2002) categorized their practice recommendations into four main areas:

- Category IA: Strongly recommended for implementation, strongly supported by well-designed experimental, clinical, or epidemiologic studies
- Category IB: Strongly recommended for implementation, supported by some well-designed experimental, clinical, or epidemiologic studies
- Category IC: Required for implementation and supported by suggestive clinical and epidemiologic studies or a theoretical rationale
- Category II: Suggested for implementation and supported by suggestive clinical and epidemiologic studies or a theoretical rationale

The following recommendations have been proposed (CDC, 2005) with the corresponding categorization included:

- Wash hands with antimicrobial or non-antimicrobial soap and water when hands are visibly soiled or contaminated (IA)
- If hands are not visibly soiled, use an alcohol-based waterless antiseptic agent (IA)
- On nursing units where an alcohol-based handrub is available, also provide a non-antimicrobial soap for use when hands are visibly soiled when an alcohol handrub is also available. It can be confusing to personnel if both an alcohol handrub and an antimicrobial soap are available in the same nursing unit. (II)
- Decontaminate hands after patient contact with the patient's intact skin (i.e., taking blood pressure, pulse, or lifting patient) (IB)

- Decontaminate hands after contact with the patient's body fluids or excretions, mucous membranes, non-intact skin, or wound dressings, as long as hands are not visibly soiled (IA)
- Decontaminate hands if moving from a contaminated body site to a clean body site during patient care (II)
- Decontaminate hands after contact with inanimate objects (i.e., medical equipment) in the immediate vicinity of the patient (II)
- Decontaminate hands before caring for patients with immune suppression (II)
- Decontaminate hands before donning sterile gloves when inserting a central intravascular catheter (IB)
- Decontaminate hands before inserting indwelling catheters or other invasive devices that do not require a surgical procedure (IB)
- Decontaminate hands after removing gloves (IB)
- To improve hand hygiene adherence among personnel in units or instances where high workloads and high intensity of patient care are anticipated, make alcohol handrubs available at the entrance to the patient's room or at the bedside, in other convenient locations and in individual pocket-size containers to be carried by the healthcare workers (IA)
- Make improved hand hygiene adherence an institutional priority – provide administrative and financial support (IB)

Alcohol Handrub

The HICPAC reviewed research that validated the use of alcohol handrubs in the majority of situations where hand hygiene is needed. In a number of studies that focused on antimicrobial-resistant pathogens, alcohol-based handrubs reduced the number of organisms on the hands of healthcare workers more effectively than using the soap and water handwash technique (HIC, 2002). In another study, the alcohol handrub was the only hand hygiene practice that reflected an improvement in compliance as associated with a decreased infection rate (Pettit, 2001).

Alcohols provide the most rapid bactericidal action of all antiseptics by denaturing proteins and rendering them ineffective. They are bactericidal against most vegetative gram-positive and gram-negative bacteria (including MRSA and VRE) and tubercle bacillus. However, alcohols are not effective against *Clostridium difficile* and other spore forming bacteria. Even though alcohols are not sporicidal, they are effective against many viruses and fungi.

Alcohols are characterized by providing a very rapid reduction in microbial counts on the skin. According to APIC guidelines, studies have shown that rubbing the skin with alcohol for a short 15-second period has been shown to be effective in preventing hand transmission of gram-negative bacteria (APIC, 1995). The hands should be rubbed together ensuring that all surfaces of the hands and fingers contact the alcohol preparation. This rubbing action is continued until the hands are dry. The manufacturer's recommendations should be followed on the amount of alcohol handrub to use. Usually it takes 15-25 seconds for the hands to dry and be free of pathogens. Research has also shown that rubbing the skin with alcohol for three minutes is just as effective as a 20-minute scrub (APIC, 1995).

Alcohol handrubs are less irritating to the skin as compared to traditional handwashes. Regular handwashing with soap and water can decrease skin pH, reduce lipid content, increase transepidermal water loss and increase microbial shedding (Pittet, 2001). All of these actions lead to skin irritation and breakdown. Alcohols are less irritating because they usually contain added emollients that protect against cross-contamination by keeping the resident skin flora intact.

The primary alcohols used for skin antisepsis are ethanol, n-propyl and isopropyl alcohols. Isopropyl alcohol is a more efficient fat solvent and often causes more skin roughness than other preparations. The alcohol concentration is much more important than the type of alcohol in determining the effectiveness of a preparation. Alcohol solutions or gels must be diluted with water to denature protein. Alcohol concentrations of 60% to 90% by weight appear to be the most effective for antisepsis. A concentration of less than 70% is generally more desirable because higher concentrations cause more skin drying and are more expensive (APIC, 1995). Solutions, foams and gels with 60% to 70% ethanol or isopropyl alcohols have been combined with emollients to minimize skin drying and reduce evaporation time.

The FDA has defined "healthcare personnel handwash/rub" (i.e., alcohol handrub) as an antimicrobial high-risk handwash/rub product containing a broad spectrum, fast-acting, non-irritating agent designed for frequent use. A healthcare personnel handrub is designed primarily to reduce transient organisms. Acceptable support data includes both *in vitro* and *in vivo* tests.
The advantages and benefits of using an alcohol handrub are:

- Readily available (no wash basin is needed, can clean hands while walking down the hall)
- Less time to use as compared to the traditional handwash
- Less prone to cause irritant contact dermatitis
- Improves adherence to hand hygiene policies
- Reduces infection rates
- Active against all bacteria and most clinically important viruses, yeasts, and fungi
- Rapid action and evaporation
- Decreases skin irritation
- Excellent spreading ability
- Complies with new hand hygiene guidelines to control infection transmission

As long as hands are not visibly soiled, the CDC guidelines (2005) call for use of waterless antiseptics (alcohol handrubs) in the following situations:

- After contact with patient's intact skin
- After contact with body fluids or excretions, mucous membranes, broken skin, or wound dressing, provided hands are not visibly soiled
- After moving from a contaminated body site to a clean site
- After contact with inanimate objects (in the immediate vicinity of the patient)

- Before caring for patients with severe neutropenia or other types of severe immune suppression
- Before donning sterile gloves when inserting a central venous catheter
- Before inserting an indwelling urinary catheter
- After removing gloves

The CDC also recommends the following when using alcohol handrubs:

- Healthcare personnel should rub their hands until the alcohol has evaporated (until hands are dry)
- The alcohol handrubs should be stored away from high temperatures or flames. (In accordance with CDC and National Fire Protection Agency recommendations)
- Alcohol handrub dispensers should be installed in patient rooms, treatment rooms and other appropriate locations. They should not be installed in egress or exit corridors
- Supplies of alcohol handrubs should be stored in cabinets or areas approved for flammable materials

Implementation of an Alcohol Handrub Program

The CDC hand hygiene recommendations will prompt healthcare facilities to implement a comprehensive plan that includes alcohol handrub practices. In light of the overwhelming body of evidence supporting these new hand hygiene practices, many infection control practitioners are being proactive and have already begun this process.

The main challenge for the successful implementation of new hand hygiene is changing healthcare workers' behavior. The key to mandating any transformation in practice is "buy-in." The healthcare worker must have a vested interest and ownership in the change so that implementation can progress smoothly.

Behavior changes are based on the three basic concepts of: education, motivation and system change (Pettit, 2001). By providing education, those involved with the change are able to validate and justify why the change is necessary. Basic beliefs must be explored to dispel any false information or negative attitudes about the new practice or product being implemented. Motivation to change may be fueled by dissatisfaction with current practices (i.e., no time to wash hands with soap and water), a positive perception of the alternative that is being put into place (i.e., impressed with the alcohol handrub) and recognition at the individual and institutional level for an ability to change. This last factor is critical for encouraging motivation for change. System change can include positive administrative support, rewards to ensure active participation in the change process and program champions who have successfully embraced the change.

Through administrative support for compliance with new hand hygiene practices, a new culture of patient care and safety is created. Strong and visible support from the top healthcare officials from the CEO to the nursing administrator is critically important to the success of implementing alcohol handrub practices. With the increase in nosocomial infections, strict adherence to proper hand hygiene has become an institutional priority. Administrators are delegating significant financial resources to ensure a quick and comprehensive conversion to making alcohol handrubs readily accessible as recommended by the CDC.

A variety of educational programs and methods can be used to encourage compliance with new hand hygiene practices. These educational programs must be multidisciplinary and target specific audiences. Studies have shown that compliance varies by the type of healthcare worker. The educational approaches and information given must also be different (Pittet, 2001). The use of informational wall cards, in-service videos and in-service lectures can help to drive compliance with alcohol handrub practices. Topics of discussion should include the types of patient care activities that can lead to cross contamination, the various methods used for hand hygiene and the advantages and disadvantages of each method. A team approach should be used to stress that proper hand hygiene is a continuous process that should be regularly employed. The team members serve to remind each other about acceptable hand care which, in turn, helps the workers from regressing into former practices. Role models and leaders are definitely critical to inspire others to participate in the change

Group and individual creativity often emerges when implementing new practices. For example, some healthcare environments have placed alcohol handrub dispensers at the patient's bedside and provided brochures on the importance of proper hand hygiene to minimize infection transmission. This action encourages the patient to remind the healthcare worker to wash his or her hands. When "social pressure" is applied by patients, the speedy implementation of alcohol handrub washing practices can be facilitated.

The argument for greater patient safety is an intense motivational factor in the successful implementation of alcohol handrub practices. Patient safety should be the focal theme of designing patient brochures to educate about this topic. The Medical College of Virginia Campus of Virginia Commonwealth University of Richmond has installed bedside alcohol handrub dispensers and has developed a handrub brochure for their patients. The brochure (HIC, 1999) highlights the following:

- Physicians and nurses are very busy and need reminders to wash their hands
- Many germs that cause infections can be passed by hands
- Handwashing is the single most important procedure for preventing the spread of infection to you, so take control of your care by reminding doctors and nurses to wash their hands
- You should ask, "Have you washed your hands?" before healthcare workers examine you and before and after they wear gloves. Patient reminders help ensure compliance with the new alcohol handrub practices

Often healthcare workers need rewards for compliance and sanctions for noncompliance to assist with the enforcement of new hand hygiene practices. Since enforcement is often a problem, programs should be geared towards workers who are willing to assist with compliance. These change masters need to create a system to monitor their colleagues and provide feedback so that compliance will be encouraged. Studies have shown that without a feedback monitoring system, compliance decreases (HIC, 2002).

Outcome management involved with implementing an alcohol handrub protocol includes making compliance part of the healthcare provider's performance appraisal. A system to measure improvements in hand hygiene compliance should be developed to monitor and record the healthcare worker's activities. This information must be reported to the worker on a regular basis to promote consistent compliance. Compliance can also be monitored by recording alcohol handrub usage over a period of time. Outcome management should also include infection rate monitoring and rapid reporting of outbreaks so that compliance with the proper hand hygiene can be determined.

Alcohol handrub practices are being eagerly accepted by healthcare providers today and will be supported in the CDC hand hygiene

guidelines (reference draft guidelines) in the future. Convenience, ease of use and saving time are all factors driving the use of alcohol handrubs in the healthcare worker's environment, as well as private life. Many nurses and doctors now carry the pocket-sized containers in their purses or pockets and have incorporated the habit of regular use in their activities of daily living.

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Review Questions

1. The most frequent response for not practicing good hand hygiene is:
   A. Nursing shortage
   B. No sink available
   C. Lack of time
   D. Low infection rates

2. The spread of antibiotic-resistant pathogens is directly related to the unwashed hands of healthcare workers.
   A. True
   B. False

3. _____ (also known as colonizing flora) are microorganisms that are considered permanent residents of the skin and not readily removed by mechanical friction.
   A. Transient flora
   B. Bacteria
   C. Epidermal flora
   D. Resident flora

4. The three main components in the chain of infection are the agent, route of transmission and the number of organisms.
   A. True
   B. False

5. Studies have shown that _____of all hospital infections are preventable.
   A. 25%
   B. 33%
   C. 75%
   D. 100%

6. The CDC guideline strongly recommends the use of an alcohol-based, waterless, antiseptic agent when hands are not visibly soiled.
   A. True
   B. False

7. _____ provides the most rapid bactericidal action of all antiseptics by denaturing proteins and rendering them ineffective.
   A. PCMX
   B. Plain soap
   C. Alcohol
   D. Iodophors

8. Alcohol solutions with _____ ethanol or isopropyl alcohols combined with emollients have been the most effective to minimize skin drying and reduce evaporation time.
   A. 60% to 70%
   B. 20% to 25%
   C. 100%
   D. 10% to 15%

9. The key to mandating any transformation in practice is _____.
   A. Product availability
   B. "Buy in" by the healthcare team
   C. Patient participation
   D. Administrative support

10. The argument for greater patient safety is extremely important for the successful implementation of alcohol handrub practices.
    A. True
    B. False

Answers to Review Questions & Section Sources:
1. C (Handwashing Compliance)
2. A (Handwashing Compliance)
3. D (Transient vs. Resident Organisms)
4. B (Chain of infection)
5. B (CDC Recommendations for Hand Hygiene Protocols)
6. A (CDC Recommendations for Hand Hygiene Protocols)
7. C (Alcohol Handrub)
8. A (Alcohol Handrub)
9. B (Implementation of an Alcohol Handrub Program)
10. A (Implementation of an Alcohol Handrub Program)

Evaluation Form

Study Guide 9: Alcohol Hand Sanitizer: The New Age of Hand Hygiene

Last Name

First Name/M.I.

RN/LPN/LVN License Number (Circle one: RN - LPN - LVN)

Non-RN: License or Social Security Number

Health Care Facility

Health Care Facility Street Address | City | State | ZIP Code

Current Home Street Address | City | State | ZIP Code

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Rate on a scale of: 1=low 5=high

To what extent did the study guide meet the 2 stated objectives below?

1. Discuss basic facts regarding the importance of good hand hygiene. [1] [2] [3] [4] [5]
2. Review the recommendations for hand hygiene using alcohol hand sanitizers. [1] [2] [3] [4] [5]
3. To what extent is this learning method easy-to-use? [1] [2] [3] [4] [5]
4. How much time was required to read the content, take the test, compare your answers and complete the evaluation form? _____ hours _____ minutes
5. Has the provider disclosed the conflict of interest or lack therof declared by the planners and content specialist? Yes_____No_____ (Review inside cover page)
6. Was the content presented without bias of any commercial product or drug? Yes_____No_____

I have completed all the requirements for this entire activity (please sign and date).

_____

Your signature is required to attest that you have completed the requirements for this activity.

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