American Red Cross

Scientific Advisory Council

ARC SAC Advisory
Hand Hygiene for General Public

Overall Recommendation:

Hand hygiene guidelines have been available for health care workers for many years. The American Red Cross Scientific Advisory Council is recommending improved hand hygiene practices, for three population groups. These three groups are: first aid providers (professional and lay), home care givers and the general public. Improved hand hygiene, including handwashing following contact with contaminated individuals is recommended in order to reduce the transmission of pathogenic microorganisms. Additional recommendations for handwashing technique, skin care and gloves are also provided.

Recommendations for Hand Hygiene for the General Public:

Indications for hand washing and hand sanitizing

1. When hands are visibly dirty or contaminated with biological material or are visibly soiled with blood or other body fluids, food, or other organic matter, wash hands with either a non-antimicrobial soap and water or an antimicrobial soap or water
2. If hands are not visibly soiled, use an alcohol based hand rub for decontaminating hands or alternatively wash hands with an antimicrobial soap and water
3. Decontaminate hands after contact with any body fluids or excretions, mucous membranes, non-intact skin or wound dressings or intact skin
4. Decontaminate hands after contact with inanimate objects in the vicinity of an contaminated person
5. Before eating and after using a restroom, wash hands with a non-antimicrobial soap and water or with a antimicrobial soap and water
6. **Soap and alcohol-based hand rubs should not be used simultaneously**

Hand hygiene technique

1. When decontaminating hands with an alcohol-based hand rub, apply product to the palm of one hand and rub hands together, covering all surfaces of hands and fingers until hands are dry. Follow manufacturer's recommendations regarding volume of product to use.
2. When washing hands with soap and water, wet hands first with water, apply an amount of product recommended by the manufacturer to hands and rub hands together 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 towel to turn off the faucet.
3. Liquid, bar, leaflet or powdered forms of plain soap are acceptable when washing hands with a non-antimicrobial soap and water.
4. Multiple-use cloth towels of the hanging or roll type as well as air dryers are not recommended for drying. Rather use disposable paper towels.

Skin care

1. Hand lotions or creams can be used to minimize the occurrence of irritant contact dermatitis associated with repeated hand sanitizing or hand washing**. NOTE:** this recommendation was included in the CDC Guideline, but may not be necessary for lay rescuer guidance where repeated hand washing is unlikely.

Other aspects of hand hygiene

1. Wear gloves when contact with blood or other potentially infectious materials, mucous membranes and non-intact skin occur.
2. Remove gloves after caring for a sick person. Do not wear the same pair of gloves for the care of more than one person an**d do not wash glov**es between uses with different people**. NOTE:** this guidance may not be necessary for the lay rescuer.
3. Remove all jewelry and sanitize separately. **NOTE: the professional resc**uer should remove all jewelry before care however this ca**n**not be done for the general public. Literature evidence indicates that jewelry can negatively impact the efficacy of hand hygiene
4. If artificial fingernails, extenders or natural fingernails beyond ¼ inch are worn, additional care must be given to washing beneath the nail **(No recommendation)**.

Overview:

It is generally recognized that good hand hygiene is effective in reducing the spread of infection, however there is a lack of scientific evidence which definitively demonstrates this. A number of options are available to lay rescuers and the general public for hand hygiene. No universal consensus exists on the types of hygiene agents, quantity of use, time required or application/washing technique. Each of these factors is thought to have an impact on adherence. The Centers for Disease Control (CDC) have provided Guidelines for Hand Hygiene in Health Care Settings (2002) which is based on a thorough review of the literature since publication of the last guidelines in 1985.

In 2005 two literature searches were conducted. First an on-line search of "Evidence Based Medicine" EMB reviews from 1966 to October 2005 was performed in the following databases: EBM Reviews; Cochrane Database of Systematic Reviews; ACP Journal Club; Database of Abstracts of Reviews of Effects; Cochrane Central Register of Controlled trials and Ovid Healthstar. Search terms included: hand sanitizers, hand hygiene, handwashing, antibacterial, soap and gel. The second literature search was conducted in the following databases: CAB Abstracts 1972-present, Biosis 1969-present, Current Contents 1995-present, Derwent Drug File 1983-present, Embase 1974-present, Medline 1951-present, Pascal 1973-present, SciSearch 1974-present, ToxFile 1965-present Chemical Abstracts 1967-present, Japanese Science and Technology 1985-present and Dissertation Abstracts 1861-present. Search terms for this literature search included: resistance, tolerance, antiinfectives, antibacterial, antiviral, disinfective, effectiveness, susceptibility. The Center for Disease Control's (CDC) 2002 report "Guideline for Hand Hygiene in Health Care Settings" provided additional sources for the development of this statement.

Summary:
A literature search was completed to examine the effective use of hand sanitizers by both professional and lay emergency responders. There is a certain amount of variability in the definition of terms used in hand hygiene practice. Hand hygiene is a general term that encompasses handwashing (also referred to as "scrubs"), antiseptic handwashing, antiseptic hand rub (with either liquids or gels) and surgical hand antisepsis (CDC, 2002). For the purposes of this review hand sanitizer/sanitization will not include handwashing which is defined as washing hands with plain (ie., non-antimicrobial) soap and water. (CDC, 2002).
While there are no published studies of hand hygiene efficacy in reducing illness rates or disease transmission in professional or lay rescuers, it is well established that hand hygiene programs reduce the spread of infections. Studies have shown lower rates of infection in health care institutions after introduction of hand antisepsis programs, (Larson et al 2005; Massanari and Hierholzer, 1984; Gordin et al., 2005). Montville et al., (2002) examined the literature related to hand washing in order to determine those factors that would influence bacterial levels on the hands of food service workers. They concluded that while a number of factors influence final counts on the hand, that hand washing generally reduces the risk of bacterial contamination. Several studies also demonstrated the effectiveness of hand hygiene programs in reducing illness related absenteeism in elementary schools (Hammond et al., 2000) and university residence halls (White et al., 2003). Meadows and LeSoux conducted a systematic review of the literature related to the effectiveness of antimicrobial rinse free hand sanitizers in reducing absenteeism in school children and reported that while all studies reported statistically significant reductions due to the use of hand gel, none of the available studies were properly conducted, blinded and randomized clinical trials. Sandora et al., (2005) in a randomized controlled trial demonstrated a reduction in gastrointestinal (but not respiratory) illness rates in homes after introduction of a hand hygiene program that included an alcohol-based sanitizer and hand hygiene education.

Hand washing technique has a significant effect on the overall efficacy of any hand hygiene program. Widmer and Dangel (2004) concluded that not washing for the recommended amount of time and cleaning all surfaces of the hands and fingers are two aspects of hand washing that are often poorly performed. Lin et al., (2003) compared several hand washing techniques and hand washing and antisepsis products for their ability to remove *E.coli* or caliciviruses. They determined that the greatest reduction in microbial populations was seen after hand washing with a nail brush using soap and water and that the least reduction was obtained from using alcohol-based hand rub. They further recommend not wearing artificial nails or extenders and maintaining shorter length natural nails.

Other factors considered in implementing a hand hygiene program include, compliance and cost. Wendt et al., (2004) reported that compliance with hand hygiene varied as a function of type of health care worker (physician versus nurse), type of activity (higher compliance with more riskier activities) and location in hospital (higher compliance in less busy wards than ICUs). Repeated hand washing and hand washing has been associated with skin dryness and irritation (CDC, 2002). Pittet et al., (2004) demonstrated that the cost of hand hygiene promotion is less than 1% of the costs associated with nososcomial infections.

The CDC (2002) reviewed the efficacy of different preparations used for hand hygiene in developing their Guidelines. The reviews considered the following: alcohol-based antiseptics, plain (non-antimicrobial) soap, chlorhexidine, chloroxylenol, hexachlorophene, iodine and iodophors, quaternary ammonium salts, triclosan and other compounds. Performance results varied as a function of the methodology used to determine efficacy, microbial agent, and length of time as well as technique for hand washing or sanitizing. In 2009 the WHO also reviewed efficacy of different preparations used for hand hygiene in developing their Guidelines. The WHO and CDC were consistent in the recommendations for hand hygiene provided.

Different methods have been employed to study both the in vitro and in vivo efficacy of hand washing and hand antisepsis. The FDA regulates antiseptic hand washing products based on requirements outlined in the Tentative Final Monograph for Healthcare Antiseptic Drug Products (known as the TFM) (1994). Products are considered efficacious if they result in a 2-log10 reduction of the indicator organism (*Serratia marcescens*) on each hand within 5 minutes after the first use and a 3-log10 reduction of the indicator organism on each hand after the 10^{th} use. In the EU, the efficacy of hand hygiene products is regulated by the European EN 1500 Standard (1997). In this standard, product efficacy is established for a product if it results in performance equal to disinfection with 60% isopropyl alcohol (approximately 4-log10). Kramer et al., (2002) tested 14 different alcohol-based hand gels or hand rinses according to the EU EN 1500 Standard and found that while the bacterial reduction factors of the gels ranged from 2.13-log10 to 4.09-log10, none of the hand gels met the same level of activity as the reference standard. Each of the hand rinses did meet the EN1500 requirements however, prompting the conclusion that hand gels should not replace alcohol–based liquid disinfectants in hospitals. No scientific studies have established standard tests of efficacy of products for viruses or fungi and no scientific studies have been conducted to determine the extent to which microorganisms on hands need to be reduced (1-log10 to 4-log10 or 90% to 99.99%) in order to minimize their transmission (CDC, 2002; Diekema, 2002).

Alcohol-based products are generally the most efficacious for broad spectrum hand antisepsis in the health care sector (CDC, 2002). Alcohol acts to denature proteins and solutions containing between 60-95% alcohol are most generally effective (Larson and Morton, 1991). The majority of products utilize either isopropanol or ethanol or a combination of these with n-propanol along with other antiseptic agents. Alcohols have excellent efficacy against gram positive and gram negative bacteria, M. tuberculosis, fungi and certain enveloped viruses including: herpes simplex, HIV, influenza and Hepatitis B (CDC, 2002). They are less efficacious against non-enveloped viruses (Rotter, 2001), but are effective against rotavirus (Ansari et al., 1989; Bellamy et al., 1993), and rhinovirus (Hendley et al., 1978). Wolff et al., (2001) tested two alcohol-based disinfectants against Hepatitis A using an in vitro suspension test. They found that although the disinfectants caused a 1.8-3-log10 reduction in virus titre, they did not achieve the required 4-log 10 reduction necessary for virucidal activity in accordance with German guidelines. Alcohols are not effective against bacterial spores. Alcohol based products are not appropriate for use when hands are visibly dirty or contaminated with proteinaceous materials (Larson and Bobo, 1992). Efficacy is also dependent on contact time, volume of alcohol used and whether or not the hands are wet when applied (CDC, 2002).

In making hand hygiene recommendations for emergency responders, separate consideration should be given to the general public, lay responder and professional rescuers. For professional, it is recommended that the Guidelines for Hand Hygiene in Health Care Settings be followed (CDC, 2002). The CDC Guidelines are designed for use in health care settings and are not intended for use in food processing or food service establishments. For the general public, the following subset of the Guidelines are recommended:

Footnote

Each recommendation in the CDC Guidelines is categorized on the basis of existing scientific data, theoretical rationale, applicability and economic impact. The system categories are as follows:

IA. Strongly recommended for implementation and strongly supported by well designed experimental, clinical or epidemiologic studies.

IB. Strongly recommended for implementation and supported by certain experimental, clinical or epidemiologic studies and a strong theoretical rationale.

IC. Required for implementation, as mandated by federal or state regulation or standard

II. Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretical rationale.

No recommendation. Unresolved issue. Practices for which insufficient evidence or no consensus regarding efficacy exist.