B1.1.3 What product should be used?

Existing guidelines (WHO 2009; Boyce and Pittet 2002; Pratt et al 2007; Canada Standards and Guideline Core Committee 2008; PIDAC 2008) and literature reviews (Pittet and Boyce 2001; Picheansathian 2004; Rotter 2004; Nicolay 2006; Larmer et al 2008; Grayson et al 2009) agree that hand hygiene using alcohol-based hand rubs is much more effective against the majority of common infectious agents on hands than hand hygiene with plain or antiseptic soap and water.

One advantage of alcohol-based hand rubs is that they are easily accessible at point of care. They have (Grayson et al 2009):

- excellent antimicrobial activity against Gram-positive and Gram-negative vegetative bacteria, *Mycobacterium tuberculosis* and a wide range of fungi;
- generally good antimicrobial activity against enveloped viruses;
- lesser and/or variable antimicrobial activity against non-enveloped viruses (such as norovirus); and
- no activity against protozoan oocysts and bacterial spores (such as *C. difficile*) (see Section B2.2).

The range of antimicrobial activity in alcohol-based hand rubs varies with the alcohol compound (ethanol, isopropanol or n-propanol) used. Different alcohol species have different levels of activity (60% v/v n-propanol is approximately equivalent to 70% v/v isopropanol and to 80% v/v ethanol) and many commercial formulations consist of blends of different alcohol species. Most published clinical studies that have demonstrated reductions in HAIs with the use of alcohol-based hand rubs have been associated with products that contain at least 70% alcohol (isopropanol), 0.5% chlorhexidine and a skin emollient (Grayson et al 2009). However the efficacy of alcohol-based hand hygiene products is affected by a number of factors including the type of alcohol used, concentration of alcohol, contact time, volume of product used, and whether the hands are wet when the product is applied. These factors are generally assessed through testing standards for skin disinfectants, for which TGA is the regulatory body responsible for approving products for use in Australia.

Plain soaps act by mechanical removal of microorganisms and have no antimicrobial activity. They are sufficient for general social contact and for cleansing of visibly soiled hands. They are also used for mechanical removal of certain organisms such as *C. difficile* and norovirus.

When *C. difficile* and non-enveloped viruses are suspected or known to be present, use of alcohol-based hand rubs alone may not be sufficient to reduce transmission of these organisms. Alcohol-based hand rubs are effective at removing vegetative forms of *C. difficile*, but not effective at removing spores (Maiwald 2009). If gloves are worn during the care of patients in settings where *C. difficile* or non-enveloped viruses are suspected or known to be present, spore contamination of the hands will be minimal and alcohol-based hand rub remains the agent of choice for hand hygiene (Johnson et al 1990; Jabbar et al 2010). However, if gloves have not been worn or the hands are visibly soiled, they must be meticulously washed with soap and water and patted dry, to facilitate the mechanical removal of spores.

There is a tendency for antimicrobial soaps to be more effective than plain soaps, although the evidence around this is inconsistent. Antimicrobial soap is associated with skin care issues and it is not necessary for use in everyday clinical practice (Pratt et al 2001; Boyce and Pittet 2002; Pratt et al 2007.)

Neutral hand-wipe products may be considered in instances where hygienic access to soap and water is not readily available, such as in community care settings. Alcohol-based hand rubs are also suitable for use in resource-limited or remote areas with lack of accessibility to sinks or other facilities for hand hygiene (including clean water, towels etc.).

Choosing an alcohol-based handrub

It is necessary to choose products:

- that have excellent antimicrobial efficacy combined with good user acceptability and skin tolerability (dermal tolerance, fragrance, colour, texture and ease of use);
- that are TGA approved for skin antisepsis; and
- meet the requirements of EN1500 testing standard for bactericidal effect (which are currently referred to by TGA).

Healthcare worker acceptance of alcohol-based hand rub is a crucial factor in the success of any program to improve hand hygiene practice.
Several studies showed that user acceptability and skin tolerability tend to be determined by the overall hand rub composition (e.g. consistency as gel or rub, texture, fragrance) and by emollient additives, but both are largely independent of a formulation’s antimicrobial activity (Rotter et al 1991; Kramer et al 2002a; Girard et al 2006; WHO 2009). Even where emollient agents are present in the product, ready access to a moisturising skin-care product is essential (see Section B1.1.5). The selected alcohol-based hand rubs, soaps and moisturising lotions should be chemically compatible, to minimise skin reactions and ensure that the decontaminating properties of the hand hygiene product are not deactivated. It is advisable to purchase hand hygiene and hand-care products from a range made by a single manufacturer, as this ensures compatibility between the products.

Different healthcare workers and healthcare settings have different preferences, and the choice between a gel or liquid needs to be evaluated on an individual basis (Maiwald and Widmer 2007; Pittet 2007). In some healthcare facilities, it may be useful to offer both liquid and gel alongside each other, in order to provide a choice that suits a wide range of healthcare workers (Pittet 2007; Traore et al 2007, Girard R et al 2006). Some studies have noted that gel formulations have generally significantly less antimicrobial activity than liquid alcohol-based hand rub formulations, even if the total alcohol content is similar (Pietsch 2001; Kramer et al 2002b; Picheansathian 2004).

The Hand Hygiene Australia Manual (Grayson et al 2009) outlines the following alcohol-based hand rub features as important in influencing acceptability, as well as ready accessibility at each bedside and in all patient-care areas:

- **Fragrance and colour** — these may increase the initial appeal but may causes allergenic reactions, and are therefore discouraged;
- **Emollient agent(s) in the alcohol-based hand rub** — these should prevent skin drying and irritant skin reactions, but not leave a sticky residue on hands;
- **Drying characteristics** — in general, solutions have lower viscosity than gels and therefore tend to dry more quickly; and
- **Risk of skin irritation and dryness** — proactive and sympathetic management of this problem is vital.

There is some evidence to suggest that gels are preferred to solutions (WHO 2009), however it is important for staff to evaluate products themselves before implementation where possible. Even where emollient agents are present in the product, ready access to a moisturising skin-care product is essential. All hand hygiene products should be chemically compatible. It is advisable that hand hygiene and hand-care products are from a range made by a single manufacturer, as this ensures compatibility between the products.

### Other issues associated with alcohol-based hand rubs

Other factors that should be considered when choosing products include cost issues, availability, convenience and functioning of dispenser, and ability to prevent contamination. Consideration should also be given to occupational health and safety issues associated with alcohol-based hand rubs. Alcohols are flammable, and healthcare workers handling alcohol-based preparations should respect safety standards. Accidental and intentional ingestion and dermal absorption of alcohol-based products used for hand hygiene have also been reported (Roberts et al 2005; Brown et al 2007). The risk of these issues can be mitigated by appropriate placement of dispensers within the facility (see Section C; in addition, the Hand Hygiene Australia risk assessment form outlines the safety issues in more detail).

### Recommendations

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<tr>
<th>2 Choice of product for routine hand hygiene practices</th>
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<tr>
<td>For all routine hand hygiene practices in healthcare settings, use alcohol-based hand rubs that:</td>
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<tr>
<td>- contain between 60% and 80% v/v ethanol or equivalent; and</td>
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<td>- meet the requirements of EN1500.</td>
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<th>3 Choice of hand hygiene product when hands are visibly soiled</th>
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<td>If hands are visibly soiled, hand hygiene should be performed using soap and water.</td>
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<th>4 Hand hygiene for Clostridium difficile and non-enveloped viruses</th>
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<tr>
<td>Hand hygiene should be performed using soap and water when Clostridium difficile or non-enveloped viruses such as norovirus are known or suspected to be present and gloves have not been worn. After washing, hands should be dried thoroughly with single-use towels.</td>
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Effective hand hygiene relies on appropriate technique as much as on selection of the correct product. Inappropriate technique can lead to failure of hand hygiene measures to appropriately remove or kill microorganisms on hands, despite the superficial appearance of having complied with hand hygiene requirements.

Key factors in effective hand hygiene and maintaining skin integrity include (Boyce and Pittet 2002):

- the duration of hand hygiene measures;
- the exposure of all surfaces of hands and wrists to the preparation used (Widmer and Dangel 2004);
- the use of rubbing to create friction; and
- ensuring that hands are completely dry.

**Table B1.2: Use of alcohol-based hand rub**

- Apply the amount of alcohol-based hand rub recommended by the manufacturer onto dry hands.
- Rub hands together so that the solution comes into contact with all surfaces of the hand, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers.
- Continue rubbing until the solution has evaporated and the hands are dry.

**Table B1.3: Using soap (including antimicrobial soap) and water**

- Wet hands under tepid running water and apply the recommended amount of liquid soap.
- Rub hands together for a minimum of 15 seconds so that the solution comes into contact with all surfaces of the hand, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers.
- Rinse hands thoroughly under running water, then pat dry with single-use towels.