Title

Clinical guideline for hand hygiene in hospital staff

Working group

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Date and approval

Approved 3rd April 2009 by:

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Revision date: January 2011.

Target Group

Hospital staff in clinical wards with patient contact and staff who perform clean or un-clean procedures related to patients or patient surroundings (1-3).

Summary

Background
Hand hygiene is considered one of the most important measures in the prevention of spreading of pathogens in hospitals to avoid hospital acquired infections. We found strong evidence for alcohol-based handrubbing compared with traditional hand washing. The most important recommendation in this guideline is the use of alcohol-based handrub before and after procedures during hospital care. Unfortunately, adherence to hand hygiene remains low in hospital staff.

Target group
Hospital staff in clinical wards with patient contact and staff members who perform clean or un-clean procedures related to patients or patient surroundings.

Purpose
To increase the level of adherence to hand hygiene in order to prevent hospital acquired infections.

1 The working group who performe the 1 edition of the guideline in 2004 consisted also of infection control nurse Kirsten Pedersen, nurse Vibeke Dabelsteen, radiographer Dina Due, nurse Hanne Andersen, nurse Lene Jensen, nurse Dorthe Toft Christensen and assistant matron Gitte Eltzholtz Aarhus University Hospital Skejby, Denmark.
Recommendations
When and how to
- perform alcohol-based handrubbing
- perform handwashing
- use non-sterile gloves
- perform skin care,
as well as other aspects related to correct performance of hand hygiene.

Monitoring of hospital staff includes performance of alcohol-based handrubbing before and after a procedure; use of gloves; and wearing hand jewellery or watches.

Background
In Denmark, it is estimated that more than 100,000 patients annually get a hospital acquired infection corresponding to 10% of all admitted patients (4). Hospital acquired infections cause longer in-hospital stay, unwarranted patient suffering, and increase the economical burden of the health care system (5;6). Microorganism can be transferred from the hospital environment and between patients via the hands of hospital staff (18;19). Hand hygiene is considered one of the most important measures for preventing the spread of pathogens in hospitals (1;7-14). About a third of hospital acquired infections are preventable by a broad range of efforts, whereas hand hygiene is an important factor (15-17). Unfortunately, studies confirm adherence to hand hygiene remains low among hospital staff (1;20-23).

Problem statement
It is documented that adherence to hand hygiene is low in hospitals. The consequence of insufficient hand hygiene is an increased risk of cross-transmission with microorganisms (14;24). Hand hygiene should be encouraged by a multimodal and an interdisciplinary approach (7;25).

Among the reasons for low adherence to hand hygiene are:
- lack of organisation and leadership in hand hygiene
- dry skin on hands
- lack of knowledge of the principles of hand hygiene
- scepticism concerning the value of hand hygiene
- high workload (1;21;26-31).

Definitions (1;32)
Hand hygiene: Action for the purpose of physically or mechanically removing of dirt, organic material with microorganism on hand and wrists of hospital staff.

Clean procedure: Action in which there is a limited but acceptable risk of contaminating the hands and wrists or the hospital surroundings with potential pathogenic microorganism. Furthermore, action in which it is important to prevent from exogenous contamination with microorganisms.

Unclean procedure: Action in which there is a risk of contaminating the hands and
wrist or the hospital surroundings with potential pathogenic microorganism.

Gloves (non-sterile): Gloves used to protect the patient and staff from contamination with potential pathogenic microorganisms.

Skin care: Action to prevent the risk of drying out skin on the hands

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<th>Purpose</th>
<th>1. To increase the level of adherence to hand hygiene in order to prevent hospital acquired infections (1;7;8;14)</th>
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| Methods | **Systematic review questions**  
*What is the evidence that contaminated hands are a cause of hospital acquired infections?*  
*Which hand cleaning agents are the most effective at removing/reducing potential pathogenic bacteria?*  
*When must hands be cleaned in relation to patient care activities?*  
*What is the most effective hand washing/handrubbing technique for removal/reducing microorganisms on hands?*  
*Which hand cleaning agents are least toxic to hospital staff hands?*  
*How can contamination of hands be prevented?*  
*When and how should gloves be used?*  
*What are the prerequisites for performing correct hand hygiene?*  

**Literature search**  
Systematic search of the literature was done during winter 2008-2009 from 1985 to 2009 in Cochrane, PubMed, Embase, Cinahl, SweMed and the Danish article base. Search terms used were: Infection control, cross infection, hand hygiene, hand rub, handrubbing, alcohol-based handrub, hand wash, handwashing (MESH), non-sterile gloves, hand cream, hand emollient, nails, skin and corresponding Danish searching terms. National and international guidelines were also included.

**Strategy for selection and validation of the literature**  
We searched primarily for studies with the highest strength of evidence from meta-analysis or randomised controlled trials (RCTs). Studies with lower evidence were included when RCTs were lacking. We also included identified papers reference lists. The literature was validated independently and jointly by the two persons in the working group. Selection of papers was done by consensus. Furthermore, we used consensus to formulate the recommendation and when choosing indicators and standards. The latter also considering what can be monitored realistically.

**Discussion**  
The literature about hand hygiene consider if improved hand hygiene reduces the number of hospital acquired infections. We found no RCTs on this topic. Present studies are primarily observational studies, comparing proportions or rates of hospital acquired infections in two consecutive observation periods before and after implementation of hand hygiene interventions. The studies differed
in the terms of setting; the way infections were measured; differences in baseline, type and number of infections enrolled; length of observation period; and the used hand hygiene intervention. The weaknesses of the studies included lack of blinding, no confounder control and invalid method of measurements. Best evidence remains a more than 150 years old historical controlled trial by I. Semmelweis (24).

The literature about hand hygiene also considered the effectiveness of different hand hygiene procedures on prevention or removal of microorganisms on hands. The following provides a short review of the literature constituting the background of this clinical guideline.

**Alcohol-based handrub**: RCTs showed that alcohol-based handrub are significantly more efficient in reducing microorganisms on hands compared with water and soap (22;26;33;34). Moreover, alcohol-based handrub are significantly more gentle to the skin on hands due to the added emollient (35), and it is faster to use than water and soap (28). A controlled trial (36) and a cross-sectional study (37) showed that correctly performed alcohol-based handrubbing reduces significantly more bacterial counts on hands than incorrectly performed alcohol-based handrubbing. Several controlled trials (14;18;38) and two reviews (2;3) documented that alcohol-based handrubbing should be performed before and after direct and indirect contact with patients and patient surroundings. Alcohol-based handrub are inactivated by proteins in body fluids (1).

**Handwashing**: RCTs demonstrated that handwashing is significantly more effective to remove visible dirt on hands than alcohol-based handrubbing. (15;39-41). RCTs documented how handwashing should be performed (39;42). There is inconsistency and lacking evidence on how to dry hands after handwashing. But it seems important to press hands into the single use paper towel instead of rubbing to reduce friction of the skin (32;43). Controlled studies confirm that handwashing always should be followed by alcohol-based handrubbing since handwashing dries out the skin and thus risking contamination and possible colonisation of the skin on hands (44;45).

**Non-sterile gloves**: A RCT illustrated that gloves should be worn to prevent contamination of hands with body fluids (46). A cross-sectional study recommends the use of gloves made of latex (nitrile when allergic to latex), since those materials have less pin-holes, fits the hands better, and are stronger materials than vinyl or plastic materials (47). Cross-sectional studies demonstrated that gloves should be intact during performance of clinical procedures (47;48); should be removed after a patient procedure (49;50), and should be changed between patients and during patient care if moving from a contaminated body site to a clean body site within the same patient to prevent the spread of microorganism (51). There are no clinical studies, but a guideline, illustrating how gloves should be removed to
prevent contamination of the hands from the outside of the gloves (52). But cross-sectional studies showed that hands get contaminated by glove wearing and during removal of gloves, whereby alcohol-based handrubbing should follow the use of gloves to reduce the risk of cross-transmitting potential pathogens during hospital care (47;48;53).

Skin care: RCTs documented that hand-care prevents dryness of the skin. Dry skin on hands has a higher risk of being contaminated (54;55).

Prerequisites for performing correct hand hygiene
Hand jewellery: A RCT showed increased deposit of microorganisms under rings with the risk of cross-transmitting pathogens during hospital care (56).

White coat: Cross-sectional studies illustrated that between 1/3 - 1/4 of white coats of hospital staff get contaminated with potential pathogenic bacteria during care (57-59). This contamination was mostly related to cuffs/sleeves and pockets (58;60).

Wounds and bandage on hands: A national guideline do not recommend wearing of hand-bandage, arm-stocking and hand-brace during hospital care, since these avert correctly performance of hand hygiene increasing the risk of spreading microorganisms during hospital care (61). According to a national standard, the immediate leader is responsible for staff members with wounds on hands and wrists performing hospital care (27). The wound may be covered by a bandage and gloves should be used (41;62). Furthermore, the possible bandage and the gloves must be replaced and alcohol-based handrubbing performed between each procedure (41).

Nails: A controlled trial showed that artificial nails have a significantly increased risk of contaminating hands (63). The same pattern was shown with long nails in a cohort study (64). There is not enough evidence to prohibit the use of nail polish according to a meta-analysis (65;66). Nevertheless, a national standard described that frequent hand washing increases the risk of the nail polish not being intact (after 2 days) which may increase the risk of contaminating the hands (32).

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<tr>
<td><strong>Alcohol-based handrubbing</strong></td>
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<td><strong>Indications for alcohol-based handrubbing</strong></td>
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- after unclean procedures (18;38)(B)
- after the use of gloves (47;48;53)(C)
- after handwashing (44;45)(B)

**Handrubbing technique**
- apply 3-5 mL (2 pump pushes) of alcohol-based handrub (26;33;34)(A)
- rub the alcohol-based handrub palm to palm, around the fingertips and thumbs, around the wrists and on the back of the hands, and between fingers (34;46)(A)
- the handrubbing must continue for about 30 seconds (until dryness) (22;34;56)(A)

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<tr>
<td>- when hands are visibly soiled with blood, secretion, excretions or other biological materials (15;39-41)(A)</td>
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<tr>
<td>Handwashing should always be followed by alcohol-based handrubbing (44;45)(B)</td>
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**Handwashing technique**
- wet hands and wrists with water (cold or lukewarm)
- apply 1-2 pump pushes of soap (39)(A)
- rub mechanically the water and soap palm to palm, around the fingertips and thumbs, around the wrists and on the back of the hands, and between fingers for about 15 seconds. Rinse thoroughly with water (39;42)(A)
- hands and wrists should be carefully pressed dry with a single use paper towel (32;43)(D)

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<th>Non-sterile gloves</th>
<th>Indications for glove use</th>
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<td>- risk of possible contact with blood, secretions, excretions and other biological materials (46)(A)</td>
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<td>- if the staff member has clean wounds on hands and wrists (44;45)(B)</td>
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**Use of gloves**
- perform alcohol-based handrubbing before taking gloves out of the dispenser (14)(B)
- during procedures, gloves must be intact (47;48)(C).
- remove the gloves immediately after ending each procedure (49;50)(C)
- change gloves between procedures and between patients (51)(C)
- remove gloves by grabbing one cuff and turning the inner part of the glove outside. Repeat with the other glove (52)(D)
- perform alcohol-based handrubbing after glove use (48;50;51)(C)
- it is allowed to change gloves without performing alcohol-based handrubbing during short procedures with the same patient, if the gloves in advance are taken out of the dispenser, and if moving from a clean body site/clean procedure to an unclean body site/procedure
| **Skin care** | To prevent dryness of the skin on hands, supply with a hand lotion or cream whenever needed (54;55)(A) |
| **Other aspects of hand hygiene** | **Hospital staff with patient contact or performing clean or unclean procedures must**<br>- wear white coat/uniform with short sleeves (57-60)(C).<br>- not wear rings, watches or bracelets (56)(A).<br>- not wear arm-stocking, hand-brace or hand-bandage (61)(D).<br>- have a wound on hands or wrists evaluated by the immediate responsible leader (27)(D)<br>- cover clean wounds on hands and wrists with gloves and a possible bandage (41;62) (D). After ending a procedure, remove the glove and possible bandage and perform alcohol-based handrubbing. If the wound is bleeding, wash hands followed by alcohol-based handrubbing (41)(A).<br>- have visible clean, whole and short nails (64)(68) (B).<br>- not use nail polish (32)(D)<br>- not use artificial nails (63;64)(B). |
| **Monitoring** | **Indicators (standards %)**<br>1. Proportion of performed alcohol-based handrubbing before clean procedures (85%)<br>2. Proportion of performed alcohol-based handrubbing after unclean procedures (85%)<br>3. Proportion of used gloves by risk of contact with body fluids or other biological material (95%)<br>4. Proportion og hospital staff not wearing rings, watches or bracelets (98%)<br>The monitoring is accomplished by an annual observation study. |
| **Updating** | Elisabeth Lund is responsible for revision and updating in January 2011. Literature search will be updated for the period from year 2009 to 2011 and the recommendations and indicators/standards will be adjusted according to the literature and the results from audits. |
| **Formal requirements** | Title: Clinical guideline for hand hygiene (10 pages)<br>Search words: hand hygiene, alcohol-based handrubbing, alcohol-based handrub, hand washing, gloves, skin care |
References


(61) Armstrømper og håndskinner. CAS-NYT 2003;96.


