

A guide to surgical hand antisepsis

Proof (evidence)

Alcohol hand rubs are gaining popularity as a surgical scrub replacement as they save time, water and money. In a Saudi randomised controlled equivalent trial of 500 patients undergoing clean and clean/contaminated surgery, surgical site infections (SSIs) occurred in 8 (2.94%) of patients in the traditional surgical scrub compared to 12 (5.33%) in the alcohol-based hand rub (following an initial scrub when commencing the surgical list) (Al-Naami et al 2009). The authors claimed that alcohol hand rub was as effective and was preferred by the surgeons. A one year retrospective analysis of cardiac surgery infection rates in a Canadian theatre showed comparable infection rates between the two methods (Marchand et al 2008). Sixty nine SSIs in 2,084 operations (3.31%) with standard scrub compared to 78 SSIs in 2,175 operations (3.59%). The study also showed high compliance acceptability as well as cost savings.

The reader is directed to a paper on scrub products' performance requirements compared to their clinical relevance for more detail on the efficacy of surgical scrubs (Paulson 2004). In reality there will be a limited number of products available for surgical scrub from the hospital pharmacy. It is anticipated that the products will comply with safety requirements.

A systematic review that examined surgical hand antisepsis to reduce SSIs found only one randomised control trial RCT which compared a surgical scrub with an alcohol rub and this demonstrated equivalence in the number of SSIs between the groups (Tanner et al 2008). The other nine trials included in the review measured hand contamination rather than SSI. Three RCTs which compared aqueous surgical scrubs showed that aqueous chlorhexidine gluconate is significantly more effective than povidone iodine in reducing colony-forming units CFUs, but this cannot be extrapolated into a reduction in SSIs (Tanner et al 2008).

Duration of the scrub procedure was also included in the review. The evidence was based on CFUs not SSIs and centres around two to three minutes supported by recent surgical specialist consensus (Parvizi et al 2013).

Protecting the environment

Many theatres are now equipped with electronic sensors ensuring that water flows only when required. A study by Peterwood and Shridhar (2009) examined the amount of water used in a five minute 'taps on' scrub (1.5L) compared to a 'taps off' scrub (4.5L). Turning the taps off intermittently showed a saving of 1.1L or 71%. This study was undertaken in Australia where the drought imperative stimulated the research. It confirmed the findings of a similar study by Sommer et al (2008). The take home message is that expensive equipment is not necessary and the use of mixer taps with knee/foot controls will save money and help the environment.

Dispensers should be checked to ensure that they deliver the correct amount of the product according to the manufacturers' recommendations. Overuse of surgical scrub will not result in greater effectiveness and over time it may cause irritation and will cost to the organisation and the environment. Partially empty dispensers should not be 'topped up' as contamination may occur.

Products

1. **Antimicrobial activity** - this should include destruction of a broad spectrum of pathogenic organisms.
 2. **Persistent activity** - the antimicrobial agent should be long lasting especially for longer cases.
 3. **Safety** - the agent should be safe for the skin and eyes of the person using it, as well as being non-irritating and sensitising. The environment also needs to be considered as the agent may have long term harmful effects.
 4. **Acceptance** - this is a more subtle characteristic which may include colour, smell and feel and is required for antiseptic uptake by the surgical team. Acceptance should not be underestimated.
- Three types of antiseptic solutions are available (Tanner et al 2008):
1. **Aqueous scrubs** - usually contain chlorhexidine gluconate or povidone iodine. Using aqueous solutions require a surgical scrub (see 'process' section).
 2. **Alcohol rubs** - three main types of alcohol ethanol, isopropanol and n-propanol. This involves rubbing the alcohol solution into the hands systematically following removal of visible soiling or a preliminary hand wash.
 3. **Alcohol rubs containing additional active ingredients** - these include chlorhexidine gluconate, iodophors, biguanides and phenolic compounds such as hexachlorophene and triclosan.

References and further reading

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A guide to surgical hand antisepsis

Purpose

The purpose of the surgical hand antisepsis is to remove or destroy transient microorganisms and inhibit the growth of resident microorganisms (Tanner et al 2008).

Preparation of personnel and personal protective equipment prior to scrub process

All staff should be in the appropriate theatre attire before commencing surgical hand antisepsis. Expert opinion asserts that headwear (AfPP 2011), masks (AORN 2014) and attire should be comfortable, safe and unlikely to need adjustment after the scrub procedure thus avoiding potential contamination. Scrub suit sleeves must be rolled up well past the elbows and nail varnish, false nails, rings, watches and bracelets should be removed. Expert opinion (AfPP 2011) proposes that this type of accessory is likely to harbour pathogenic organisms which could contaminate surgically scrubbed hands and arms (NICE 2008). Any skin abrasions to digits, hands or arms must be occluded with a waterproof dressing. Wear appropriate mask and eye protection or a face shield as guided by local governance (AfPP 2011) to protect mucous membranes of the eyes, nose and mouth during procedures that are likely to generate splashes or sprays of blood, body fluids, secretions or excretions.

Select an appropriate sized surgical gown and double glove system as recommended by Tanner and Parkinson (2006). Peel open outer wrapper of gown pack, lay this on gowning station, scrub up ledge or trolley surface. Place gloves close by ready for circulator to peel open for you.

Procedure

Nail picks are recommended in UK theatre practice (AfPP 2011), nails are cleaned in the subungual area, however if nails are too short, then a nail brush is recommended. Nail brush use, other than directly to nails, is not recommended (AfPP 2011). In US literature (CDC 2002) brushes were advocated to commence the procedure; hence the outdated term of 'scrubbing' which lingers on.

Process

Each step of surgical 'scrubbing' consists of five strokes rubbing backwards and forwards and adapts Ayliffe's six step technique (Ayliffe et al 2000) into nine steps. Sources of evidence drawn on include AfPP's Standards and Recommendations for Safe Perioperative Practice (AfPP 2011), AORN's recommended practices (Paulson 2004), and Ayliffe's six step hand washing technique (Ayliffe et al 2000).

Preliminary wash

For the first antisepsis of day the hands should be washed with plain soap or an anti-microbial solution under running water before beginning the surgical hand antisepsis (AfPP 2011).

The temperature and flow of the water must be adjusted before the procedure is started to achieve comfort and avoid getting the scrub suit wet. Open nail brush and pick pack.

Ensuring that no part of the sink or taps is touched wet the hands and arms up to the elbow working from the fingertips towards the elbow in one direction only, keeping the hands higher than the elbows.

Wash hands and arms with a dose of antimicrobial solution (5mls) or plain soap (if using alcohol) up to the elbow, working from the fingertips toward the elbows.

Load brush with antiseptic and clean tips of finger with brush.

Use pick to gently remove debris from underneath tips of nails on each hand, and then discard.

Rinse hands and forearms up to elbow.

Surgical scrub

During each of the following steps keep hands (clean area) above the elbows (dirty area) allowing water to drain away, avoid splashing surgical attire.

Step 1

Apply appropriate amount of appropriate solution: 5ml dose from dispenser (one downward stroke action). Work into hands palm to palm and to encompass all areas of the hands and arms to just below the elbows as follows:



Step 2

Right palm over back of left and vice versa with fingers interlaced.



Step 3

Rub palm to palm, fingers interlaced.



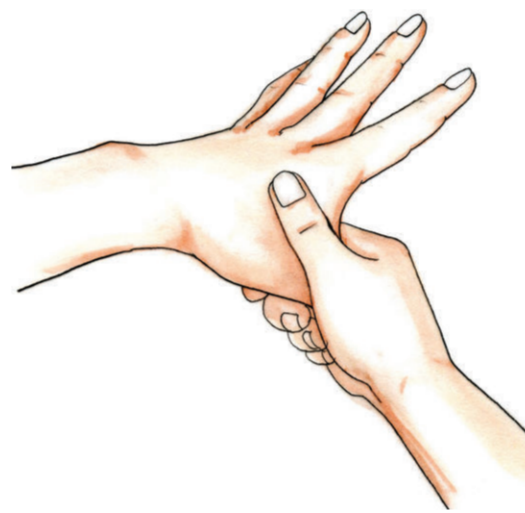
Step 4

Rotational rubbing backwards and forwards with clasped fingers of right hand into left palm hand and vice versa.



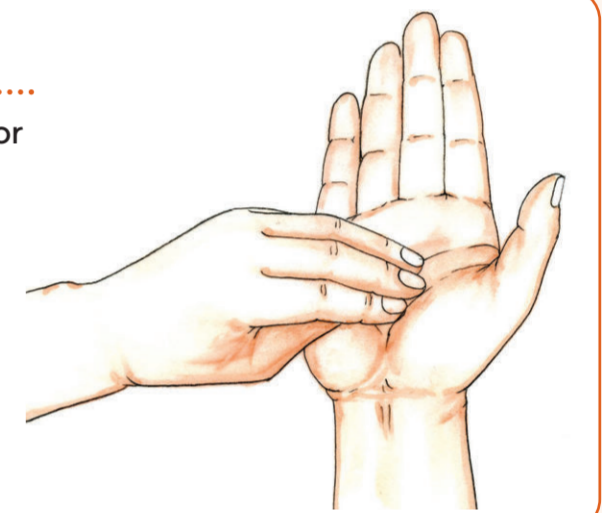
Step 5

Rotational rubbing of right thumb clasped in left hand and vice versa.



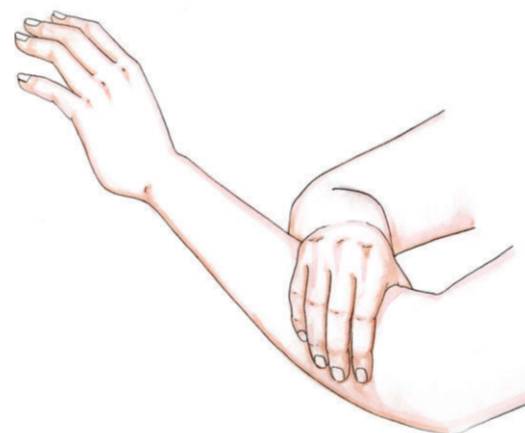
Step 6

Rub finger tips on palms for both hands.



Step 7

Continue with rotating action down opposing arms, working to just below the elbows.



Step 8

Rinse and repeat steps 1-7 keeping hands raised above elbows at all times.

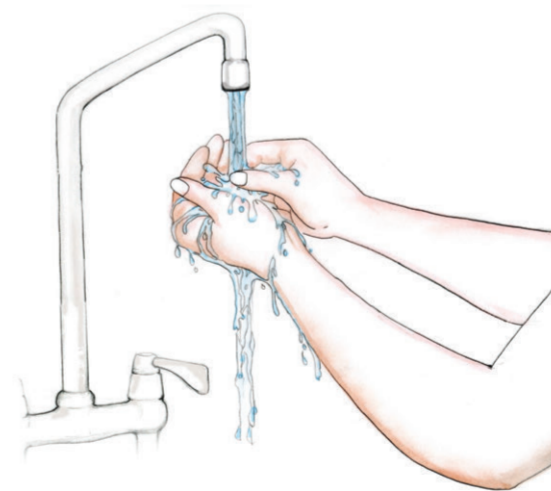
This wash should now only cover two thirds of the forearms to avoid compromising cleanliness of hands.

Local policy may include repeating these steps a third time but to wrists only.

Step 9

Rinse hands under running water – clean to dirty area. Turn off tap using elbows if necessary.

Open gown pack into a squared off surface and take a hand towel. Hands are dried first by placing the opposite hand behind the towel and blotting the skin, then, using a corkscrew movement, to dry from hand to elbow. Discard towel. Using a second towel, repeat the process on other hand and forearm before discarding.



Surgical hand antisepsis: application of alcohol hand rub

(If local policy/governance dictates for subsequent hand antisepsis)

- Application of alcohol rub consists of five strokes rubbing backwards and forwards and adapts Ayliffe's six step technique (Ayliffe et al 2000).
- As above, follow steps 2 – 7.
- Allow alcohol to evaporate before donning gloves to avoid the risk of dermatitis.

Gowning and gloving

Gowning and gloving is achieved by using the closed gloving technique (AfPP 2011) and once prepared, the hands and arms should be kept at waist level as personnel move to the sterile field.