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[Intervention Review]

Surgical hand antisepsis to reduce surgical site infection

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ABSTRACT

Background

Medical professionals routinely carry out surgical hand antisepsis before undertaking invasive procedures to destroy transient micro-organisms and inhibit the growth of resident micro-organisms. Antisepsis may reduce the risk of surgical site infections (SSIs) in patients.

Objectives

To assess the effects of surgical hand antisepsis on preventing surgical site infections (SSIs) in patients treated in any setting. The secondary objective is to determine the effects of surgical hand antisepsis on the numbers of colony-forming units (CFUs) of bacteria on the hands of the surgical team.

Search methods

In June 2015 for this update, we searched: The Cochrane Wounds Group Specialized Register; The Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library*); Ovid MEDLINE; Ovid MEDLINE (In-Process & Other Non-Indexed Citations) and EBSCO CINAHL. There were no restrictions with respect to language, date of publication or study setting.

Selection criteria

Randomised controlled trials comparing surgical hand antisepsis of varying duration, methods and antiseptic solutions.

Data collection and analysis

Three authors independently assessed studies for inclusion and trial quality and extracted data.

Main results

Fourteen trials were included in the updated review. Four trials reported the primary outcome, rates of SSIs, while 10 trials reported number of CFUs but not SSI rates. In general studies were small, and some did not present data or analyses that could be easily interpreted or related to clinical outcomes. These factors reduced the quality of the evidence.

SSIs

One study randomised 3317 participants to basic hand hygiene (soap and water) versus an alcohol rub plus additional hydrogen peroxide. There was no clear evidence of a difference in the risk of SSI (risk ratio (RR) 0.97, 95% CI 0.77 to 1.23, moderate quality evidence downgraded for imprecision).

One study (500 participants) compared alcohol-only rub versus an aqueous scrub and found no clear evidence of a difference in the risk of SSI (RR 0.56, 95% CI 0.23 to 1.34, very low quality evidence downgraded for imprecision and risk of bias).

One study (4387 participants) compared alcohol rubs with additional active ingredients versus aqueous scrubs and found no clear evidence of a difference in SSI (RR 1.02, 95% CI 0.70 to 1.48, low quality evidence downgraded for imprecision and risk of bias).

One study (100 participants) compared an alcohol rub with an additional ingredient versus an aqueous scrub with a brush and found no evidence of a difference in SSI (RR 0.50, 95% CI 0.05 to 5.34, low quality evidence downgraded for imprecision).

CFUs

The review presents results for a number of comparisons; key findings include the following.

Four studies compared different aqueous scrubs in reducing CFUs on hands. Three studies found chlorhexidine gluconate scrubs resulted in fewer CFUs than povidone iodine scrubs immediately after scrubbing, 2 hours after the initial scrub and 2 hours after subsequent scrubbing. All evidence was low or very low quality, with downgrading typically for imprecision and indirectness of outcome. One trial comparing a chlorhexidine gluconate scrub versus a povidone iodine plus triclosan scrub found no clear evidence of a difference—this was very low quality evidence (downgraded for risk of bias, imprecision and indirectness of outcome).

Four studies compared aqueous scrubs versus alcohol rubs containing additional active ingredients and reported CFUs. In three comparisons there was evidence of fewer CFUs after using alcohol rubs with additional active ingredients (moderate or very low quality evidence downgraded for imprecision and indirectness of outcome). Evidence from one study suggested that an aqueous scrub was more effective in reducing CFUs than an alcohol rub containing additional ingredients, but this was very low quality evidence downgraded for imprecision and indirectness of outcome.

Evidence for the effectiveness of different scrub durations varied. Four studies compared the effect of different durations of scrubs and rubs on the number of CFUs on hands. There was evidence that a 3 minute scrub reduced the number of CFUs compared with a 2 minute scrub (very low quality evidence downgraded for imprecision and indirectness of outcome). Data on other comparisons were not consistent, and interpretation was difficult. All further evidence was low or very low quality (typically downgraded for imprecision and indirectness).

One study compared the effectiveness of using nail brushes and nail picks under running water prior to a chlorhexidine scrub on the number of CFUs on hands. It was unclear whether there was a difference in the effectiveness of these different techniques in terms of the number of CFUs remaining on hands (very low quality evidence downgraded due to imprecision and indirectness).

Authors' conclusions

There is no firm evidence that one type of hand antisepsis is better than another in reducing SSIs. Chlorhexidine gluconate scrubs may reduce the number of CFUs on hands compared with povidone iodine scrubs; however, the clinical relevance of this surrogate outcome is unclear. Alcohol rubs with additional antiseptic ingredients may reduce CFUs compared with aqueous scrubs. With regard to duration of hand antisepsis, a 3 minute initial scrub reduced CFUs on the hand compared with a 2 minute scrub, but this was very low quality evidence, and findings about a longer initial scrub and subsequent scrub durations are not consistent. It is unclear whether nail picks and brushes have a differential impact on the number of CFUs remaining on the hand. Generally, almost all evidence available to inform decisions about hand antisepsis approaches that were explored here were informed by low or very low quality evidence.

PLAIN LANGUAGE SUMMARY

Surgical hand antisepsis to reduce surgical site infection

What are surgical site infections and who is at risk?

The inadvertent transfer of micro-organisms such as bacteria to a patient's wound site during surgery can result in a wound infection that is commonly called a surgical site infection (SSI). SSIs are one of the most common forms of health care-associated infections for surgical patients. Around 1 in 20 surgical patients develop an SSI in hospital, and this proportion rises when people go home. SSIs result in delayed wound healing, increased hospital stays, increased use of antibiotics, unnecessary pain and, in extreme cases, the death of the patient, so their prevention is a key aim for health services.

Why use hand antisepsis prior to surgery?

There are many different points in the care pathway where prevention of SSIs can take place. This includes antiseptic cleansing of the hands for those who are operating on the patient. Surgical hand antisepsis is the focus of this review. The two most common forms of hand antisepsis involve aqueous scrubs and alcohol rubs. Aqueous scrubs are water-based solutions containing antiseptic ingredients such as chlorhexidine gluconate or povidone iodine. Scrubbing involves wetting the hands and forearms with water, systematically applying an aqueous scrub solution using either hands or sponges, rinsing under running water and then repeating this process. Alcohol solutions containing additional active ingredients are used to perform an 'alcohol rub'. Surgical teams systematically apply the alcohol rub solutions to their hands and allow it to evaporate. Alcohol is effective against a wide range of bacteria and other micro-organisms. Following hand

antisepsis, operating staff then put on gloves, which provide an important barrier between operating staff and the patient; however, because gloves can become perforated during surgery, it is necessary to have hands as germ-free as possible.

What we found

In June 2015 we searched for as many relevant studies that had a robust design (randomised controlled trials) as we could find and compared different types of hand antisepsis before surgery. We included 14 studies that compared a range of methods for performing surgical hand antisepsis. The two measures used to assess the effectiveness of treatments were the number of cases of SSIs in patients (presented in four included studies) and the number of viable bacteria or fungal cells (known as colony-forming units, or CFUs) on the hand of the person operating before surgery and after surgery (which is a way of counting the bacteria present on the skin surface). It is not clear whether the method of hand antisepsis influences the risk of SSI, as most of the studies were too small and had flaws. There was some evidence that hand antisepsis with chlorhexidine may reduce the number of bacteria on the hands of health professionals compared with povidone iodine. Importantly, we do not know what the number of CFUs on the hands tells us about the likelihood of patients developing SSIs. There was also some evidence that alcohol rubs with additional antiseptic ingredients may reduce CFUs compared with aqueous scrubs.

Up-to-date June 2015