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QUESTION 3: Does the technique, duration or agent used for surgical hand scrubbing by the surgeon and operating room personnel alter the patient's risk of surgical site infections/periprosthetic joint infections (SSIs/PJIs)?

RECOMMENDATION: Unknown. Surgical hand preparation should be performed either by traditional scrubbing with a suitable antimicrobial soap and water or by using a suitable alcohol-based hand cleansing agent.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 93%, Disagree: 5%, Abstain: 2% (Super Majority, Strong Consensus)

RATIONALE

Multiple reviews have been performed in order to study this matter, however none of these reviews have been able to show differences between different surgical hand antisepsis on SSIs rates. There is indicative evidence advocating alcohol-based hand rubs (ABHRs), which reduce colony forming units (CFUs) in hands better than traditional scrubbing as well as cause less skin damage in comparison [1–7].

A Cochrane database review was published in 2016 assessing the effect of different surgical hand antisepsis on preventing SSIs. They compared the effects of different techniques (i.e., hand rubbing vs. hand scrubbing), products (i.e., different formulations of ABHRs vs. plain soap vs. medicated soap) and application times for the same product. The conclusion was that there is no firm evidence that one type of hand antisepsis is better than another in reducing SSIs [2].

The review concludes that there is evidence that the ability of different hand antisepsis to reduce CFUs is different but the clinical outcomes of these findings are unclear. Chlorhexidine gluconate (CHG) scrubs may reduce the number of CFUs on hands compared with povidone iodine (PVPI) scrubs. Alcohol rubs with additional antiseptic ingredients may reduce CFUs compared with aqueous scrubs [2].

This review also evaluated the duration of hand antisepsis, and concluded that a three-minute scrub reduced CFUs on the hand compared with a two-minute scrub but this was very low-quality evidence. Furthermore, findings about a longer initial scrub and subsequent scrub durations are not consistent. It is also unclear whether nail picks and brushes have an impact on the number of CFUs remaining on the hand. The Cochrane review states that almost all evidence available to make decisions about hand antisepsis were informed by low or very low-quality evidence [2].

The World Health Organization's recommendations on preoperative measures for SSI prevention published in 2016 state that the overall evidence (rated as moderate quality) showed no differences between ABHR and hand scrubbing in reducing SSIs. They also concluded that studies using CFUs on participants' hands as the outcome showed that some ABHRs are more effective than scrubbing with water and antiseptic or plain soap. However, the relevance of this outcome to the risks of SSIs is uncertain [1].

Oriel et al. published a study in 2017 in which the authors reported the incidence of SSIs after introducing ABHR as an alternative to traditional aqueous surgical scrubs. The SSI rates for traditional scrubbing (n = 4,051), and ABHR (n = 2,293) were similar (1.8 vs. 1.5%, p = 0.31) [6,7].

Also, in 2016, Oriel and Itani found that none of the SSI studies have shown any benefit of one product type over another, even though the literature shows the inferiority of PVPI to both CHG and ethyl alcohol (EA). EA often outranks CHG in non-clinical in vivo tests. Both ABHRs and CHG are preferred to PVPI for surgical hand antisepsis [3].

In 2015, Shen et al. performed a study to compare a conventional surgical scrub with an ABHR in order to evaluate antimicrobial efficacy. They performed hand sampling for cultures before and after operations. The culture positive rates of ABHR were 6.2% before operations and 10.8% after operations. Both rates were lower than the conventional surgical scrub (47.6% before operations [$p < 0.001$], and 25.4% after operations [$p = 0.03$]). Multivariate analysis showed that ABHR was a significant protective factor for positive hand cultures [5].

Liu et al. published a review in 2016 in which the authors studied the influences of different hand antisepsis on SSI rates and skin integrity. They advocate ABHR because it appears to cause less skin damage than traditional scrub protocols but is as effective as traditional scrub. Some studies have demonstrated relatively poor compliance for optimal scrubbing time and techniques by personnel using a brush with personnel preferring to use AHBRs [4].

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