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Commentary

Guidelines for the prevention of surgical site infection: an update from NICE

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The National Institute for Health and Care Excellence revisited and published its guideline for prevention of surgical site infection in 2019 [1] and four areas were deemed suitable for review and revision:

1. Nasal decolonisation before surgery. Consider nasal mupirocin in combination with a chlorhexidine body wash before procedures in which Staphylococcus aureus is a likely cause of a surgical site infection. This should be locally determined and take into account: the type of procedure, individual patient risk factors and the increased risk of side effects in preterm infants. Maintain surveillance on antimicrobial resistance associated with the use of mupirocin.

2. Antiseptic skin preparation. Prepare skin at the surgical site immediately before incision using a first choice of an alcohol-based solution of chlorhexidine, unless contraindicated. Be aware of the risks of using skin antiseptics in babies, in particular the risk of severe chemical injuries with the use of chlorhexidine (both alcohol-based and aqueous solutions). If the surgical site is next to a mucous membrane use an aqueous solution of chlorhexidine. If chlorhexidine is contraindicated use an alcohol-based solution of povidone-iodine and if both an alcohol-based solution and chlorhexidine are unsuitable then use an aqueous solution of povidone iodine.

3. Antiseptics and antibiotics before wound closure. Only apply an antiseptic or antibiotic to the incised wound before closure as part of a clinical research trial. Consider using gentamicin-collagen implants in cardiac surgery.

4. Methods of wound closure. When using sutures, consider using antimicrobial triclosan-coated sutures, especially for paediatric surgery, to reduce the risk of surgical site infection. Consider using sutures rather than staples to close the skin after Caesarean section to reduce the risk of superficial wound dehiscence.

Most of these recommendations are not materially different from those published by the World Health Organisation (WHO) guidelines published in 2016 [2] or the North American Healthcare Infection Control Practice Advisory Committee (HICPAC) of the Centers for Disease Control (CDC) [3] guidelines published in 2017.

The WHO guideline takes a more pragmatic view of the use of screening and staphylococcal decontamination for patients having higher risk cardiac or orthopaedic operations or for known past carriers of staphylococci. The CDC guideline recommends that nasal decolonization with mupirocin should be used prior to orthopaedic or cardiothoracic surgery to reduce the risk of staphylococcal SSI. The use of chlorhexidine for

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nasal decolonisation was also one of the two domains which benefitted from an extensive NICE cost-utility analysis which indicated that universal treatment without screening should be the dominant strategy except when rates of SSI, caused by staphylococci, were low. None of the guidelines give a clear recommendation of the timing of decolonisation, which is challenging to implement: could patients benefit from the cumulative effect of chlorhexidine and mupirocin for five days to suppress S. aureus to undetectable levels? NICE offers tools and resources to help with implementation and this may be an area for more research.

The guidelines specifically favour the use of alcoholic chlorhexidine for skin preparation, ahead of povidone iodine or aqueous antiseptic solutions. The NICE guideline also presents network analysis data and a meta-regression model which convincingly shows the superiority of alcoholic chlorhexidine solutions for the prevention of SSI. Single use applicators, with the added disadvantage of a need for their disposal, were considered to require further research before a clear recommendation could be made.

The use of wound irrigation, with or without antiseptics, prior to closure was considered by NICE and WHO to have insufficient evidence to recommend its use, although this is an area for further research. The CDC guidelines recommend intraoperative wound irrigation of deep or subcutaneous tissues with dilute povidone iodine. None supported the use of topical antibiotic wound irrigation, although gentamicin-collagen implants have some support from NICE for their use in cardiac surgery [1].

The beneficial use of antimicrobial coated or impregnated sutures, for the reduction of SSIs, has been the subject of many systematic reviews, yet there are still guarded recommendations for their use in all wound closures. The WHO guideline has been the most supportive, based on their own systematic review and meta-analysis which showed a statistically significant 28% reduction in SSIs [4]. CDC suggest that triclosan-coated sutures should be considered for the prevention of SSI with no evidence of harm.

All guidelines have used systematic review and meta-analysis when possible for a level 1A evidence base for their recommendations; both NICE and WHO undertake their own. The use of Grading of Recommendations, Assessment, Development and Evaluations (GRADE) [5] has been promoted for developing summaries of evidence to make clinical practice recommendations. However, interpretation of this to avoid bias and give optimal recommendations has led to the phrasing of advice such as "consider using". As an example several systematic reviews and meta-analyses have independently found level 1A evidence for the use of antimicrobial sutures but the WHO guideline reports the evidence as being conditional and of moderate quality, although advocating their use independent of type of surgery. Practitioners really would prefer clear, unambiguous recommendations.

It is an attractive hypothesis that the bundling of proven interventions, which individually reduce the risk of SSI, could lead to the lowest possible SSI rate through a summation of effects; provided, of course, that compliance with an agreed bundle is acceptable (and definitions and post-discharge surveillance are satisfactory [6,7]). Certainly there is some evidence that incorporation of a care bundle can halve the risk of an SSI [8] but this has not been tested prospectively; it is possible that some elements of a bundle might negate other elements. Much of the supporting evidence for bundles has been from observational studies but high quality prospective randomised trials, of carefully selected and well-justified bundles, have sometimes shown disappointing results [9].

Selecting mutually-beneficial (i.e. cumulatively additive) interventions to decrease SSI in a particular clinical situation can be challenging. The current ROSSINI 2 trial in the UK is utilising a multi-arm, multi-stage (MAMS) design to assess the clinical effectiveness of three in-theatre interventions to decrease SSI after abdominal surgery [10]. This modern design allows for seven intervention arms to be compared against each other and a control, to assess all combinations of interventions and actively explore the role of interactions between interventions, both positive and potentially negative, on SSI rates. Such evidence could allow robust identification of the optimal bundles for potential widespread adoption in particular operation types.

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