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QUESTION 5: Should surgeons and operating room (OR) personnel wear a mask and a cap in the OR?

RECOMMENDATION: Yes. The use of surgical facemasks (SFMs) and caps by staff in the OR is presumed to reduce the frequency of surgical site infections (SSIs). There is a paucity of data with few studies addressing this topic. The long-standing established standard of SFMs and caps in the OR should continue despite the lack of strong evidence demonstrating clinical efficacy and a lack of persuasive evidence for altering current clinical practice. Evidence for the potential role for SFMs in protecting staff from infectious material encountered in the OR is also controversial. In the absence of convincing clinical evidence either for or against wearing masks and caps in the OR, it is advisable, at this time, to continue to follow local or national health and safety regulations.

LEVEL OF EVIDENCE: Limited. Conflicting study results are published. Further research is likely to have an important effect on our confidence in the response and may change this recommendation. The evidence is currently supported only by observational studies, with no randomized control trials or other high level studies available.

DELEGATE VOTE: Agree: 98%, Disagree: 1%, Abstain: 1% (Unanimous, Strongest Consensus)

RATIONALE

Surgeons and nurses typically wear disposable facemasks and caps in the OR. The purpose of face masks is thought to be two-fold: (1) to prevent the passage of bacteria from the surgeon's nose and mouth into the patient's wound and (2) to protect the surgeon's face from sprays and splashes from the patient. Facemasks are thought to make wound infections after surgery less likely. However, incorrectly-worn masks may paradoxically increase the likelihood of the wound becoming contaminated with shed skin and debris. It is unclear if by wearing facemasks the surgical team increases or decreases the risk of SSIs in patients undergoing clean surgeries including elective joint arthroplasties [1].

Infections occurring in a wound created by an invasive surgical procedure are referred to as SSIs. Postoperative wound infections increase the lengths-of-hospitalization, and predictably, substantially raise the costs of care. SSIs account for a marked fraction of health care associated infections, and can be associated with considerable morbidity, with estimates that over one-third of postoperative deaths are at least partly attributable to SSIs. In the OR there are, therefore, many procedures and practices in place intended to reduce the probability of infectious material transfer between OR staff and patients [2].

SFMs provide a physical barrier between bacteria of oropharyngeal and nasopharyngeal origin and an open wound. Additionally, SFMs potentially protect OR staff by providing a physical barrier to infectious bodily fluid splashes from the patient. Wearing a SFMs in the OR is one of many long-standing preventative practices, yet controversy still exists as to the clinical effectiveness of SFMs in reducing the frequency of SSIs. General-purpose disposable SFMs, however, are not specifically designed to protect the wearer from airborne infectious particulates [3].

The 1999 Centers for Disease Control and Prevention's (CDC) "Guideline for Prevention of Surgical Site Infection" [4] strongly recommended the use of SFMs for prevention of SSIs. The 2007 CDC "Guideline for Isolation Protection" [5] reiterated the recommended use of different qualities of SFMs for sterile procedures without adding any new scientific data in support of this recommendation. Most international guidelines acknowledge the controversy surrounding the use of disposable SFMs [6,7] with no clear clinical or experimental evidence that wearing SFMs effectively diminishes the incidence of SSIs. The incidence of SSI is itself dependent upon multiple other variables, particularly the patient's immunological status, and the behavior of the surgical team in and around the operative field.

The systematic review by Lipp and Edwards [8] included 2,106 patients undergoing elective clean surgeries. Clean surgery is defined as surgery where no inflammation is encountered and the alimentary, respiratory and genitourinary tracts are not entered. The conclusion from the study was unclear whether the wearing of SFMs by the surgical team increased or decreased the risks of SSIs. The systematic review by Bahli [9] included data on 8,311 patients undergoing elective surgeries and concluded that the evidence regarding the efficacy of SFMs in preventing postoperative wound infections in elective surgery is inconclusive. At this time, therefore, it is still difficult to recommend changing the established clinical practices of wearing facemasks in rooms on the basis of current evidence.

The topic of OR headgear has been very controversial and the quality of data used to support OR policy surrounding this topic is marginal. A 1991 study by Humphries et al. suggested that wearing any type of headgear in the OR did not decrease bacterial counts. However, the use of proper ventilation techniques drastically reduced these counts and the authors concluded that non-scrubbed individuals did not need to wear headgear because proper ventilation likely counteracted any bacterial shedding [10]. Ten years later, however, a conflicting study by Friberg et al. demonstrated a two-to-five-fold increase in bacterial contamination at random sites throughout the OR when headgear was not worn and a 60-fold increase in contamination in the wound bed [11]. Considering these results, it is apparent that wearing headgear markedly decreases the probability of spreading fomites and debris to an open surgical wound. However, it remains uncertain whether this translates into a greater risk of SSIs and periprosthetic joint infections as no study specifically examining this possibility has ever been conducted.

Humphreys et al. performed air cultures in a sealed OR when volunteers wore either surgical hoods or no head coverings. The investigators found little effects of a head cover on volumetric air sampling cultures (i.e., no settle plates were used to simulate settling of bacteria near an OR bed). Nevertheless, the investigators concluded that personnel assisting in the surgical procedure should continue to wear head coverings [10]. Markel et al. [12] observed that disposable bouffant style hats had high permeability, greater particle penetration and increased porosity, leading to higher levels of bacterial and particulate contamination in a dynamic OR environment. When compared with disposable skullcaps, bouffant hats cannot be considered superior. Furthermore, if properly laundered, the use of cloth skullcaps may yield better sterility compared with standard disposable bouffant hats.

The use of SFMs and caps by staff in the OR is presumed to reduce the frequency of SSIs. Although there is a paucity of solid data on this topic, there is no persuasive evidence to indicate any rationale for altering clinical practices. The long-standing practice of wearing SFMs and caps in the OR should continue despite the lack of strong clinical evidence supporting their use. Evidence supporting the potential role for SFMs in protecting staff from infectious material encountered in the OR is also controversial. In the absence of strong clinical evidence for or against wearing masks and caps in OR, it is advisable at this time to continue to follow local or national health and safety regulations.

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