QUESTION 5: Does changing gloves during prolonged operations reduce the risk of surgical site infections/periprosthetic joint infections (SSIs/PJIs)? If so, how frequently should gloves be changed during the procedure?

RECOMMENDATION: Changing gloves intraoperatively may reduce the risks of SSIs/PJIs in arthroplasty surgery by reducing contamination. Based on prior studies, gloves should be changed after draping, before handling implants and when macroscopic perforation of the glove occurs. Gloves should also be changed at least once every 60 to 90 minutes, as contamination and glove perforation rates increase with duration of surgery.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 92%, Disagree: 5%, Abstain: 3% (Super Majority, Strong Consensus)

RATIONALE

Double-gloving is a widely-recognized technique by surgeons in many surgical subspecialties in the hopes to minimize contamination of the surgical site [1,2]. Microbiological contamination rates of gloves increases with duration of surgery, which warrants glove change during prolonged procedures [3]. However, no studies have been published that evaluate the direct relationships between changing gloves and the risks of SSIs/PJIs. Furthermore, there is conflicting evidence regarding the optimal frequency of glove changes.

Multiple studies have demonstrated that the percentage of intraoperative glove contaminations by microorganisms during total joint arthroplasty (TJA) procedures ranges from 3.4 to 30% [2,4–8]. The high variability of contamination may be attributed to differing methods of quantifying contamination. Other factors, such as ventilation in the operating room, may also impact the rates of surgical glove contamination. Most studies are observational and only reported absolute intraoperative contamination rates. These studies have not compared the differences in contamination rates between cases where gloves were changed intraoperatively, during the middle of a clean orthopaedic procedure, versus cases when they were not changed. However, in one randomized trial of 102 surgical team members, Ward et al. demonstrated that changing gloves 1 hour into a clean orthopaedic procedure was associated with significantly decreased intraoperative glove contamination rates [13 vs. 23%] [2].

There are conflicting reports regarding the optimal frequency of changing gloves during a procedure. Most studies recommend changing gloves after draping because of the high contamination rates due to disturbed laminar flow [4,7,9]. Other studies advise changing gloves before handling implants in order to prevent transfer of pathogens onto the new prostheses [2]. Regardless of contamination rates, perforated gloves are ineffective as a protective barrier against contamination [10]. Therefore, changing gloves is also recommended whenever a macroscopic glove perforation is detected, which has been shown to occur after an average of 93 ± 50 minutes of intraoperative time [11]. The recommended timing of glove changes in studies using contamination and/or perforation is variable, ranging from every 20 minutes to 90 minutes [8,11–13], also after bone resection and before inserting implants [14].

Although no studies investigate the direct link between intraoperative glove changes and SSIs/PJIs following TJA, studies from other surgical specialties demonstrate a reduction in SSIs after outer glove changes [15,16]. Due to the low PJI rates in arthroplasty surgeries, conducting a randomized control trial (RCT) with PJI as the primary outcome would be unfeasible due to the high number of surgeries needed to be performed in order for one PJI to occur. Moreover, the relevance of the findings from other surgical specialties is unclear due to the unique nature and components used in arthroplasty surgery. More studies are required to draw a definitive conclusion regarding the effectiveness of changing gloves in reducing the risk of SSIs/PJIs.

REFERENCES