

Intraoperative Wound Irrigation in Orthopedic Surgery: A Survey of Current Understanding and Practice Across the United States

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Introduction: Periprosthetic joint infections (PJIs) following primary and revision total joint arthroplasty (TJA) impose significant clinical and economic burdens. Despite advances in preventative measures and published evidence supporting the use of intraoperative wound irrigation (IOWI) with antiseptic solutions, data on practice implementation of IOWI remains sparse. Intraoperative wound irrigation (IOWI) has been demonstrated to reduce surgical site infections (SSIs); however significant variability remains in its clinical use in the operating room. The objective of this study was to define current IOWI practices, surgeon perceptions, and priorities for optimization in primary and revision TJA.

Methods: An evidence based survey on IOWI use was disseminated to high-volume (>200 joint replacements annually) arthroplasty surgeons across the United States. Intraoperative IOWI usage patterns and the rationale for IOWI selection was queried. The survey also collected data on the challenges of SSI in relation to IOWI and current IOWI practice across the primary and revision operative stages of exposure, instrumentation, implantation and closure. Survey responses were collected and analyzed to determine practice variation.

Results Section: Of the surgeon respondents, 112 met inclusion criteria. Antiseptic IOWI solutions were nearly universally (96%) employed and typically administered prior to wound closure (52%). There was a strong preference for pulse lavage as the IOWI delivery mechanism (60-76%) compared to pouring from a basin (5%-14%), gravity flow (9%-11%), or bulb syringe (10-16%). In primary joint replacements, respondents most highly valued an IOWI which 1) prevented biofilm formation (97%) and 2) had rapid (<1 minute) bactericidal activity (96%). Almost all respondents (96%) considered antiseptic IOWI as a necessary adjunct to systemic antibiotics and advocated the need for societal-based guidance. Chlorhexidine gluconate, povidone iodine and acetic acid were the most common antiseptic solutions utilized (70%, 65%, 29%, respectively); however, no consensus was determined for the optimal dwell time and whether there was a requirement for residual antimicrobial activity following IOWI. Querying ideal properties of IOWI for aseptic TJA revision, surgeons prioritized biofilm prevention (21%) and broad spectrum activity (17%). Conversely, for septic TJA revision, priorities included the ability to kill mature biofilm (26%), rapid bactericidal activity (22%), and the ability to disrupt biofilm structure (20%). Significant variability existed in agent selection, IOWI volume, and perceived cytotoxicity risks.

Discussion: Despite widespread use (>99%) of IOWI among high-volume primary TJA respondents, the type of IOWI, timing of use and expectation of its function vary widely. Arthroplasty surgeons indicate a strong desire for a standardized, evidence-based guidelines to guide IOWI use in primary hip and knee arthroplasty. Specifically, valuing solutions that prevent biofilm, have rapid, broad-spectrum bactericidal activity and can be utilized in a wide variety of arthroplasty-themed settings. In revision hip and knee arthroplasty, the results highlight significant variability amongst high volume revision TJA surgeons for goals of IOWI solutions, delivery mechanism, volume and type of solution and perceived risk. Surgeons prioritized IOWI's ability to prevent and destroy biofilm in both septic and aseptic revision TJA.

Significance/Clinical Relevance: There is tremendous variability in the indications, selection and usage of antiseptic IOWI solutions. This study establishes the need to formulate evidence-based guidelines to address the preferred type of IOWI, usage of IOWI in each phase of the arthroplasty procedure, recommended volume and delivery method, and the balance between cytotoxicity and optimal dwell time or requirement for residual antimicrobial activity following completion of IOWI. The findings in this study address the need for societal-based guidelines.