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Redefining the Outcomes of Prosthetic Joint Infection: A Meta-epidemiologic Study

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We use this protocol and it's working



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Abstract

We aim to conduct a systematic review using a meta-epidemiologic methodology to redefine the outcomes of PJI.

Image Attribution

Macrofocus GmbH, 2019; SankeyMATIC (<https://sankeymatic.com/>)

Review methods

- 1 Research question: Establishing essential criteria for a uniform definition of prosthetic joint infection (PJI) outcomes.
- 2 Searches: Any language or time limit, the librarian will provide the search string as requested.
- 3 Condition or domain being studied: Total joint arthroplasty (TJA) is one of the most frequently carried out orthopedic procedures worldwide. By 2030, the anticipated number of primary total knee arthroplasty (TKA) and total hip arthroplasty (THA) surgeries in the United States is projected to be 3.48 million and 572,000, respectively. Historical rates of PJI indicated that the biggest risk period occurs within the first two years following the arthroplasty surgery, presumably due to continuous soft tissue repair and residual postoperative inflammation (Tabaja et al. and Beam and Osmon). Periprosthetic joint infection (PJI) affects approximately 2% of arthroplasty patients, a rate that has remained relatively constant over time (Nelson et al.). Management of periprosthetic joint infections (PJI) includes both surgical (e.g., DAIR, one-stage, and two-stage exchange) and non-surgical approaches. The choice of strategy depends on specific indications, making comparisons difficult. Antimicrobial therapy is essential, tailored to culture results, with typical treatment durations of 6-12 weeks, though extended therapy may be needed in some cases to control the infection, maintain joint function, and alleviate pain. Various outcomes of prosthetic joint infection (PJI) have been evaluated in the literature. The outcomes commonly discussed in studies include mortality, patient-reported outcome measures (PROM), and several infection-related outcomes (Xu et al., Karachalios and Komnos, Johns et al., and International Consensus Meeting on Musculoskeletal Infection [2018]).
- 4 Participants/population: Articles published from January 2005 up to October 2024, including case series and RCTs on at least 10 adult patients with PJI that report any type of quotable outcome, either in the main text or in supplementary materials, were included without restrictions on publication language.
- 5 Intervention(s), exposure(s): Various outcomes of prosthetic joint infection (PJI) have been evaluated in the literature. The outcomes commonly discussed in studies include mortality, patient-reported outcome measures (PROM), and several infection-related outcomes such as (Xu et al., Karachalios and Komnos, and Johns et al.):
 - Cure with no need for further surgery or antibiotics
 - Cure with repeat DAIR and an additional course of antibiotics
 - Relapse requiring radical surgery following a failed two-stage exchange
 - Relapse resulting in chronic PJI managed with long-term antibiotic suppression
 - Relapse followed by successful two-stage exchange with antibiotic therapy

Based on International Consensus Meeting on Musculoskeletal Infection (2018)

- Tier 1. Tier 2. Tier 3.
- Tier 4.
- Tier 1: Infection control with no continued antibiotic therapy
- Tier 2: Infection control with patient on suppressive antibiotic therapy
- Tier 3: Need for reoperation and/or revision and/or spacer retention (assigned to subgroups of A, B, C, D, E, and F based on the type of reoperation)
 - A. Aseptic revision 3e 1 year from initiation of PJI treatment
 - B. Septic revision (including debridement, antibiotic and implant retention (DAIR)) 3e 1 year from initiation of PJI treatment (excluding amputation, resection arthroplasty and fusion)
 - C. Aseptic revision ≤ 1 year from initiation of PJI treatment
 - D. Septic revision (including DAIR) ≤ 1 year from initiation of PJI treatment (excluding amputation, resection arthroplasty, and fusion)
 - E. Amputation, resection arthroplasty, or fusion
 - F. Retained spacer
- Tier 4: Death (assigned to subgroups A or B)
 - A. Death ≤ 1 year from initiation of PJI treatment
 - B. Death 3e 1 year from initiation of PJI treatment

6 Comparator(s)/control: None needed.

7 Types of study to be included:

Inclusion

- Cohort studies and randomized controlled trials (RCTs) involving patients with prosthetic joint infections (PJI) or related conditions that presented a clearly defined and quotable outcome for PJI or its synonyms, either within the manuscript or supplementary appendix, were included.
- No restriction on language
- Adult patients (age ≥ 18 years old)
- From Jan 2005 up to Oct 2024

Exclusion

- Case reports, review articles, commentaries, letters, grey literature.
- Pediatric patients (age ≤ 18 years old).

In case of duplicated or salami publications, we will choose the most recent or the one with the largest sample size from the same group.

8 Primary outcome(s): To systematically review the definitions of PJI outcomes in the existing literature.

- 9 Secondary outcomes: To analyze their content and temporal distribution, and identify thematic clusters to enhance patient care and advance scientific research.
- 10 Screening and data extraction (selection and coding): The abstract and full-text screening will be managed through the Covidence Systematic Review Software (Veritas Health Innovation, Melbourne, Australia). Two reviewers will be involved in abstract, full-text screening and data extraction. Each article will be reviewed by two reviewers. To resolve any emerging disagreements, a third reviewer will be consulted and/or consensus through discussion between the reviewers will be achieved.
- 11 Risk of bias (quality) assessment: Not needed for this type of study as per PRISMA modified guidelines for meta-epidemiological studies (Murad et al.) and because we will be not estimating an association.
- 12 Strategy for data synthesis: We will be piloting a data extraction form in Excel on a sample of 10 manuscripts. Based on the research team's advice, the form will be further refined. In an iterative process between the reviewers, the form will be modified to avoid misunderstandings or later disagreements. After this process, two independent reviewers will extract relevant information from each article and record it in separate Excel sheet.
We will describe data using counts and percentages. We will pursue a thematic synthesis of the outcome using the Boolean operators (AND, OR, AND NOT). Consequently, a single outcome will, therefore, yield multiple outputs outcome if multiple possibilities were given by the authors for each study.
To graphically depict the outcomes of this study, we will utilize multi-dimensional analytics with a Sankey diagram to represent combinations derived from the outcomes, weighting their distribution across the literature for the number of patients with PJI and its synonyms for each study (High-D (Version 9.0; Macrofocus GmbH, 2019), and SankeyMATIC (<https://sankeymatic.com/>) as data analysis softwares).

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Benchmark articles for the literature search

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