# Five-Year Milestone Survivorship Following Two-Stage Exchange Arthroplasty for Chronic Periprosthetic Joint Infection

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## Introduction

**Background**

- Two-stage exchange arthroplasty remains the benchmark treatment for chronic knee periprosthetic joint infection (PJI).
- Reported success rates vary because of differences in follow-up duration, outcome definitions, and censoring strategies.

**Purpose**

- Characterize time-dependent outcomes after two-stage exchange using the Musculoskeletal Infection Society Outcome Reporting Tool (MSIS ORT).
- Assess how alternative endpoint definitions affect milestone outcome estimates.

## Methods

- Retrospective cohort of patients undergoing intended two-stage exchange for chronic knee PJI fro 2013–2021.
- Included patients met 2018 ICM/MSIS criteria after primary total knee arthroplasty.
- Outcomes were classified by MSIS ORT at 1, 3, and 5 years after reimplantation or spacer placement in non-reimplanted patients.
- Success definitions:
  - Tier 1: Infection control without suppressive antibiotics
  - Tier 1+2: Infection control with or without suppressive antibiotics
- Kaplan–Meier and sensitivity analyses evaluated alternative censoring strategies.

**Cohort**

- 114 patients
- Median follow-up: 57 months (IQR, 42.3–70.0)
- Reimplanted: 108 (94.7%)

## Results

**Figure 1**. Kaplan-Meier Survivorship Stratified by MSIS ORT Success Definitions (N=114)

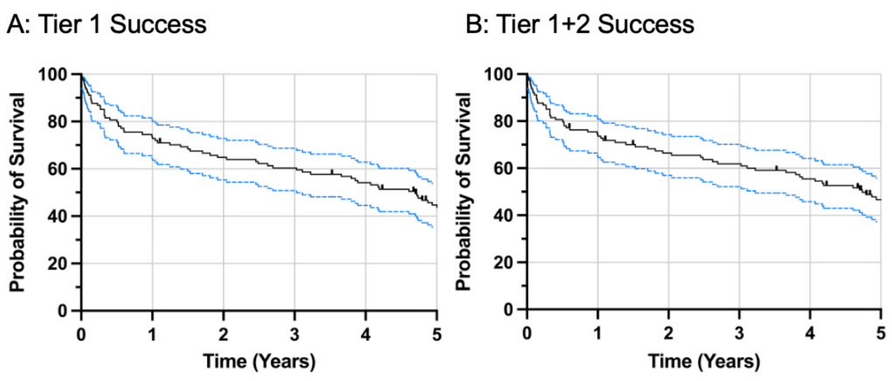


**Figure 2**. Long-Term Survivorship Following Two-Stage Exchange Using Alternative ORT Endpoint Definitions (N=114)

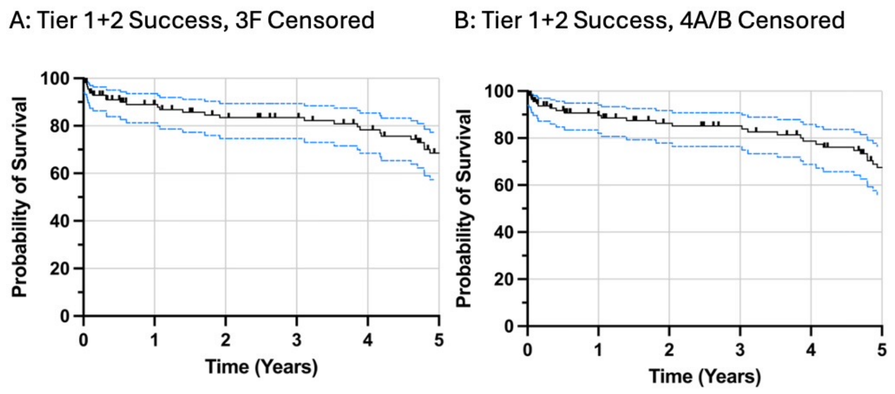


**Table 1**. Distribution of Clinical Success and Failure Tiers at 1, 3, and 5-Year Follow-up.

| Outcome / Tier | Description | ORT Tier at 1 Year N (%) | ORT Tier at 3 Years N (%) | ORT Tier at 5 Years N (%) |
|---|---|---|---|---|
| **Treatment Success (Tier 1 Alone)** | Infection control, no continued antibiotic | 68 (59.6) | 58 (50.9) | 43 (37.7) |
| **Treatment Success (Tier 1 & 2)** | Infection control with and without prolonged antibiotics | 80 (70.2) | 68 (59.6) | 55 (48.2) |
| **Treatment Failure (Tier 3A-4B)** | | 34 (29.8) | 46 (40.4) | 59 (51.8) |
| **Tier 3A** | Aseptic revision >1 year from PJI initiation | 0 (0.0) | 3 (2.6) | 4 (3.5) |
| **Tier 3B** | Septic revision (incl. DAIR) >1 year | 0 (0.0) | 4 (3.5) | 7 (6.1) |
| **Tier 3C** | Aseptic revision ≤1 year | 11 (9.6) | 9 (7.9) | 8 (7.0) |
| **Tier 3D** | Septic revision (incl. DAIR) ≤1 year | 11 (9.6) | 11 (9.6) | 10 (8.8) |
| **Tier 3E** | Amputation / resection / arthrodesis | 0 (0.0) | 2 (1.8) | 2 (1.8) |
| **Tier 3F** | Retained spacer | 11 (9.6) | 10 (8.8) | 11 (9.6) |
| **Tier 4A** | Death <1 year | 1 (0.9) | 1 (0.9) | 1 (0.9) |
| **Tier 4B** | Death >1 year | 0 (0.0) | 6 (5.3) | 16 (14.0) |

## Results Cont.

- A total of 114 patients met inclusion criteria; 108 (94.7%) underwent reimplantation
  - **Tier 1:** Infection control without suppressive antibiotics.
  - **Tier 2:** Infection control with suppressive antibiotics.
  - **Tier 3F:** Retained spacer without reimplantation.
  - **Tier 4A/4B:** Death unrelated or related to PJI.

- Tier 1 survivorship declined from 59.6% at 1 year to 50.9% at 3 years and 37.7% at 5 years. Combined Tier 1+2 survivorship declined from 70.2% to 59.6% and 48.2% at the same milestones (Figure 1).
- Sensitivity analyses produced higher estimates when Tier 3F retained spacers were censored (88.9%, 83.4%, and 68.5%) or Tier 4A/4B mortality was censored (89.7%, 83.9%, and 67.4%) at 1, 3, and 5 years, respectively. Despite varying endpoint definitions, treatment success progressively declined over time (Figure 2).

## Conclusion

- Outcomes after two-stage exchange are **time dependent.** Standardized milestone reporting with the MSIS ORT provides a consistent framework for comparing treatment outcomes across studies and cohorts.

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