

The Attributable Mortality of Prosthetic Joint Infection after Primary Hip and Knee Arthroplasty among Medicare Beneficiaries; 2005—2012

Kara Jacobs Slifka MD MPH, Sarah Yi PhD, Sujan Reddy MD, James Baggs PhD, John Jernigan MD MS
Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, GA

BACKGROUND

- Americans age 65 years and older are increasing
- Total hip arthroplasty (THA) and total knee arthroplasty (TKA) are among the most common elective procedures and are expected to increase; prosthetic joint infection (PJI) is a common complication
- Little is known regarding the mortality attributable to PJI after THA and TKA

OBJECTIVE

In a large cohort of beneficiaries enrolled in Medicare, we estimated the attributable mortality of PJI following THA and TKA surgery.

METHODS

Centers for Medicare and Medicaid (CMS)
5% Sample of Beneficiaries

- We utilized administrative claims data from the CMS 5% sample Standard Analytic Files, which includes:
 - Institutional claims
 - Beneficiary demographics
 - Enrollment data
 - Beneficiary date of death regardless of location
 - Beneficiary chronic conditions/comorbidities
- Identified patients who had a THA or TKA performed between 2004—2012 using ICD-9-CM Procedure codes:
 - 81.51 Joint replacement of lower extremity: total hip
 - 81.54 Joint replacement of lower extremity: total knee
- PJI was identified by ICD-9-CM code 996.66 (Infection and inflammatory reaction due to internal joint prosthesis) on an inpatient claim within 365 days following THA or TKA
- Beneficiaries with missing surgery date, subsequent primary surgery within one year, or diagnosis of PJI prior or during index stay were excluded
- Beneficiaries had to maintain complete Medicare coverage (Part A/B) from one year prior and throughout their follow-up; age as original reason for entitlement
- Patients censored at 2 years or end of study period, death, or change of coverage.

Analytic Method

Extended Cox Proportional Hazards Model

- We used a time-dependent variable to account for the presence of PJI, since time to infection and time to death can vary
- Compared the rates of death for person time with and without infection through an extended-Cox Proportional Hazards model.
- Potential confounders included in the model:
 - Demographics
 - Chronic conditions
 - Characteristics from the surgical hospitalization such as length of stay

RESULTS

Hip Arthroplasty

- Mortality rate for patients with PJI was 9.4 per 100 person-years (PY) compared to 2.9 per 100 PY without PJI

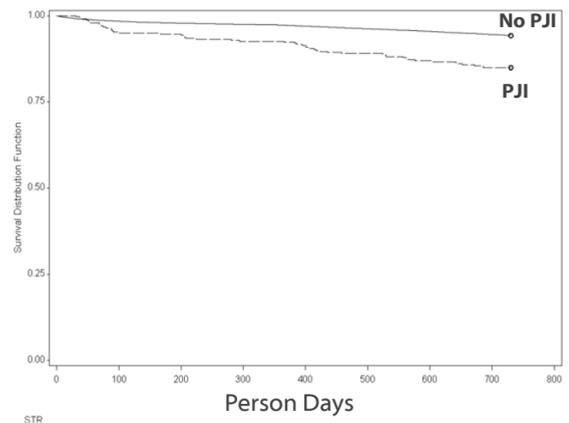
Knee Arthroplasty

- Mortality rate for patients with PJI was 5.1 per 100 person-years (PY) compared to 1.4 per 100 PY without PJI

Survival Curve by PJI Status

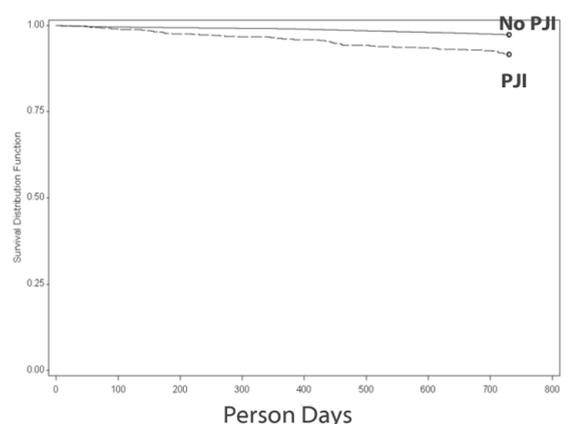
Hip Arthroplasty

Among 37,098 beneficiaries, 338 (1%) were identified as having PJI within 365 days of their hip surgery.



Knee Arthroplasty

Among 80,429 beneficiaries, 726 (1%) were identified as having PJI within 365 days of their knee surgery.



Hazard Ratios

Exposure: PJI Outcome: Mortality

PJI after Hip Arthroplasty

Hazard Ratio (HR): 3.2 (95% CI: 2.3-4.2)
Adjusted HR – 2.5 (95% CI: 1.9,3.3)

PJI after Knee Arthroplasty

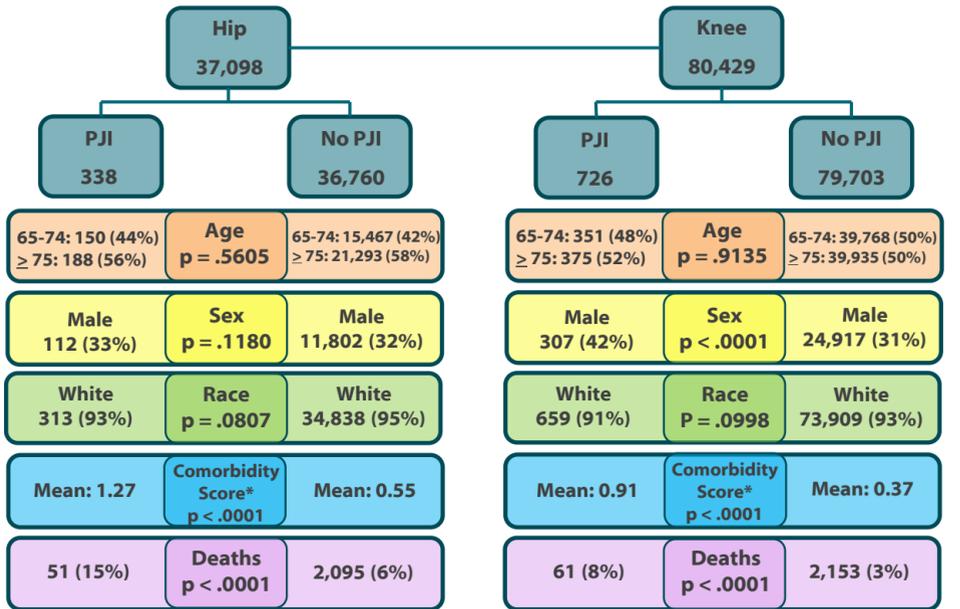
Hazard Ratio (HR): 3.7 (95% CI: 2.9-4.8)
Adjusted HR – 2.6 (95% CI: 2.0, 3.4)

Strengths and Limitations

- Strengths:**
 - Large cohort with longitudinal data
 - Ability to detect PJI up to one year
 - Validated date of death
 - Analytic model including time dependent exposure and ability to control for potential confounders
- Limitations:**
 - Potential misclassification of exposure (PJI)
 - Sample limited to beneficiaries of traditional Medicare coverage
 - Limitations with administrative claims data

Characteristics

- 248,340 total hip & knee arthroplasties performed
- 117,515 arthroplasties met inclusion criteria



*Gagne combined comorbidity score

CONCLUSIONS

- Medicare beneficiaries who develop PJI after THA or TKA have an increased risk of death the first two years following the procedure
- Given anticipated increases in THA and TKA in coming years, these findings highlight the importance of preventing PJI following arthroplasties in order to avert preventable deaths

CONTACT INFO

Kara M. Jacobs Slifka – ipf8@CDC.gov
1600 Clifton Road
Atlanta, GA 30329

