

# Incidence of and Risk factors for Periprosthetic Joint Infection in Patients with Total Hip and Knee Arthroplasty Undergoing Colonoscopy

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## INTRODUCTION:

The number of patients undergoing total joint arthroplasty continues to rise as the US population ages. For patients older than 45, the American Cancer Society recommends routine screening for colorectal cancer with diagnostic colonoscopy. Colonoscopy is associated with transient bacteremia and has been shown to be a potential risk factor for periprosthetic joint infection (PJI). Currently, there are no perioperative guidelines to counsel patients on time from or time to routine colonoscopy in patients undergoing total joint arthroplasty (TJA), and no society currently recommends any form of antimicrobial prophylaxis. The purpose of this retrospective cohort study is to characterize the incidence of PJI for the development of clinical practice recommendations to better counsel patients undergoing TJA.

## METHODS:

We queried the Military Health System (MHS) Data Repository (MDR) for all MHS beneficiaries older than 45 with CPT codes for total hip and knee arthroplasty from FY2010-2016 in either a military treatment facility or the civilian sector. Colonoscopy status preoperatively was identified by the presence of a colonoscopy CPT code within 6 months prior to TJA. PJI status was defined by PJI ICD code presence within 1 year post TJA. Descriptive statistics were reported for demographic characteristics, comorbidities, and stratified by colonoscopy status. Multivariable logistic regression was used to estimate adjusted odds ratios associated with colonoscopy status and demographic and chronic conditions as independent variables and PJI within one year post TJA as the dependent variable. Additional analyses defined colonoscopy presence within 3 months and 12 months prior to TJA to evaluate for sensitivity of estimates to the time between procedures.

In a separate set of analyses in the TJA cohort we identified colonoscopy postoperatively by the presence of a colonoscopy CPT code within 6 months post TJA. Propensity score-matched colonoscopy and non-colonoscopy cohorts were defined using nearest neighbor matching with a 1:5 case: control ratio. Propensity scores for probability of colonoscopy post TJA as the dependent variable were estimated with a logistic regression model of age, sex, beneficiary status, TJA surgical date, and presence of any health risk condition as independent variables. Balance in baseline characteristics among matched cohorts was evaluated with standardized mean differences. A matched colonoscopy index date was assigned from each case to that case's matched controls. PJI status was then identified by PJI ICD code presence within 1 year post colonoscopy index date. Multivariable logistic regression was used to evaluate adjusted odds ratios associated with colonoscopy status and demographic and health risk characteristics as independent variables and PJI within one year post TJA as the dependent variable. Sensitivity analyses repeated matched cohorts and odds ratio estimates when defining colonoscopy postoperatively within 12 months post TJA. Propensity-score matching (PSM) was done.

## RESULTS:

Analyses of PJI risk associated with colonoscopy preoperatively included 243,671 patients older than 45 who had TJA in the MHS from 2010-2016. Of these patients, 11,482 (4.7%) received a colonoscopy within 6 months prior to surgery. The incidence of PJI within one year postoperatively was 2.8% (N=325) in patients who did versus 2.4% (N=5504) in patients who did not have a colonoscopy within 6 months prior to surgery (unadjusted OR = 1.20; 95% CI = 1.07, 1.34). In a multivariable regression model of demographic and health risk characteristics and colonoscopy status as predictors of PJI within one year postoperatively, active duty status (OR = 0.71; 95% CI = 0.51, 0.95) and older age (OR = 0.91; 95% CI = 0.88, 0.93 per 10 year increase) were each associated with lower PJI risk. Male sex (OR = 1.32; 95% CI = 1.25, 1.39) and several chronic health conditions (diabetes, renal, osteoarthritis, pulmonary, and rheumatoid arthritis/inflammatory) were each associated with higher PJI risk. Colonoscopy within 6 months prior to surgery remained associated (OR = 1.16; 95% CI = 1.03, 1.30) with PJI risk in this adjusted model. This estimate was attenuated and no longer significant when presence of colonoscopy was ascertained within up to 1 year prior (OR = 1.07; 95% CI = 0.98, 1.17) and within 3 months prior to surgery (OR = 1.12; 95% CI = 0.95, 1.31).

Postoperative analyses included 7,500 patients who had a colonoscopy within 6 months post TJA and 37,500 matched non-colonoscopy TJA controls. The incidence of PJI within one year post TJA was 1.8% (n=138) in the colonoscopy vs. 1.9% (n=704) in the control cohort. Before PSM, TJA patients who had colonoscopy within 6 months postoperatively were more likely than those who did not to be male and retirees and had a higher number of chronic conditions and earlier year of surgery. In a multivariable logistic regression model of demographic and health risk characteristics and colonoscopy status as predictors of PJI within one year postoperatively, older age (OR = 0.89; 95% CI = 0.82, 0.96 per 10 year increase) was associated with lower PJI risk. Male sex (OR = 1.31; 95% CI = 1.14, 1.50) and several chronic health conditions (renal, osteoarthritis, pulmonary, and rheumatoid arthritis/inflammatory) were each associated with higher PJI

risk. Index colonoscopy within 6 months postoperatively was not associated (OR = 0.98; 95% CI = 0.81, 1.17) with PJI risk. This OR was similar when defining the index colonoscopy within 12 months postoperatively.

**DISCUSSION AND CONCLUSION:**

Timing of colonoscopy and TJA was not associated with increased PJI risk one year preoperatively and postoperatively TJA in this MHS population. However, several chronic health conditions were independently associated with PJI, and they should be medically optimized prior to and post TJI. These data build on evidence from large retrospective cohorts that may be used to guide the development of clinical practice recommendations to better counsel patients undergoing TJA and coordinate scheduling and prioritization between these two, generally elective, procedures.