

# The Impact of Common Urologic Complications on the Risk of a Prosthetic Joint Infection



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## OBJECTIVE

- To determine if urinary tract infection (UTI) and acute urinary retention (AUR) are risk factors for joint infections after total hip or knee arthroplasty (THA or TKA)

## INTRODUCTION

- Prosthetic joint infections (PJI) after THA/TKA are significant complications
- They are associated with significant patient morbidity and healthcare cost
- There are conflicting reports of their association with urologic complications

## METHODS

### Study Design and Setting:

- Population based, retrospective cohort study using administrative data
- Included all patients (>66 years of age) undergoing a THA or TKA between April 1, 2003 and March 31, 2013 in Ontario, Canada (population of approx. 13 million)

### Data Sources:

- The Canadian Institute for Health Information's Discharge Abstract and Same Day Surgery (CIHI-DAD/SDS)
- The Ontario Health Insurance Plan (OHIP)
- The Registered Persons Database (RPDB)
- The National Ambulatory Care Reporting System (NACRS)
- The Ontario Drug Benefit (ODB) Program

### Patient Cohort:

- Patients censored at death, emigration or end of study period (March 31, 2015)
- Patients excluded if missing age/gender, <66 years, prior THA/TKA within 10 years, prior possible joint infection or simultaneous bilateral THA or TKA

### Primary Outcome:

- Prosthetic joint infection requiring hospital admission following THA or TKA

### Exposures:

- Post-operative UTI presenting to hospital or physician for care (within 2 years)
- Acute urinary retention (within 30 days)

### Statistical Analysis:

- Reported medians (IQR) and frequencies (count), and baseline differences evaluated using standardized differences (SD)
- Univariate and multivariate Cox proportional hazard regression for risk factors
- Hazard ratios, 95% confidence intervals and p-values were reported

Table 1 – Patient Demographics

	Entire Cohort (n=113,061) (n,%)
<b>Demographics</b>	
Age (median, IQR)	74 (70-79)
Gender (Female)	69,104 (61.1%)
Rural	18,966 (16.8%)
<b>Socioeconomic status</b>	
Low (lowest two quintiles)	41,996 (37.1%)
High (greatest three quintiles)	70,730 (62.6%)
Missing	335 (0.3%)
<b>Relevant Comorbidities</b>	
Charlson Comorbidity Index	
0	94,236 (83.3%)
1	9,121 (8.1%)
>1=2	9704 (8.6%)
Diabetes Mellitus	28,617 (25.3%)
Chronic Renal Insufficiency	6,491 (5.7%)
End Stage Renal Disease	183 (0.2%)
Obesity (BMI >40)	7,328 (6.5%)
Malignancy	12,833 (11.4%)
Rheumatoid Arthritis	3,387 (3.0%)
Congestive Heart Failure	10,136 (9.0%)
Peripheral Vascular Disease	1,227 (1.1%)
Myocardial Infarction	39,661 (35.1%)
Atrial Fibrillation	21,388 (18.9%)
History of Alcohol Abuse	746 (0.7%)
History of Depression	4,364 (3.9%)
<b>Urologic History (in prior 5 years)</b>	
History of AUR	3,196 (2.8%)
History of Transurethral Prostatectomy	1,893 (1.7%)
History of Cystoscopy	14,256 (12.6%)
Prior Radical Prostatectomy	496 (0.4%)
History of UTI	13,230 (11.7%)
<b>Medication Usage (in prior year)</b>	
Prior Alpha-Blocker Exposure	5,196 (4.6%)
Prior Antibiotic Exposure	42,265 (37.4%)
Prior SARI Exposure	2,743 (2.4%)
Prior Corticosteroid Exposure	19,680 (17.4%)
<b>Healthcare Utilization</b>	
Number of Urology Visits (median, IQR)	0 (0-0)
Number of GP Visits (median, IQR)	7 (4-10)
Number of Ortho Visits (median, IQR)	2 (1-2)
Number of Hospitalization (median, IQR)	0 (0-0)
Number of ER Visits (median, IQR)	0 (0-1)
<b>Other</b>	
Academic Hospital	26,945 (23.8%)
General Anesthetic	28,209 (25.0%)

## RESULTS

Table 2 - Unadjusted Primary Outcomes Based on Primary and Secondary Exposures

	No UTI (n=84,805)	UTI (n=28,256)	No AUR (n=110,545)	AUR (n=2,516)
Number of Patients with Event	889	140	645	16
Median Time to First Exposure in Days (IQR)		200 (42-432)		0 (0-0)*
Unadjusted Analysis (HR, 95% CI, p-value)	1.00 (ref)	1.24 (1.18-1.30) p<0.01	1.00 (ref)	1.18 (0.72-1.94) p=0.52

\*The median time of 0 represents predominantly immediate, postoperative urinary retention.

Table 3 - Multivariable Analysis for UTI and AUR Exposure

	Hazard Ratio	95% CI	p-value
<b>UTI Exposure</b>			
UTI Exposure	1.210	1.143 1.281	<.0001
Age (per year increase)	1.005	0.994 1.015	0.406
Sex (Ref = Female)	1.466	1.291 1.664	<.0001
Charlson Score	1.101	1.038 1.168	0.001
History of AUR	1.143	0.824 1.585	0.425
History of Cystoscopy	1.278	1.053 1.551	0.013
History of UTI	1.018	0.836 1.239	0.862
Prior Antibiotic Exposure	1.018	0.889 1.164	0.799
Number of Urology Visits	0.940	0.880 1.005	0.068
Number of GP Visits	1.009	1.000 1.017	0.039
Number of Hospital Visits	1.138	1.017 1.272	0.024
Number of ER Visits	1.078	1.051 1.106	<.0001
<b>AUR Exposure</b>			
AUR Exposure	0.993	0.601 1.641	0.979
Age (per year increase)	1.016	1.002 1.029	0.023
Sex (Ref = Female)	1.359	1.159 1.593	0.000
Charlson Score	1.081	1.001 1.166	0.046
History of AUR	1.131	0.744 1.719	0.565
History of Cystoscopy	1.278	1.000 1.632	0.050
History of UTI	0.999	0.778 1.283	0.992
Prior Antibiotic Exposure	1.033	0.873 1.221	0.708
Number of Urology Visits	0.955	0.878 1.039	0.283
Number of GP Visits	1.006	0.995 1.017	0.261
Number of Hospital Visits	1.118	0.975 1.282	0.111
Number of ER Visits	1.090	1.060 1.122	<.0001

UTI: aHR 1.20 (1.14-1.28) p<0.01

AUR: aHR 0.99 (0.60-1.64) p=0.98

### UTI patients:

- Older
- Female
- Previous antibiotic exposure
- Previous cystoscopy
- History of AUR
- Atrial fibrillation

### AUR patients:

- Older
- Male
- Comorbidities
- Renal disease
- Malignancy
- Heart failure
- Myocardial infarction
- Atrial fibrillation
- Previous transurethral resection of prostate or cystoscopy
- Previous alpha blocker or 5-alpha reductase inhibitor
- More Urology visits
- General anesthetic

## SUMMARY/CONCLUSION

- Each additional UTI increases the risk of PJI within the 2 years after THA or TKA
- Early post-operative AUR is not a significant risk factor for PJI
- Timely and appropriate management of symptomatic UTIs may be important to prevent future joint infection