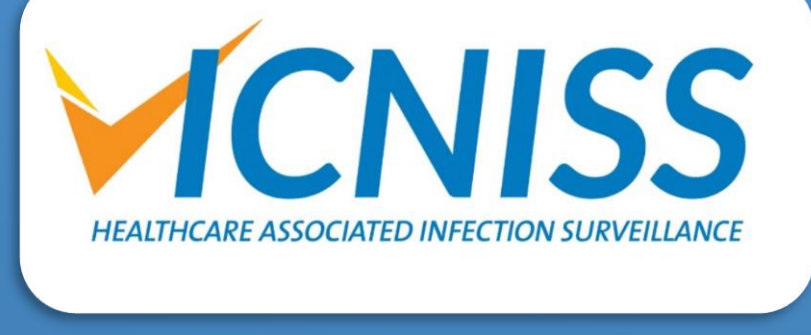


# Hip and Knee Prosthetic Joint Infections: Evaluating Current Burden and Risks Using an Australian Surveillance Network



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## Background

In Victoria, surgical site infection (SSI) surveillance in hospitals, in tandem with robust local infection prevention programs that identify the root causes of SSI and addresses modifiable risk factors, has resulted in a significant reduction in hip and knee PJI rates over the last decade.<sup>1</sup>

## Aim

To describe the current burden and risks for PJI (Prosthetic Joint Infection) in Australian patients using a state-wide surveillance network for the period 2014-2018.

## Methods

- The VICNISS program monitors healthcare-associated infections in Victorian hospitals, including surgical site infections
- PJI surveillance is undertaken by trained infection prevention staff using patient records, microbiology and radiology results until hospital discharge and if readmitted within 90-days
- Internationally-accepted methods (National Healthcare Safety Network/NHSN) are employed

## Results

Over 5 years, 39,370 procedures were monitored in 32 public Victorian hospitals. Patient demographics, **Table 1**, were similar in those undergoing hip or knee arthroplasties by gender, age and proportion of primary to revisions. Patients undergoing knee procedures had higher mean BMI and ASA scores.

**Table 2** describes 456 PJI identified; an overall crude PJI rate of 1.2/100 procedures. There were higher infection rates in hip to knee procedures (1.27 vs. 0.95/100 procedures, p=0.002); revision compared to primary (1.67 vs. 1.27/100 procedures for hips, p=0.18) which was consistent across hip or knee procedures.

**Figures 1 and 2** show that there was an increased risk of PJI in patients with BMI and length of procedure, respectively.

**Table 3** shows compliance with surgical antimicrobial prophylaxis.

**Table 4** describes the microbiology of PJI. Of 456 PJI, 357 (78%) were microbiologically confirmed; 259 (56.7%) were monomicrobial and 98 (21.5%) polymicrobial. Gram positive pathogens were reported in 335 (67.7%), and Gram negatives in 139 (28.1%). The most common reported single organism was *S. aureus* (35%), followed by coagulase-negative Staphylococci, *Pseudomonas* and *Enterococcus* spp.

**Table 2: Patients with hip and knee PJI (VICNISS, 2014-2018)**

	Hip arthroplasty	Knee arthroplasty	p-value
SSI/Total procedures (%)	295/22673 (1.27%)	161/16697 (0.96%)	0.002
Mean days to infection (range)	24.2 (3-89 days)	25.8 (2-85 days)	0.241
SSI type, total	295	161	0.001
- superficial	75 (25%)	65 (40%)	
- deep/incisional	90 (31%)	51 (32%)	
- organ space	130 (44%)	45 (28%)	
Infection rate, males	129/ 8985 (1.44%)	78/ 6428 (1.21%)	0.237
Infection rate, females	166/ 13687 (1.21%)	83/10268 (0.81%)	0.002
Primary surgeries infection rate	1.27% (269/21117)	0.95% (148/15554)	0.004
Revision surgeries infection rate	1.67% (26/1556)	1.14% (13/1143)	0.251

**Table 1: Demographics patients undergoing Hip and Knee Arthroplasties (VICNISS, 2014-18)**

	Number of procedures		% Female	Median Age, years (range)	Mean BMI (kg/m <sup>2</sup> )	ASA score		
	Primary	Revision				0/1	2	≥3
Hip arthroplasty	22,673	21,117 (93.14%) 1,556 (6.86%)	60.4%	71.7 (18-104)	29.0	0/1: 5.5%	2: 37.3%	≥3: 57.2%
Knee Arthroplasty	16,697	15,554 (93.15%) 1,143 (6.85%)	61.5%	69.3 (19.4-103)	33.0	0/1: 4.4%	2: 48.8%	≥3: 46.8%

**Table 3: Antibiotic Prophylaxis compliance for Joint Arthroplasty (VICNISS, 2014-18)**

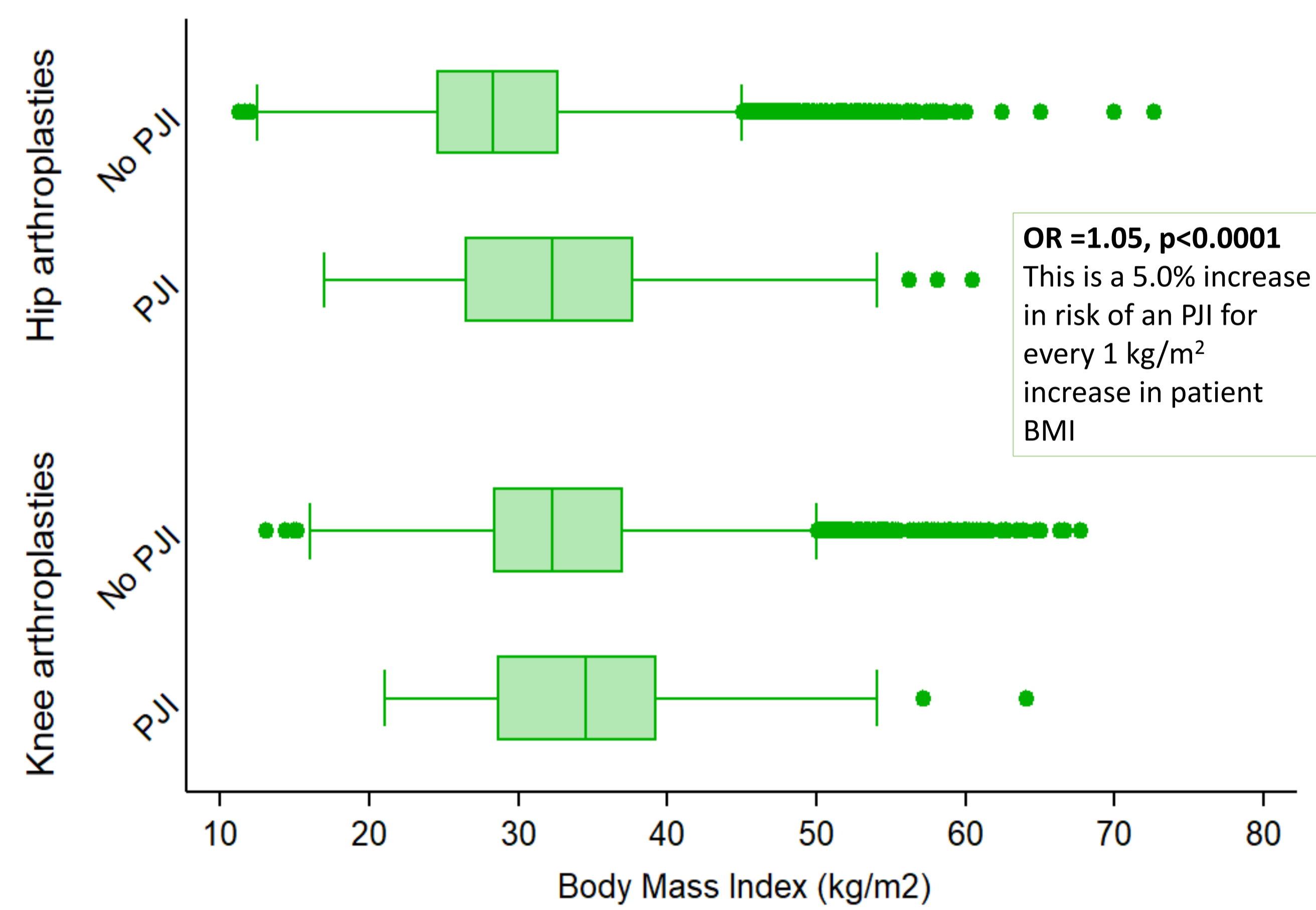
		Hip	Knee
		Choice	Compliant: 89.2%
	Noncompliant: 2.7%	2.5%	
Timing	Compliant: 80.3%	80.1%	
	Noncompliant: 7.4%	7.6%	
Duration	Compliant: 83.1%	83.1%	
	Noncompliant: 7.4%	7.4%	

Surgical antibiotic prophylaxis measured against Therapeutic Guidelines: Antibiotic. Procedures where antibiotics administered were unknown are not included in table.

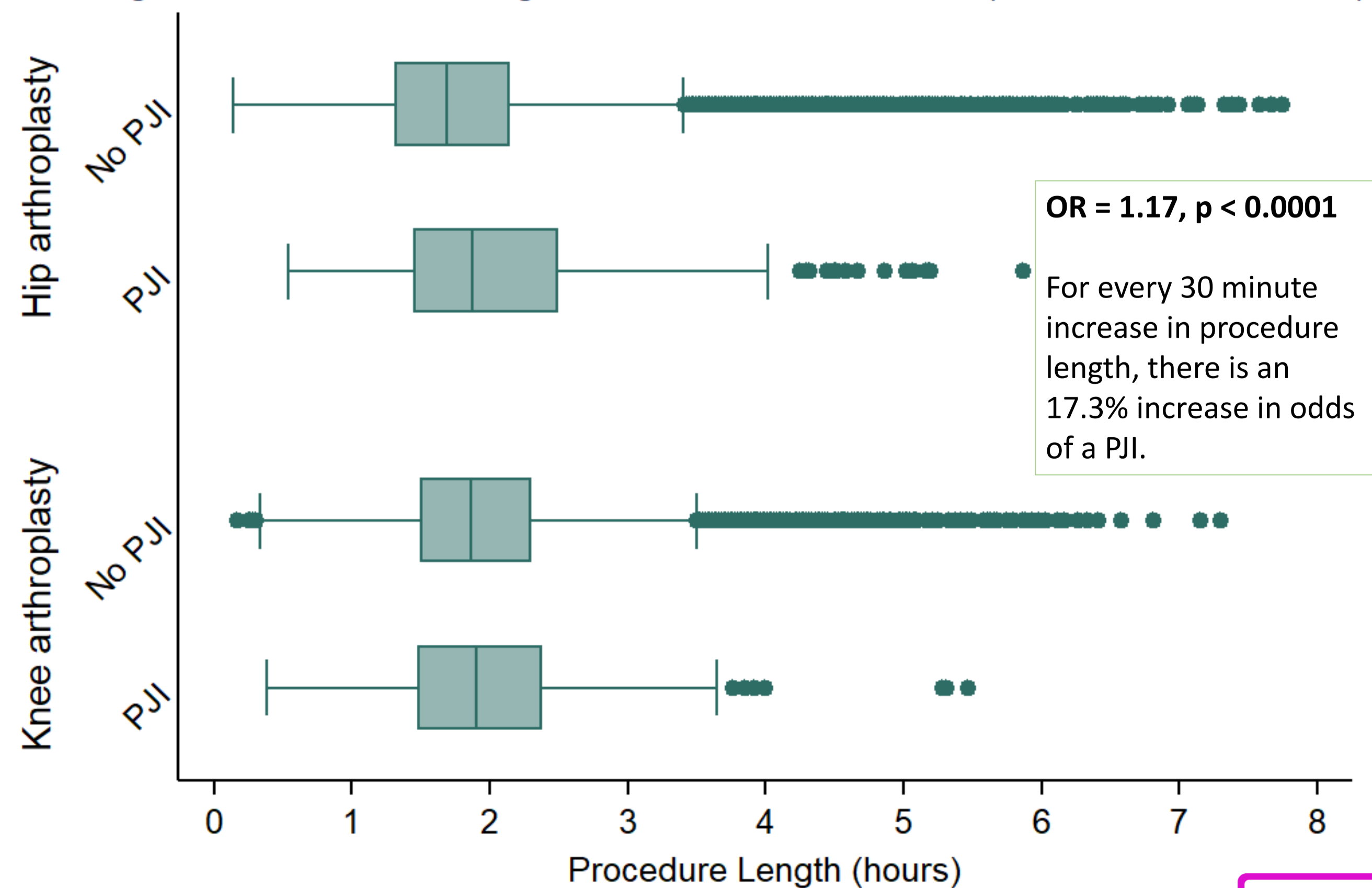
**Table 4: Rank order of most frequently reported pathogens Hip and Knee PJI, n=495 (VICNISS 2014-18)**

Rank	Pathogen	n,%	Rank	Pathogen	n,%
1	<i>S. aureus</i> - MSSA - MRSA - Unknown	174 (35.2%) 86 (49.4%) 38 (21.8%) 48 (27.5%)	6	<i>E. coli</i>	23 (4.6%)
2	Coagulase-negative Staphylococci	101 (20.4%)	7	<i>Streptococci</i> spp.	17 (4.8%)
3	<i>Pseudomonas</i> spp.	40 (8.1%)	8	<i>S. marcescens</i>	11 (2.2%)
4	<i>Enterococcus</i> spp. - <i>E. faecalis</i> - <i>E. faecium</i>	32 (6.5%) 24 (88.9%) 3 (11.1%)	9	<i>E. cloacae</i>	11 (2.2%)
5	<i>Proteus</i> spp.	27 (5.5%)	10	<i>K. pneumoniae</i>	7 (1.4%)

**Figure 1: BMI as a Risk Factor for PJI (VICNISS, 2014-2018)**



**Figure 2: Procedure Length as a Risk Factor of PJI (VICNISS, 2014-2018)**



## Key Findings and Conclusions

Enhanced risk-mitigation strategies may be required for patients undergoing procedures where a higher burden of PJI is observed: those undergoing hip compared to knee procedures, revision over primary and patients with higher BMI. While *S. aureus* remains the most common pathogen, the burden of PJI due to other pathogens is significant and requires ongoing monitoring to inform best practice.