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# NATIONAL JOINT REPLACEMENT REGISTRY



AOA

AUSTRALIAN  
ORTHOPAEDIC  
ASSOCIATION

Hip, Knee & Shoulder  
Arthroplasty

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## ANNUAL REPORT 2017



## HOSPITAL VARIATION

The Registry assessed whether there was variation in revision for both primary total conventional hip and primary total knee replacement when individual hospitals were compared. Only hospitals with 50 or more procedures were included.

In addition, the rates of revision for public and private hospitals were also compared. There are many potential factors that may influence these rates. These include differences in patient characteristics, patient expectations, access to healthcare, prostheses used, and variation in surgeon experience and training. Many of these factors cannot be controlled for in this type of comparative analysis. One factor that can be controlled for is prosthesis choice. As this was identified as an important factor in surgeon variation, an analysis was undertaken to determine if prosthesis choice had an effect on the rate of revision in public and private hospitals.

### PRIMARY TOTAL CONVENTIONAL HIP REPLACEMENT

Variation in revision between hospitals following primary total conventional hip replacement for osteoarthritis was assessed. The percentage of hospital outliers (above the upper 99.7% confidence limit) is 11.5% (Figure SV24).

The rate of revision following primary total conventional hip replacement (for osteoarthritis and fractured neck of femur separately) undertaken in public and private hospital groups was also compared.

For those procedures undertaken for osteoarthritis, private hospitals have a higher rate of revision after three months (Table SV9 and Figure SV25).

This difference was also evident when primary total conventional hip replacement was undertaken for fractured neck of femur (Table SV10 and Figure SV26).

### Use of Better Performing Prostheses

The difference in the rate of revision between public and private hospitals was further explored by restricting the analysis to the 10 prosthesis combinations with the lowest cumulative percentage revision at five years and used in at least 1,000 procedures. The number of prosthesis combinations (10) was chosen to examine the effect of prosthesis choice. As mentioned previously in the section on surgeon variation, there are many other prosthesis combinations with a similar low rate of revision.

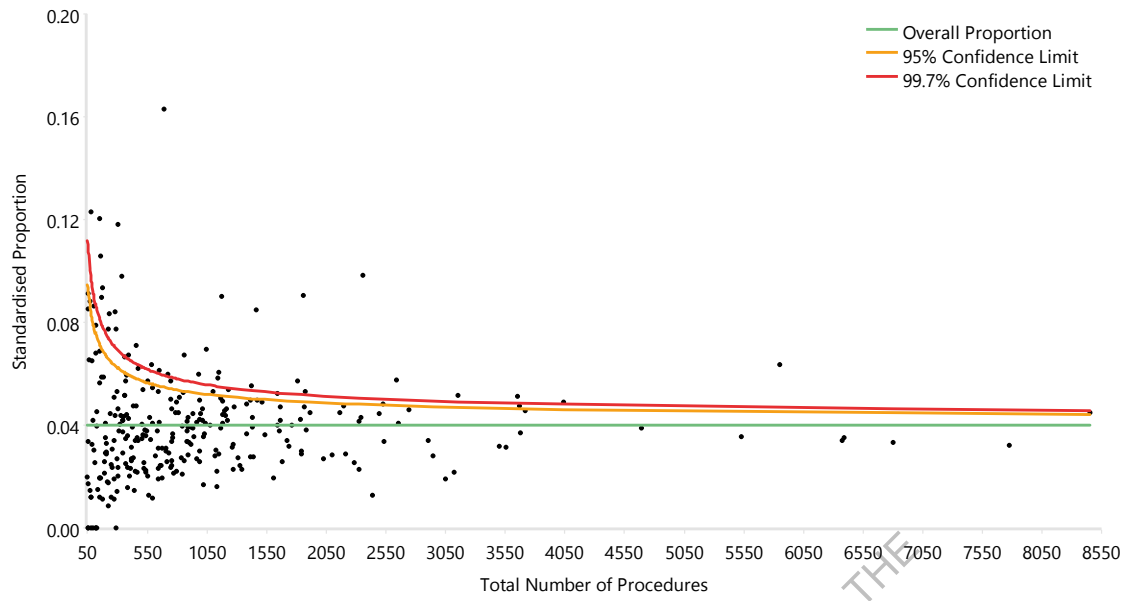
For procedures undertaken for osteoarthritis using only the 10 prosthesis combinations with the lowest cumulative percent revision at five years, there is a lower rate of revision in private hospitals in the first month, and no difference after that time (Table SV11 and Figure SV27).

For procedures undertaken for fractured neck of femur using only the 10 prosthesis combinations with the lowest cumulative percent revision at five years, there is no difference in the rate of revision between private and public hospitals (Table SV12 and Figure SV28).

These results suggest that the difference in the rate of revision between public and private hospitals is largely due to prosthesis choice.

**The difference in rates of revision between public and private hospitals is largely due to prosthesis choice.**

**Figure SV24 Funnel plot of Primary Total Conventional Hip Replacement by Hospital (Primary Diagnosis OA, Revision for Any Reason)**

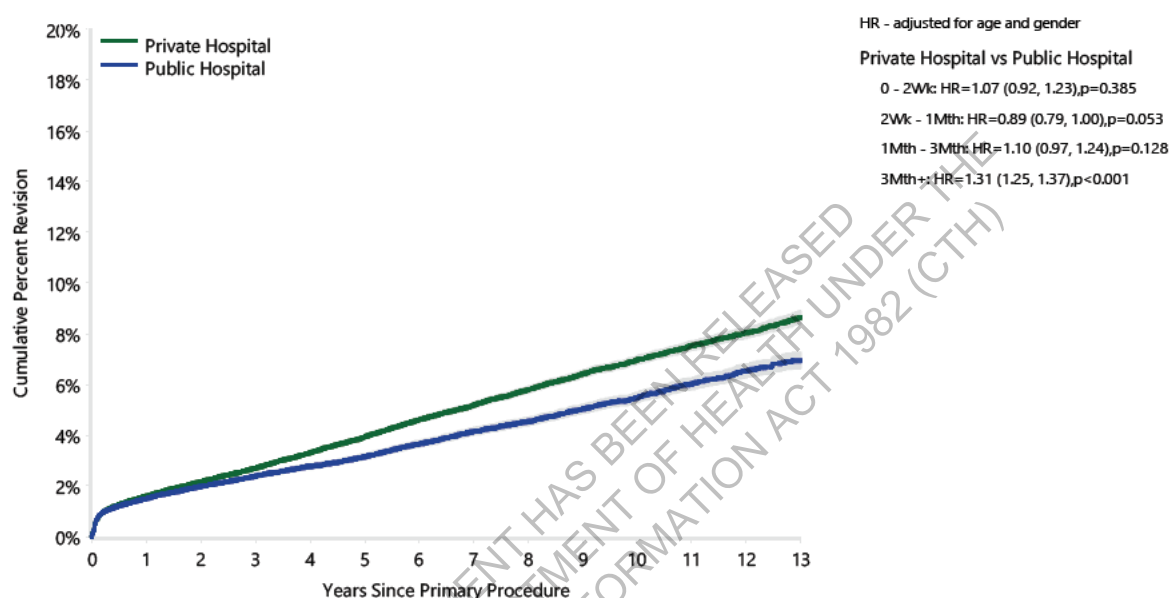


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**Table SV9 Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Hospital Type (Primary Diagnosis OA)**

Hospital Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	8910	210828	1.6 (1.5, 1.7)	2.7 (2.6, 2.8)	3.9 (3.8, 4.0)	5.2 (5.1, 5.3)	7.0 (6.8, 7.1)	8.7 (8.4, 8.9)
Public Hospital	3609	100931	1.5 (1.4, 1.6)	2.4 (2.3, 2.5)	3.2 (3.0, 3.3)	4.2 (4.0, 4.3)	5.5 (5.3, 5.7)	6.9 (6.6, 7.3)
<b>TOTAL</b>	<b>12519</b>	<b>311759</b>						

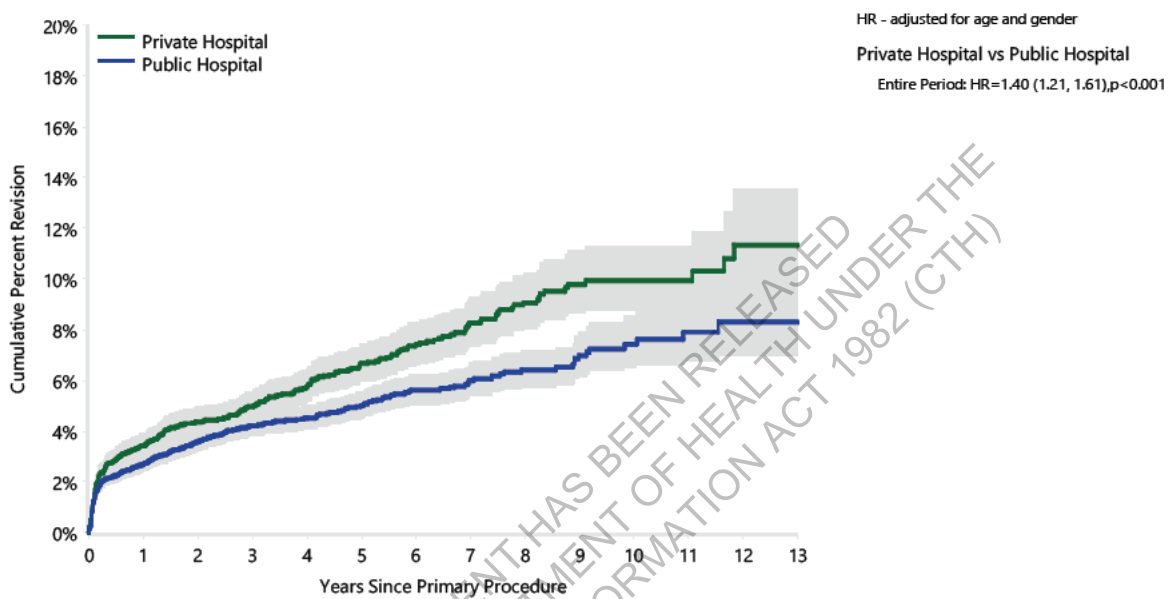
**Figure SV25 Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Hospital Type (Primary Diagnosis OA)**



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	210828	184220	138555	99366	66029	29927	5808
Public Hospital	100931	88836	68381	50871	34854	16112	3098

**Table SV10 Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Hospital Type (Primary Diagnosis Fractured NOF)**

Hospital Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	354	6118	3.4 (3.0, 3.9)	5.0 (4.4, 5.6)	6.7 (5.9, 7.5)	8.3 (7.3, 9.3)	9.9 (8.8, 11.3)	11.3 (9.5, 13.5)
Public Hospital	413	9484	2.7 (2.4, 3.1)	4.2 (3.8, 4.7)	5.0 (4.5, 5.6)	6.0 (5.4, 6.7)	7.4 (6.5, 8.5)	8.3 (7.0, 9.8)
<b>TOTAL</b>	<b>767</b>	<b>15602</b>						

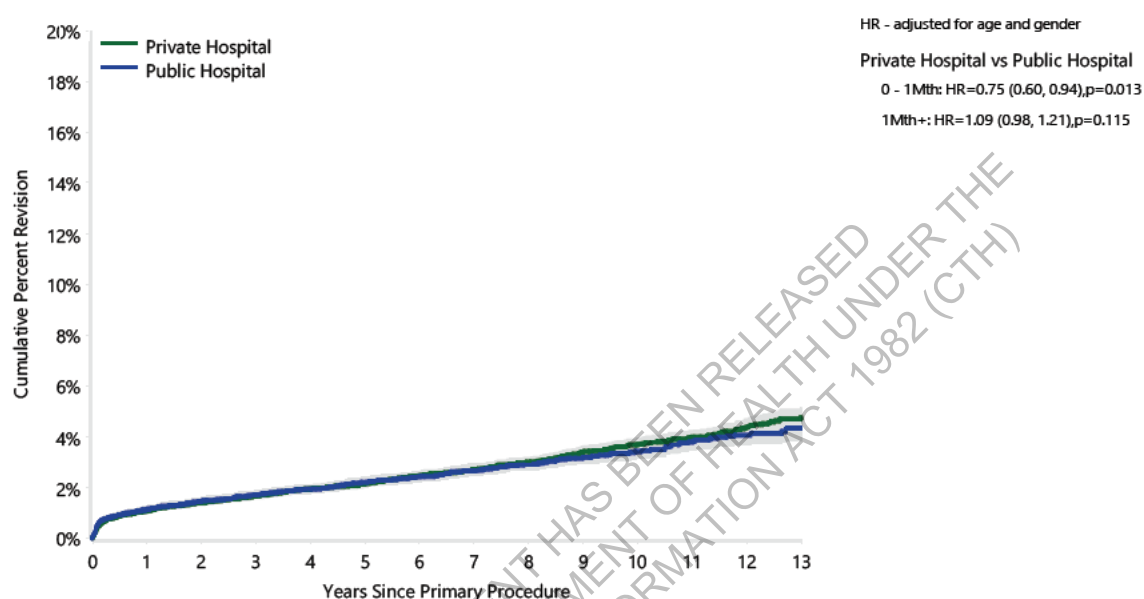
**Figure SV26 Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Hospital Type (Primary Diagnosis Fractured NOF)**

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	6118	4752	3188	2040	1183	431	63
Public Hospital	9484	7467	4846	2975	1634	497	71

**Table SV11 Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Hospital Type using the 10 Prosthesis Combinations with Lowest 5 year CPR (Primary Diagnosis OA)**

Hospital Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	1148	44909	1.1 (1.0, 1.2)	1.7 (1.6, 1.8)	2.1 (2.0, 2.3)	2.7 (2.5, 2.9)	3.7 (3.5, 3.9)	4.8 (4.4, 5.2)
Public Hospital	654	27522	1.1 (1.0, 1.3)	1.7 (1.6, 1.9)	2.2 (2.0, 2.4)	2.7 (2.5, 2.9)	3.4 (3.1, 3.7)	4.3 (3.8, 4.8)
<b>TOTAL</b>	<b>1802</b>	<b>72431</b>						

**Figure SV27 Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Hospital Type using the 10 Prosthesis Combinations with Lowest 5 year CPR (Primary Diagnosis OA)**

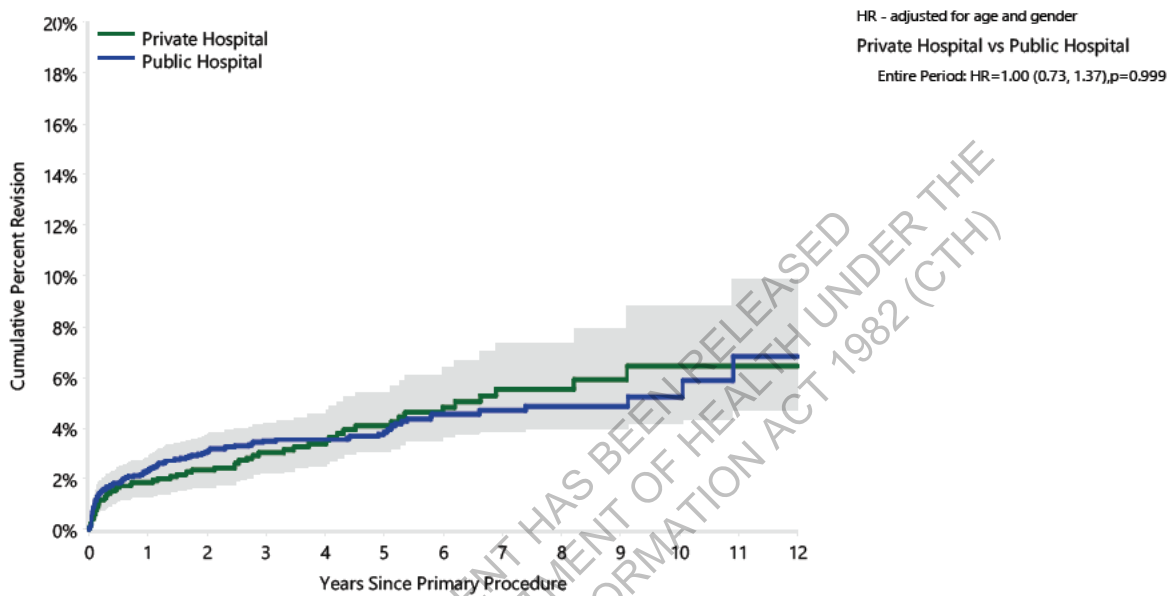


Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	44909	40668	32326	24506	17536	9048	1671
Public Hospital	27522	24372	18710	14103	9953	4738	730



**Table SV12 Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Hospital Type using the 10 Prosthesis Combinations with Lowest 5 year CPR (Primary Diagnosis Fractured NOF)**

Hospital Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	59	1634	1.9 (1.3, 2.7)	3.0 (2.2, 4.1)	4.1 (3.1, 5.4)	5.5 (4.2, 7.4)	6.4 (4.7, 8.8)	
Public Hospital	129	3688	2.3 (1.9, 2.9)	3.5 (2.9, 4.2)	3.8 (3.2, 4.6)	4.7 (3.9, 5.7)	5.2 (4.2, 6.6)	
<b>TOTAL</b>	<b>188</b>	<b>5322</b>						

**Figure SV28 Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Hospital Type using the 10 Prosthesis Combinations with Lowest 5 year CPR (Primary Diagnosis Fractured NOF)**

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	1634	1322	917	570	357	128	18
Public Hospital	3688	2927	1918	1191	631	158	19

## PRIMARY TOTAL KNEE REPLACEMENT

Variation in revision between hospitals following primary total knee replacement for osteoarthritis was assessed. The percentage of hospital outliers (above the upper 99.7% confidence limit) is 15.2% (Figure SV29).

The rate of revision following primary total knee replacement for osteoarthritis, undertaken in public and private hospital groups, was also compared. Private hospitals have a higher rate of revision after four years (Table SV13 and Figure SV30).

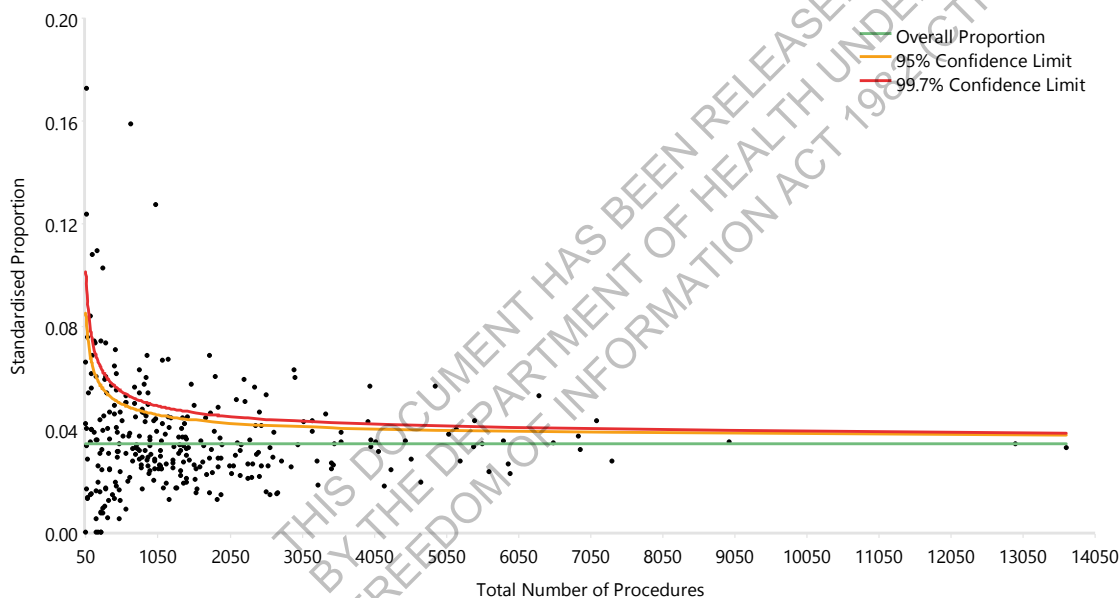
procedures performed using only the 10 prosthesis combinations with the lowest cumulative percentage revision at five years and used in at least 1,000 procedures. In this analysis, private hospitals have a lower rate of revision in the first three months and after 1.5 years (Table SV14 and Figure SV31).

As with primary total conventional hip replacement, it appears that the difference in rate of revision between private and public hospitals is largely due to prosthesis choice.

## Use of Better Performing Prostheses

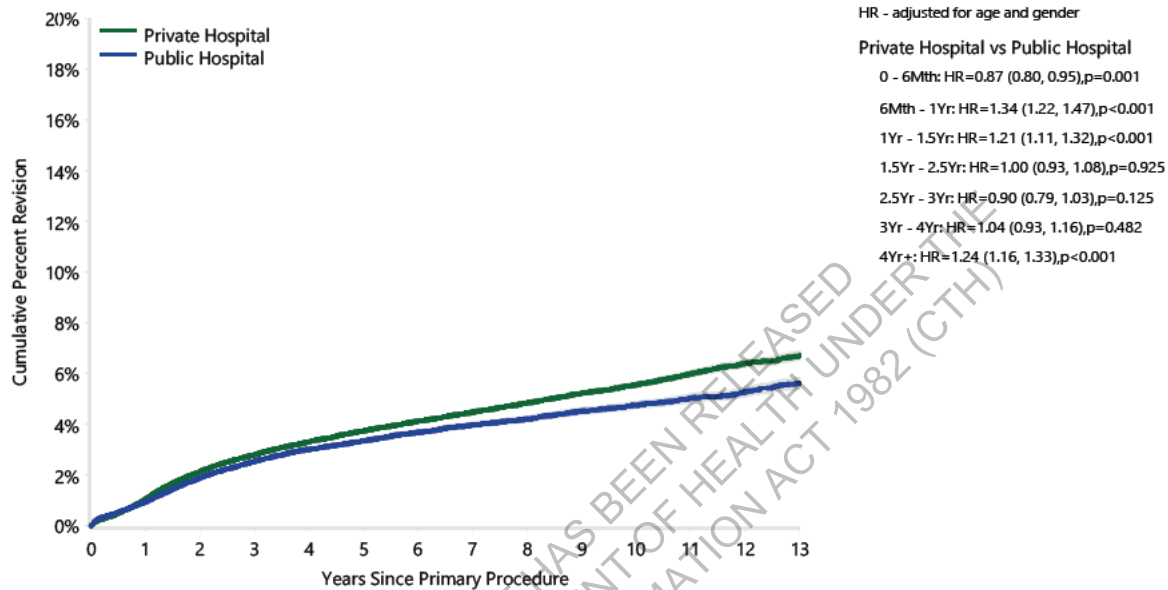
The difference in the rate of revision was further explored by comparing the outcomes of all

**Figure SV29** Funnel plot of Primary Total Knee Replacement by Hospital (Primary Diagnosis OA, Revision for Any Reason)



**Table SV13 Cumulative Percent Revision of Primary Total Knee Replacement by Hospital Type (Primary Diagnosis OA)**

Hospital Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	12111	338259	1.0 (1.0, 1.1)	2.8 (2.7, 2.9)	3.7 (3.7, 3.8)	4.5 (4.4, 4.6)	5.6 (5.4, 5.7)	6.7 (6.5, 6.9)
Public Hospital	5151	160642	0.9 (0.9, 1.0)	2.5 (2.5, 2.6)	3.3 (3.2, 3.4)	4.0 (3.9, 4.1)	4.7 (4.6, 4.9)	5.6 (5.4, 5.8)
<b>TOTAL</b>	<b>17262</b>	<b>498901</b>						

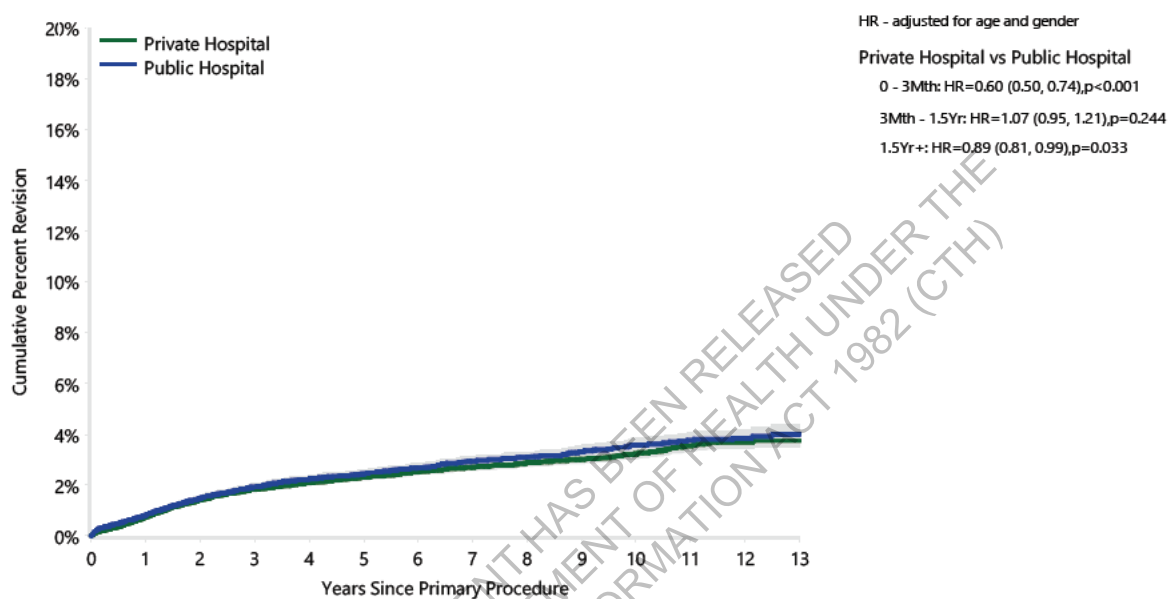
**Figure SV30 Cumulative Percent Revision of Primary Total Knee Replacement by Hospital Type (Primary Diagnosis OA)**

Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	338259	297471	222071	158463	104436	45000	8199
Public Hospital	160642	142391	108647	79446	53476	23973	4106

**Table SV14 Cumulative Percent Revision of Primary Total Knee Replacement by Hospital Type using the 10 Prosthesis Combinations with Lowest 5 year CPR (Primary Diagnosis OA)**

Hospital Type	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	2017	99701	0.7 (0.7, 0.8)	1.8 (1.7, 1.9)	2.3 (2.2, 2.4)	2.7 (2.6, 2.8)	3.2 (3.0, 3.4)	3.7 (3.5, 4.0)
Public Hospital	1131	53865	0.8 (0.7, 0.9)	1.9 (1.8, 2.1)	2.4 (2.3, 2.6)	2.9 (2.8, 3.1)	3.6 (3.3, 3.8)	4.0 (3.6, 4.4)
<b>TOTAL</b>	<b>3148</b>	<b>153566</b>						

**Figure SV31 Cumulative Percent Revision of Primary Total Knee Replacement by Hospital Type using the 10 Prosthesis Combinations with Lowest 5 year CPR (Primary Diagnosis OA)**



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	13 Yrs
Private Hospital	99701	87030	62335	39921	22725	7667	1068
Public Hospital	53865	45733	32051	20045	11197	4344	722