Australian Orthopaedic Association National Joint Replacement Registry

2026 SUPPLEMENTARY REPORT

Lay Summary: Hip, Knee and Shoulder Replacement

Australian Orthopaedic Association National Joint Replacement Registry

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Lay Summary
Hip, Knee and Shoulder Replacement

2026 Supplementary Report

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2026 Supplementary Report

Lay Summary:

Hip, Knee and Shoulder Replacement

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AOANJRR Data Snapshot 2025

2,443,994
Total number of joint replacement procedures reported by the Registry at the end of 2025

123
Data Requests

$$$$
Over a billion dollars of estimated benefit to the national health system accruing from AOANJRR activities

Joint replacement procedures performed in 2025

64,085
Hips

81,692
Knees

12,764
Shoulders

19
Hospital Audit Requests

1,200
Individual Surgeon Reports

59
Conference presentations

33
Journal Articles Published

National PROMs Data Collection

June 2026 Update

Participating Hospitals
246

Pre-Op PROMs
178,424

Post-Op PROMs
132,801

Pre-Op Completion Rate
73.6%

Post-Op Completion Rate
62.2%



% patient-reported change following hip, knee, or shoulder joint replacement as "much better"
84.9%

% patient "very satisfied" or "satisfied" following hip, knee, or shoulder joint replacement
87.7%

Total Number of Hospitals Onboard per State /Territory:

- SA: 30
- ACT: 6
- NSW: 66
- VIC: 67
- NT: 3
- WA: 21
- QLD: 45
- TAS: 8

904
Total number of surgeons participating

192,626
Patient participation through AOANJRR patient dashboards

Introduction

This summary is an explanation of the major findings of the Australian Orthopaedic Association National Joint Replacement Registry 2026 Annual Report for Hip, Knee and Shoulder Arthroplasty (replacement). This is the major clinical report produced by the Registry each year. The full version of the 2026 Annual Report on Hip, Knee and Shoulder Arthroplasty is available in the 'Publications' section of the Registry website https://registry.aoa.org.au/annual-reports-2026.

The Lay Summary is provided to ensure that a clear, concise, and easily understood explanation of the published findings are available to all those who may be interested. The Lay Summary also provides guidance for those who may wish to further review the full extent of the data published by the Registry in the Annual Report. The Australian Orthopaedic Association (AOA) believes this is especially important because of the high level of community interest in the Registry and the need to ensure that reports are accessible to all.

This year's report involved the analysis of 2,443,994 primary and revision procedures (1,036,341 hips, 1,287,308 knees and 120,345 shoulders).

This is the total number of hip, knee and shoulder replacement operations recorded by the Registry with a procedure date up to and including 31 December 2025. Some of the prosthesis designs reported since the Registry first began collecting data in 1999 are now no longer used. Understandably, the performance of many of these older designs is not quite at the same standard as the currently used prostheses (described as 'modern prostheses'). To ensure that the relevance and currency of AOANJRR data are maintained, almost all analyses (unless specifically stated) have been limited in this year's report to modern hip, knee and shoulder prostheses, i.e. those prostheses that were still being used in 2025. Most of the operations that have been reported to the Registry over the years have used modern prostheses. The effect of not including prostheses that are no longer used is that overall outcomes reported for the different device classes are better and a smaller number of individual prostheses/prosthesis combinations are listed in the report.

In addition to the Annual Report and this Lay Summary, there are a further 13 supplementary reports published by the Registry on the website: https://registry.aoa.org.au/annual-reports-2026.

A Brief History of the Registry Origins

The AOA started the National Joint Replacement Registry in 1999. It was initially for hip and knee replacement only. This was a complex system to set up, and therefore it took almost 3 years to fully implement the Registry across Australia. Since mid-2002, the Registry has received information on almost all hip and knee replacements undertaken in Australia. The Registry receives this information from over 300 hospitals.

In November 2007, the Registry commenced national data collection on a number of additional types of joint replacement. This included shoulder joint replacement procedures, the analysis of which is presented along with hip and knee replacement in the main report. The other additional types of joint replacement that the Registry collects information on include elbow, wrist, ankle, and spinal disc replacement. The analysis of these procedures is presented in the supplementary reports available on the Registry website.

In 2018, the Registry started collecting information directly from patients. These are known as patient-reported outcome measures (PROMs). The Registry collects this information from people happy to provide it, both before and 6 months after their operation. The purpose is to better understand the results of joint replacement by having good information from patients on the extent of problems that they have, not only with the joint being operated on, but also their general health and then how these change after the operation.

PROMs data are collected directly from patients invited by the Registry to answer a number of electronic survey questions. The questions are designed to provide an overview of a patient's general health, their ability to complete everyday activities and how much pain they are getting from the joint. By asking these questions before and after surgery, as well as additional questions about how happy they are with the joint replacement, the Registry is able to better understand the extent of problems that patients are having before their operation and then how much this has changed after it. This data provides really important new information that the Registry has not previously had, which is the patient's opinion on the benefit or otherwise of the joint replacement.

The Purpose of the Registry

The AOA started the Registry to improve the results of joint replacement surgery in Australia. Generally, this type of surgery is very successful but as with all areas of healthcare, there is always room for improvement. Since the Registry commenced data collection, there has been an improvement in the outcomes of this surgery.

One of the most serious consequences of a less than successful operation is the need to have a revision (redo) operation. The Registry provides information to assist surgeons to keep the number of these operations to a minimum. It does this by identifying those things that work best and highlighting what can be improved.

Supplementary Reports

The Registry publishes data in addition to that included in the Annual Report, in the following Supplementary Reports:

1. **Partial Shoulder Arthroplasty**
   Detailed information on Partial Shoulder Replacement is available in this supplementary report. A summary of Partial Shoulders is provided in the main report.

2. **Demographics of Hip, Knee and Shoulder Arthroplasty**
   This report details the age and sex profile of people receiving hip, knee or shoulder replacement and includes information on the reasons for undergoing replacement surgery.

3. **Cement in Hip and Knee Arthroplasty**
   This report details the use of the different types of cement in hip and knee replacement surgery.

4. **Mortality of Hip, Knee and Shoulder Arthroplasty**
   This report details the risk of dying following the different types of hip, knee and shoulder replacement surgery.

5. **Shoulder Arthroplasty Comparative Analyses: No Difference Observed Supplementary Report**
   This report presents data from AOANJRR analyses of shoulder replacement. The comparisons show no significant difference.

6. **Metal/Metal Bearing Surface in Total Conventional Hip Arthroplasty**

This report details the outcome of metal/metal bearings when used with large (greater than 32mm) femoral heads.

Prior to establishing the Registry, Australian orthopaedic surgeons felt they had a lack of detailed information on the results of the many different procedures and types of joint replacement available. In particular, the surgeons required information to compare the impact of the many different factors known to influence the results for their patients.

Surgeons have a large choice of different types of artificial joints that they can use to replace damaged and painful joints. There are also different techniques that can be used to put these artificial joints in place. Surgeons know that there is variation in the results depending on the patient, the nature of the patient's problem, which joint is being replaced, the way the operation is performed, and the type of artificial joint replacement used.

The Registry is able to compare all of these different factors simultaneously. In doing so, it provides information to assist surgeons to decide the best type of artificial joint replacement to use in any particular situation. The Registry can detail the results for different classes (or categories) of artificial joints and different individual types of artificial joints in each of the classes. It can also determine if patient age, sex, weight, general health, and/or the reason a joint replacement is performed affect the result.

It is important to emphasise that this is not the only information that is used to determine what the best approach should be. When providing advice to patients, surgeons will also rely on their training and experience as well as information from medical journals, other registries elsewhere in the world, conferences, and courses they may attend, as well as learning from other surgeons.

The Registry provides information to assist in deciding the best type of artificial joint replacement to use in any particular situation.

When surgeons interpret information from the Registry, they use their knowledge and experience to put that information into context. The Registry does not decide or recommend the best joint replacement for a particular patient. This can only ever be decided by the surgeon in consultation with the patient. In this way, all factors relevant to each individual patient can be carefully taken into consideration.

Supplementary Reports

7. **Demographics and Outcomes of Elbow and Wrist Arthroplasty**
   This report details the age and sex profile of people receiving elbow and wrist surgery. It includes reasons for undergoing these different types of joint replacement as well as some early information on the outcome of these operations.

8. **Demographics and Outcomes of Ankle Arthroplasty**
   This report details the age and sex profile of people receiving ankle joint replacement and reasons for undergoing ankle replacement as well as some early information on the outcome of this operation.

9. **Demographics of Spinal Disc Arthroplasty**
   This report details the age and sex profile of people receiving spinal disc replacement and reasons for undergoing this operation.

10. **Shoulder Replacement in Australia**
    This report presents a broad overview of shoulder arthroplasty outcomes as reported to the AOANJRR.

How the Registry Works

The Registry collects a small amount of confidential information on each joint replacement operation undertaken in Australia, with the exception of those people who choose not to have their information collected by the Registry.

The information collected includes age, sex, weight, height, general health, the reason for the surgery, the joint type, and whether it was on the right or the left side. Information on the type of artificial joint and the components used in the operation are also collected.

Currently the Registry monitors and has information on over 2 million joint replacement operations.

As previously mentioned, if a problem occurs following a joint replacement one of the possible outcomes is that the operation is redone. This is referred to as a revision procedure. The Registry is notified about the revision, records this information and links it to the first (or primary) operation. The Registry can then determine how many primary procedures have been revised, the reason for the revision, how long after the original surgery, and can also record which of the components (if any) were replaced.

Who Funds the Registry?

The Commonwealth Government, through the Department of Health, Disability and Ageing, funds the Registry. The Government and the Department have been very supportive of the Registry. They provided the initial funding to establish the Registry and have maintained its core funding since the Registry commenced.

Supplementary Reports

11. **Prosthesis Types with No or Minimal Use**
    This report details the outcomes of classes of hip and knee replacement that are no longer used or have minimal use and therefore do not appear in the main report.

12. **Comparative Prosthesis Performance**
    This report provides summary data and outcomes for comparative prosthesis performance.

13. **Patient Reported Outcome Measures (PROMs)**
    This report provides information on patient reported outcome measures (PROMs) which are surveys that assess dimensions of health from the perspective of the patient.

How the Registry Presents the Results

The fact that the Registry is a national database means it reports on the results of a very large number of operations, which improves the value and accuracy of the information. Currently, the Registry monitors and has information on almost 2 million joint replacement operations.

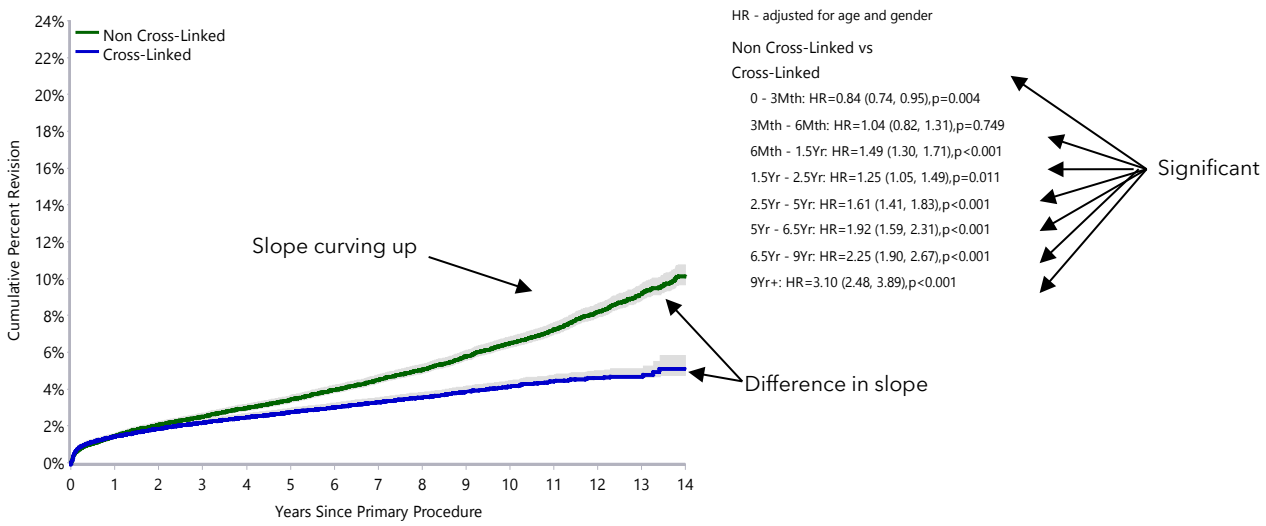
The Registry presents the results in different ways. The clearest and most important way is by graphs and tables. We know the time until the redo (revision) operation and so we can calculate the percent of procedures that have been revised at 1, 2, and 3 years after the original procedure. This is known as the cumulative percent revision. There are many things that can affect this i.e. make it lower or higher. The aim is to identify what things make the cumulative revision rate lower, which means that there is less chance of needing to have the operation again. This is done by comparing results of surgery undertaken in different types of patients (young vs older, male vs female, heavy vs normal weight, etc.), different types of joint replacement prostheses, and different techniques for implanting the device. Examples of different techniques include the use of different types of instruments, or robotic surgery, or the operative approach. By comparing these different groups, we are not only able to understand what works better in certain situations but also what does not work so well.

GRAPHS

To assist in the interpretation of any difference, the Registry often graphs the results. Figure L1 (below) is a typical example of a cumulative percent revision graph which is comparing two different types of plastic used in hip replacement. The cumulative percent revision which gets progressively greater as time progresses is plotted for each group at specific times since the original surgery. The time period scale is usually in years since the first operation.

The lines on the graph represent the results for the factors being compared. The more the lines slope upwards the greater the number of revision (redo) operations that have been done. In general, the greater the difference in the slope of the lines the more important the difference. This graph shows that there are more revisions when non cross-linked polyethylene (the green line) is used compared to cross-linked polyethylene (the blue line).
The information on the right-hand side of each of these graphs is important. This gives a measure of the amount of difference, how this is changing with time, and how confident you can be that the difference is real. The most important information is the HR (hazard ratio) and the p (probability) value. These are explained a little further down.

Example of a graph with Cumulative Percent Revision which compares the results of two different types of bearing surfaces commonly used in joint replacement surgery (cross-linked and non-cross-linked polyethylene)



TABLES

The Registry also reports data in cumulative percent revision tables (see below) which accompany these graphs. These tables give the number of revisions as a percentage of the number of operations at particular times, i.e. 1 year, 3 years, etc. The numbers are simply the values on the graph at these specific time points and are listed to provide the actual number for each year so that the number does not need to be guessed at by looking at the graph.

This table also shows some values in brackets after the main number i.e. at 10 years the main number is 5.3%, which means that at 10 years if you are still alive you have a 5.3% chance of having a revision. The reason that there are numbers in brackets afterward (in this case 5.2 and 5.4) is that 5.3% is not an exact number, it is an estimate based on the analysis of all the data. The numbers in the brackets represent the 95% confidence interval. This means that the estimate is 5.3% and there is 95% confidence that the actual or real number is somewhere between 5.2% and 5.4%. This is a small confidence interval which is usually when the number of operations is large. When the confidence interval is small the estimate is likely to be accurate.

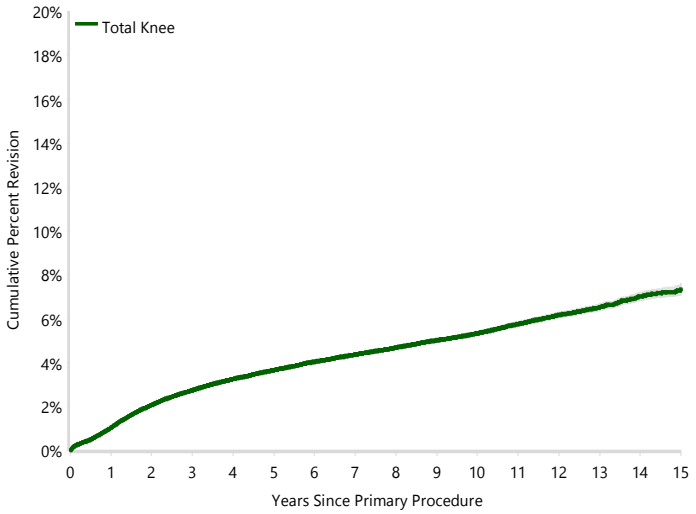
On occasion, the Registry provides only cumulative percent revision tables and does not provide the graphs. This is usually when the results of many different replacements in one category are being presented. The reason the graphs are not provided for each of the different replacements is simply a space issue. It would make the report too large.

When examining the tables, it can be seen that there is variation in the outcome of the different prostheses that are listed. It is important to understand that just because a prosthesis combination has a higher cumulative percent revision than other prosthesis combinations, it does not necessarily mean that the combination is not as good. It is possible that this difference in the number of revisions between the prostheses has occurred by chance rather than being a true difference. In reality, most but not all prostheses have equally good results.

Example of a table and corresponding graph

Figure KT12 Cumulative Percent Revision of Primary Total Knee Replacement (Primary Diagnosis OA) from the 2017 Registry Annual Report

Knee Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs	15 Yrs
Total Knee	17213	482373	1.0 (1.0, 1.1)	2.7 (2.7, 2.8)	3.6 (3.6, 3.7)	4.4 (4.3, 4.4)	5.3 (5.2, 5.4)	7.3 (7.1, 7.6)
TOTAL	**17213**	**482373**						



HAZARD RATIOS

Hazard Ratios (HR) are used to compare 2 different factors such as non cross-linked poly (non XLPE) compared to cross-linked poly (XLPE). The HR is an indication of the difference in the risk of revision for non XLPE compared to XLPE. For example, if the HR=3, this means that there is a three times greater risk of being revised. If the HR=1, then this means that there is no difference. If the HR=0.5 then this means that that risk of revision is half.

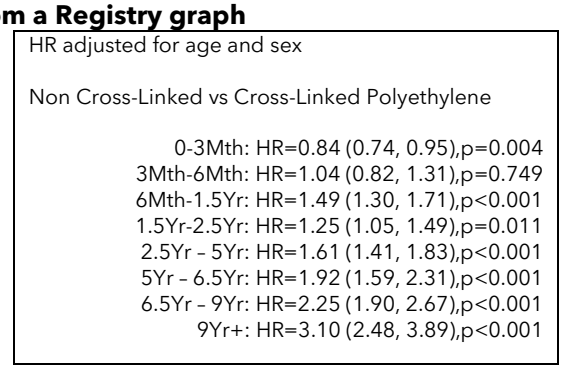
The p value is a measure of the likelihood that a difference observed between groups being compared is real, rather than occurring by chance. In statistical terms, this is called significance. The difference is regarded as significant (in other words likely to be true) if a p value is smaller than 0.05. A p value of 0.05 means that there is a 1 in 20 chance that the difference is not true. A p value of 0.001 means that there is only a 1 in 1,000 chance that the difference is not true. In other words, it is more certain that the difference is real.

Quite often different hazard ratios (HRs) are listed for different time periods as above. The time period is the number that is on the left. The values in the brackets after the HR number are the possible lower and upper limits of the HR. The reason that these numbers are given is that the HR number is an estimate just like the revision estimate and the numbers in the brackets indicate that there is a 95% degree of certainty that the actual HR falls within this range. Again, in the same manner as the revision estimate. For instance, the first entry in Figure L3 (below) referring to the 0-3 month period has a lower limit of 0.74 and an upper limit of 0.95. The HR value of 0.84 is the arithmetic mean (average) value of the upper and lower limit but because this is an estimate there is a possibility that the actual HR is not this figure but there is a 95% likelihood that it falls within the range identified by the numbers in the brackets.

When the Registry compares two different factors, such as non cross-linked to cross-linked polyethylene, to see if there is a difference, it also tests whether that difference changes with time. That is why all the different time periods are listed. With this particular comparison, it can be clearly seen that the difference between the two different polyethylene types is increasing as the time after the original operation increases i.e., the HR is increasing with time after surgery.

The length of time after the initial operation, when differences become evident, is an important piece of information in helping to determine why there is a difference. Using Figure L3 as an example, the HRs have been divided into eight time periods, the time from the joint replacement to 3 months after the surgery, then 3 months following the surgery to 6 months, and so on. There are many reasons why some things may differ soon after surgery and these reasons often change as the time after surgery increases. What can also happen, as is the case in the example provided, is that the extent of difference can vary with time; sometimes the difference is greatest early, and other times the difference may increase as time progresses which is what has occurred with this example. In some graphs, the difference does not change with time but is the same from start to finish. When this occurs then instead of having a list of different time periods, only one HR will be given, and it will state that the HR is over the entire period.

Example of a hazard ratio from a Registry graph



Modelling the Lifetime Risk of Revision

Each year, the AOANJRR Annual Report includes a Special Chapter that explores a topic of particular interest to surgeons and the wider orthopaedic community. These chapters provide new information and insights to help improve joint replacement surgery and patient outcomes.

The 2026 Special Chapter examines the lifetime risk of revision surgery following hip, knee and shoulder replacement.

What is the lifetime risk of revision surgery?

Joint replacement surgery is one of the most successful treatments for people with painful or damaged joints. Improvements in surgical techniques and artificial joints mean that hip, knee and shoulder replacements are lasting longer than ever before.

However, artificial joints do not always last a person's lifetime. Some patients may eventually need another operation to repair or replace their artificial joint. This is called revision surgery.

The lifetime risk of revision is the estimated chance that a person will need further surgery on their artificial joint during the rest of their life.

This risk is particularly important for younger patients, who are likely to live longer with their joint replacement and therefore have more time in which problems could develop.

The AOANJRR has collected information on joint replacement surgery in Australia since 1999. Using this information, the Registry has estimated the lifetime risk of revision surgery for patients having hip, knee and shoulder replacements.

What did the Registry find?

The most important finding is that the younger a person is when they have their joint replacement, the greater their lifetime risk of needing further surgery.

Other factors that can affect the risk include:

- Age: Younger patients have a higher lifetime risk because they are expected to live longer with their artificial joint.
- Sex: Males generally have a higher risk of revision following hip and total knee replacement, while females have a higher risk following partial knee replacement.
- Body weight: Patients who are obese generally have a higher lifetime risk of revision.
- General health: A patient's overall health at the time of surgery can influence their risk of revision.
- Type of artificial joint: The materials and design of the replacement, and how it is fixed in place, can affect how long it lasts.

Hip Replacement

The Registry examined more than 486,000 hip replacements performed for osteoarthritis, a condition that causes pain and damage to joints. The findings show that:

- Patients aged 46–50 years have an estimated 28% lifetime risk of needing revision surgery. This means approximately 28 out of every 100 patients in this age group may need another operation during their lifetime.
- The lifetime risk decreases with age and is much lower for patients aged over 85 years.
- Males generally have a higher lifetime risk of revision than females.
- Patients who are obese have a higher risk of revision than those who are not obese.
- Infection is currently the most common reason for revision surgery following hip replacement. Other reasons include fractures, the artificial joint becoming loose or moving out of position.

The Registry also found that the materials used in hip replacements can make a difference. In particular, a newer type of plastic called highly cross-linked polyethylene (XLPE) is associated with a lower lifetime risk of revision than older types of plastic, especially in younger patients.

Knee Replacement

There are two main types of knee replacement:

- Total knee replacement replaces the joint surfaces of the knee.
- Partial knee replacement replaces only the damaged part of the knee.

The Registry examined more than 824,000 knee replacements undertaken for osteoarthritis.

PARTIAL KNEE REPLACEMENT

The findings for partial knee replacement are:

- Patients younger than 50 years have an estimated 63% lifetime risk of revision surgery.
- For patients older than 85 years, this risk falls to 4% or less.

- Females generally have a higher lifetime risk of revision than males.

The most common reasons for revision include arthritis developing in other parts of the knee, loosening of the artificial joint and ongoing pain.

TOTAL KNEE REPLACEMENT

The findings for partial knee replacement are:

- Patients younger than 50 years have an estimated 31% lifetime risk of revision surgery.
- For patients older than 85 years, this risk falls to approximately 2%.
- Males generally have a higher lifetime risk than females.
- Patients who are obese have a higher risk of revision.
- Infection is currently the most common reason for revision surgery. Other reasons include loosening and instability of the artificial joint.

The Registry also found that the design and materials used in knee replacements can influence the risk of revision. Knees using XLPE have a lower lifetime risk of revision than those using older types of plastic.

Although partial knee replacement has a higher lifetime risk of revision than total knee replacement, it may still be an appropriate treatment for some patients. The choice of procedure depends on the patient's individual circumstances.

SHOULDER REPLACEMENT

There are two main types of shoulder replacement:
Anatomic shoulder replacement replaces the damaged joint surfaces while keeping the shoulder's natural arrangement.
Reverse shoulder replacement changes the arrangement of the joint and is often used when the muscles and tendons supporting the shoulder are damaged.

The Registry examined more than 71,000 shoulder replacements and found that:

- Patients aged 46–50 years having an anatomic shoulder replacement have an estimated 34% lifetime risk of revision.
- Patients younger than 50 years having a reverse shoulder replacement have an estimated 32% lifetime risk of revision.
- As with hip and knee replacements, the lifetime risk decreases with age.
- Females generally have a higher lifetime risk following anatomic shoulder replacement, while males have a higher risk following reverse shoulder replacement.

The most common reasons for revision include problems with the muscles and tendons supporting the shoulder, the artificial joint becoming loose or moving out of position, and fractures.

Conclusion

Joint replacement surgery remains a highly successful treatment, helping many Australians reduce pain, improve movement and return to everyday activities.
The findings show that a person's age at the time of surgery is an important factor affecting their lifetime risk of revision.
They also show that the choice of artificial joint, its materials and design, and a patient's general health can influence the likelihood of needing further surgery.
These findings can help surgeons and patients better understand the long-term risks and benefits of joint replacement and make informed decisions about treatment.

!

An important point about these estimates

The lifetime risks presented in this report are estimates, not predictions of what will happen to an individual patient.
Although the Registry has collected information for more than 25 years, most patients have not been followed for their entire lifetime. The Registry has therefore used statistical modelling to estimate what may happen in future years.
This means the results become less certain when estimating outcomes many years into the future.
Patients should discuss their individual circumstances, treatment options and likely outcomes with their surgeon.

Ten, Fifteen and Twenty Year Prosthesis Outcomes

This chapter provides information on hip and knee prostheses that have the longest follow-up in the Registry. It is very important to understand what the revision rates for different types of joint replacement are in the long term. The aim of joint replacement surgery is to relieve pain and restore function for as long as possible. Those prostheses with the lowest rates of revision over many years achieve this best.

Since the Registry commenced data collection, the risk of a revision operation has gone down. A major reason for this has been the improvement in the prostheses used. Since the Registry started collecting data over 20 years ago, many of the prostheses being used back then are no longer available. When considering which are the best prostheses to use, there is little point in considering the results of devices that are no longer available. It is for this reason that only procedures using prostheses that have been available and used in 2025 (described as modern prostheses) are included in these analyses.

Ten Year Outcomes

This year, the Registry is reporting on the outcome of 46 different modern hip prostheses (combinations of femoral and acetabular prostheses with at least 10 years of follow-up). Prostheses with 10 years of follow-up data account for 85.4% of all primary total conventional hip procedures being undertaken in Australia. The cumulative percent revision of primary total hip procedures that have 10 years of follow-up data varies from 1.9% to 8.0%. In this analysis, two groups of devices have been identified that have performed to a high standard, i.e. they are revised less often than other devices. There are prostheses with what is referred to as a 'superior benchmark' and then a second group which have been identified as having a 'non-inferior benchmark'.

All of these devices have proven low revision rates at 10 years. The superior benchmark devices have either a slightly lower revision rate than the non-inferior benchmark devices, or the certainty of the lower revision rate is higher. Both of these groups have what is regarded as low revision rates at 10 years. The Registry identified 12 hips with a superior benchmark and an additional 13 hips with a non-inferior benchmark. In other words, of the 46 different modern hip prosthesis combinations, 25 (54.3%) are identified as having low revision rates at 10 years. This is regarded as a very good result for these 25 different hip replacements.

It is important to appreciate that many factors contribute to the revision rates of different prostheses and many of the prostheses not identified as having a superior or non-inferior performance are likely to give excellent results. Surgeons are always happy to discuss the choice of prostheses with patients as it is a chance to alleviate any concerns around this.

A similar analysis was undertaken for primary total knee replacement. The Registry identified 37 modern total knee replacement combinations with data for 10 years or more. This group accounts for 92.4% of all the total knee procedures reported to the Registry. The percentage of knee replacement procedures that have 10 years of follow-up data and have been revised varies from 2.9% to 11.6%.

The Registry identified 8 knee prostheses with a superior benchmark and an additional 9 prostheses with a non-inferior benchmark. In other words, of the 37 different modern knee prostheses combinations, 17 (45.9%) are regarded as having a very good result.

This year, the Registry is reporting on 6 total stemmed anatomic shoulder replacement combinations that have been used to treat patients with osteoarthritis. These prosthesis combinations were used in 97.5% of all primary total stemmed anatomic shoulder replacement procedures performed for osteoarthritis. This group had revision rates at 10 years from 3.7% to 24.6%, with an average of 7.9%. One of the implants qualified for a superior result, and one implant qualified for a non-inferior result.

There were 8 total stemmed reverse prostheses with 10 year outcomes representing 79.5% of modern implant combinations. The rate of revision ranged from 3.2% to 9.5% with a benchmark of 5.4%. Again, there were 2 prostheses with a superior outcome, and one prosthesis combination was non-inferior.

Fifteen Year Outcomes

The Registry also has information on currently used prostheses (22 hips and19 knees) that extends out to 15 years. Many of the devices have performed well.

The percentage of hip procedures that have 15 years of follow-up data and have been revised varies between 4.2% and 17.0%. The Registry identified 4 hip prostheses with a superior benchmark and an additional 4 prostheses with a non-inferior benchmark. In other words, of the 22 different modern hip prosthesis combinations, 8

(36.4%) are identified as having low revision rates at 15 years.

For knee replacements, the percentage of procedures that have 15 years of data and have been revised varies between 4.7% to 11.1%. The Registry identified 3 knee prostheses with a superior benchmark and an additional 5 prostheses with a non-inferior benchmark.

In other words, of the 19 different modern knee prostheses combinations, 8 (42.1%) are regarded as having a very good result at 15 years.

Twenty Year Outcomes

The Registry can report 20 year outcome data for 8 hip and 8 knee combinations of prostheses that are currently being used. The hip prosthesis combinations have been used in 38.5% of all primary total conventional hip replacement procedures performed for osteoarthritis. The 20 year cumulative percent revision ranges from 6.2% to 25.7%.

The knee prosthesis combinations were used in 40.2% of all primary total knee replacement procedures performed for osteoarthritis. All 8 combinations were used in 2025. The 20 year cumulative percent revision ranges from 7.0% to 14.1%.

Hip Replacement

The Registry considers three different categories of hip replacement. These are primary partial, primary total and revision hip replacement. Each of these categories is divided into a number of different classes. These are described in the Annual Report at the start of the section on hip replacement.

There were 63,280 hip replacements undertaken in 2025.

Primary partial hips account for 13.6% of all hip replacements reported to the Registry since it commenced data collection. Primary total hips account for 76.7% and revision hips 9.7%.

The proportion of hip replacement procedures that are undertaken each year that are revision operations is called the revision burden. The aim of any intervention to improve the outcome of joint replacement is to reduce the revision burden. The revision burden has declined since 2003, with the exception of 2011. In that year, the Registry reported an increase in the revision burden. This was largely due to the high revision rate of large head metal on metal hip replacements and, in particular, the ASR XL prostheses. In 2012, the revision burden again declined and has continued to decrease since that time. In 2011, the revision burden was 12.6%, in 2012 it was 11.9%, in 2013 it was 10.7%, and in 2025 it has decreased to 6.9%.

The Registry data continues to show that, in general, Australian surgeons have increasingly used approaches to hip replacement and hip replacement prostheses that the Registry has identified as being associated with an improved result. This is particularly evident in recent years with the increased use of prostheses known to have excellent outcomes over a long period and the decreased use of those that are known to have a less satisfactory result. It is anticipated that the effect of these changes will have a progressively beneficial impact on the revision burden in the coming years.

Primary Partial Hip Replacement

Most partial hip replacements are used to treat broken hips. Elderly patients with a broken hip involving a complete fracture at the base of the femoral head (ball of the hip joint), which is significantly displaced (moved out of position). This is commonly referred to as a sub-capital fractured neck of femur.

The Registry has previously reported that the risk of further revision surgery following the treatment of broken hips with primary partial hip replacement is dependent on a number of factors. These include the age at the time of surgery, class of partial hip replacement, method of fixation, and the type of prosthesis used.

There are three main classes of partial hip replacement: unipolar monoblock prostheses, unipolar modular prostheses, and bipolar prostheses. Each has its place in the management of broken hips.

When the Registry first started collecting data, unipolar monoblock prostheses were the most common type of partial hip prostheses used. Of the three types of partial hip replacement, this has the highest rate of revision. The use of these devices, however, has continuously declined over the years, and they are now rarely used.

Bipolar prostheses are revised less frequently than unipolar modular prostheses when individuals are less than 75 years of age.

The use of cement fixation reduces the risk of revision by approximately half, regardless of the class of partial hip replacement. Consequently, in recent years, there has been a dramatic increase in the use of cement fixation when partial hips are used. However, the vast majority of partial hip replacements will do well, whether they are cemented or not.

Primary Total Hip Replacement

There are two main classes of primary total hip replacement. The first and most common is total conventional hip replacement, which involves replacing the femoral head (ball of the hip joint) as well as the acetabulum (socket of the hip joint). The second is a total resurfacing hip replacement. Although the socket is replaced in a similar way to a conventional hip, it differs in that only the surface of the femoral head is replaced, rather than the whole head.

Overall, resurfacing hip replacement has a higher rate of revision compared to primary total conventional hip replacement. In recent years, the use of total resurfacing hip replacement has continued to decline. Primary total resurfacing hip replacement represents 1.5% of all hip replacements performed in 2025. In 2025, the number of primary total resurfacing procedures is 43.4% more than in 2024.

Primary Total Resurfacing Hip Replacement

Factors that affect the outcome of primary total resurfacing hip replacement include the type of prostheses used, as well as the sex, age, and size of the patient. Women have a significantly higher rate of revision. This difference has resulted in this procedure now being done almost exclusively in males. Men have an age-related rate of revision. Males over the age of 65 years have a much higher rate of revision in the first 6 months after surgery and consequently, this surgery is almost never done in patients above this age.

It appears that there are a number of reasons for the difference in outcomes related to sex. The first relates to the size of the patient. Smaller femoral head sizes do not do as well in a resurfacing procedure and women on average have smaller femoral head sizes. It also appears that women still have a higher rate of revision following a resurfacing hip replacement when a larger head size is used, but the reason for this is not clear. Males with a smaller femoral head size also have an increased risk of revision when compared to males with larger femoral head sizes. The use of this type of hip replacement is now largely confined to men younger than 65 years who have larger femoral heads.

Primary Total Conventional Hip Replacement

The Registry has identified many factors that affect the outcome of primary total conventional hip replacement. These can be divided into patient and prosthesis factors.

Patient Factors

Patients with osteoarthritis have better outcomes compared to patients having a total hip replacement for a different reason. Generally, it can be said that women have a slightly lower risk of revision compared to men. In the long term, the rate of revision decreases as the age at the time of the initial surgery increases. This is more apparent in women than in men.

The Registry is again reporting on the impact of ASA score and BMI for all patients. The Registry only commenced collection of ASA data in 2012 and BMI data in 2015. The ASA score is a measure of general health. The score increases with the number of health problems. The higher the ASA score, the higher the risk of revision, this is due in part to an increased risk of revision for infection. This is because the general health of patients with a higher ASA score at the time of surgery is not as good. There are six categories of BMI, which include underweight, normal, pre-obese and then obese 1, 2, and 3. The revision rate is increased in patients with a BMI that is categorised as obese 1, 2, or 3. The most common reason for the increased rate of revision is infection.

Surgical Approach

The Registry is again reporting on the effect of surgical approach. The Registry only commenced collecting data on approach in 2015. There are three main operative approaches used for hip replacement. They are posterior, lateral and anterior. The lateral approach and the posterior approach have a higher rate of revision compared to the anterior approach. The lateral approach also has a higher rate of revision compared to the posterior approach. However, there are differences in the reasons why a revision is undertaken. The anterior approach has a higher rate of revision for loosening and early fracture compared to the posterior and lateral approach and a lower rate of revision for infection and dislocation.

Fixation

As has been done in previous years, important prosthesis characteristics that influence outcomes have been highlighted in this year's report. These include the method of fixation, the type of bearing surface of the artificial hip joint, and some special design features of both the femoral and acetabular prostheses.

Primary total conventional hip replacements vary in the method used to fix the prosthesis to bone. There are three main types of fixation: cemented, cementless and hybrid fixation. Cemented fixation is when the femoral and acetabular prostheses are fixed to bone using a hard setting plastic called methyl methacrylate (bone cement). Cementless fixation is when the femoral and acetabular prostheses are fixed directly to bone without using cement. Initially, the fixation is achieved by fitting the device tightly into the bone. This tight fit then allows bone to grow into specially designed roughened surfaces on both the femoral and acetabular components to permanently fix the device in place. Prostheses are designed to be specifically used with cemented or cementless fixation. The other main approach to fixation is hybrid fixation. This involves cementing the femoral component and using a cementless acetabular component.

For many years, the Registry has reported that age has a major influence on the outcome of the different types of fixation. In general, older patients do better with hybrid or cement fixation and younger patients do better with hybrid or cementless fixation. The likely reason for this is that cementless fixation particularly of the femoral component does better when the quality of a patient's bone is good. It is known that bone quality declines as we get older. With the analysis restricted to modern prostheses, there is little difference in outcomes based on fixation except for patients aged 75 years and older, where the

revision rate is lower when either hybrid or cement fixation is used.

Bearing Surface

The Registry is again reporting on the outcomes related to the use of different bearing surfaces. The bearing surface is the articulating surface, i.e. the artificial ball and socket of the hip joint. It varies depending on the material used to make the femoral head and the acetabular socket. The socket may be plastic, ceramic, or metal. The type of plastic used is called polyethylene, it may be non cross-linked (non XLPE) or cross-linked (XLPE). XLPE means that an additional manufacturing process has been used that increases the bonding of the molecules within the polyethylene. It has been shown in laboratory testing that increasing the cross-linking reduces the wear of this material as the hip replacement moves. The femoral head (ball) may be made of metal, ceramic, or a third option called ceramicised metal, which is available mainly from one company. The bearing surface is made up of the combination of materials used to make both the ball and the socket. Consequently, there are a number of possible combinations that make up the different bearing surfaces. These include metal on polyethylene (non XLPE and XLPE), ceramic on polyethylene (non XLPE and XLPE) and ceramic on ceramic. Ceramicised metal femoral heads are only used with polyethylene (XLPE and non-XLPE). Metal on metal bearings were used in the past but this bearing is now largely confined to resurfacing hip replacements. The reason that metal on metal is not used in other types of hip replacements, is because it does not work as well as other available artificial joint surfaces.

In recent years, the type of polyethylene used has been almost entirely XLPE. The use of this material has been associated with a significant reduction in the rate of revision in primary total conventional hip replacement for dislocation, loosening, and lysis. The reduced rate of revision for dislocation is due to an increased use of larger head sizes (32mm or greater) in XLPE procedures. It is possible to use these larger head sizes because this type of polyethylene is more resistant to wear. When a larger head size is used, the hip replacement is more stable and so there is a lower rate of revision for dislocation. The reduced rate of revision for loosening and lysis is thought to be due to the reduced wear rate. Loosening and lysis are most often due to an inflammatory reaction, that occurs following the production of small wear particles. Theoretically, a reduced wear rate means fewer particles and therefore less inflammation.

Non-XLPE has little use in 2025 (only 2.3% of all polyethylene inserts), so it is no longer included in these analyses. The results do not appear to be the same for every femoral head type combined with XLPE. Compared with ceramic/XLPE, metal/XLPE has a higher rate of revision after 6 months. Ceramicised metal/XLPE has a higher rate of revision for the first 3 months and a lower rate after 1 year, but this should be interpreted with caution because the bearing is a single company product used with a small number of stem and acetabular component combinations.

Ceramic/ceramic has an early lower rate of revision (2 weeks to 9 months) compared with ceramic/XLPE but a higher rate after that. After 9 years, it has the highest rate of revision among the modern bearing surfaces. The modern bearing surfaces are ceramic/ceramic and metal, ceramic and ceramicised metal femoral heads combined with XLPE.

Exchangeable Neck Femoral Stems

The Registry also reports the results of several different types of hip replacements that have special features. These include mini femoral stems, as well as constrained and dual mobility acetabular components. The Registry is reporting on the results of these devices again this year.

Exchangeable neck femoral stems have a neck that is modular and includes different lengths and angles that can be fitted into the femoral stem. This differs from most other femoral stems where the neck and the stem are attached. The purpose of exchangeable necks was to give the surgeon greater choice to replicate the desired anatomy and the optimum position of the femoral component. Unfortunately, these devices generally do not work as well as fixed neck stems and they have largely been abandoned. Information on exchangeable necks is no longer provided in the main Annual Report. Detailed information on femoral stems with exchangeable necks is available in the supplementary report 'Prosthesis Types with No or Minimal Use' on the AOANJRR website: https://registry.aoa.org.au/annual-reports-2026.

Mini Stems

Mini stems are very short cementless femoral stems, where fixation to the bone is over a smaller area entirely in the top of the femur. This contrasts with the standard femoral stem that usually extends almost halfway down the length of the inside of the femur. Currently, mini femoral stems remain a relatively new technology and are not commonly used. They represent 2.7% of all currently used prostheses for total conventional hip replacement. Mini stems have a reduced rate of revision from from 2 years onwards compared

to standard femoral stems. There is a difference in the reasons for revision, with mini stems having a lower rate of revision for loosening after 5 years compared to the standard cementless stem, with no difference prior to this time. Mini stems have a higher rate of revision for fracture in the first 3 months after surgery and then they have a lower rate of revision. The rate of revision also varies depending on the type of mini stem used.

Constrained Acetabular Prostheses

A constrained acetabular prosthesis is a special prosthesis. Unlike normal acetabular prostheses, it has a mechanism to lock the femoral head inside the acetabular socket so that there is a reduced chance of dislocation but at the same time allowing almost normal movement of the hip joint. It is not surprising to find they are used in different types of clinical situations to usual acetabular prostheses. In particular, they have been used more commonly in situations known to have a higher risk of dislocation. Constrained acetabular prostheses compared to modern non-constrained acetabular prostheses when used to treat patients with osteoarthritis have a higher rate of revision. When they are used to treat patients with a broken hip there is no difference.

Dual Mobility Acetabular Prostheses

Another type of special acetabular prosthesis is the dual mobility acetabular prosthesis. It is called dual mobility because the femoral head moves within a polyethylene component, which also moves within a fixed acetabular shell. Similar to constrained acetabular prostheses, dual mobility prostheses are proportionally used more frequently than other acetabular prostheses for fractured neck of femur, tumour and failed internal fixation. There has been increasing use of dual mobility devices since 2012, and in 2025 they were used for 19% of primary conventional hip procedures. Dual mobility prostheses have a higher rate of revision than other acetabular prostheses, both when all diagnoses are included and when they are used for osteoarthritis. However, they have a lower rate of revision for dislocation/instability.

Knee Replacement

As with hips, the Registry considers three different categories of knee replacement: primary partial, primary total, and revision knee replacement. Each of these categories is further divided into a number of different classes. These are described in the Annual Report at the start of the section on knee replacement.

There were 81,692 knee replacements reported to the Registry in 2025. This is an increase of 787 procedures (1.0%) compared to the number reported in 2024.

Primary partial knee replacement accounts for 6.9% of all knee replacements reported to the Registry since it commenced data collection. Primary total knees account for 85.4% and revision knees 7.8%. Almost all primary knee replacements, whether they are partial or total, are undertaken for osteoarthritis.

The proportion of knee procedures that are revision procedures has been decreasing since the Registry was implemented. The percentage of knee replacements that are revisions decreased from 8.8% in 2004 and 8.2% in 2019 to 6.9% in 2025.

Primary Partial Knee Replacement

A partial knee replacement is a replacement that only replaces part of the knee joint. The Registry identifies five classes of primary partial knee replacement. Most are used in small numbers and two are no longer used in Australia. The main report provides information on unicompartmental knee replacements and patella/trochlea partial knee replacements. The results of the two classes of partial knee replacement that are no longer used - unispacer and bicompartmental - are available in the supplementary report on the AOANJRR website called Prosthesis Types with No or Minimal or Use.

The most used partial knee replacement is the unicompartmental knee. This replaces the femoral and tibial joint surfaces on either the inner or outer side of the knee (most commonly the inner side of the knee). Its use accounts for 92.7% of all primary partial knees. Primary unicompartmental knee replacement has a higher rate of revision than primary total knee replacement. Age is a major factor affecting the outcome of unicompartmental knee replacement. The younger the patient, the more likely it is that the procedure will be revised early. At 20 years following a unicompartmental knee replacement, 26.3% have been revised. Almost 38.8% of patients less than 55 years of age at the time of their surgery have been revised within 20 years.

Unicompartmental knee replacement may be undertaken on the medial (inner), or lateral (outer) side of the knee. Medial unicompartmental knee replacement is much more common and accounts for 97.7% of all unicompartmental knee replacements. For the first three months, the lateral unicompartmental knee has a higher rate of revision compared to the medial unicompartmental knee replacement, but after 3 months, there is no difference. The revision rate of unicompartmental knee replacement varies depending on the type of prosthesis used. The Registry has been following and reporting on the outcomes of unicompartmental knee replacements that are placed in position using robotic surgery. Procedures using robotics assistance have a lower rate of revision compared to traditional instrumentation after 3.5 years.

Primary Total Knee Replacement

A primary total knee involves the removal and replacement of the joint surface of the femur and the tibia on both the medial (inner) and lateral (outer) sides. A single femoral prosthesis and a single tibial prosthesis are used. The tibial prosthesis may be one component, but it is more commonly two that are put together at the time of surgery. Usually, a metal tray fits over the cut surface of the tibia with a plastic insert (tibial insert) that fits inside the tray to make the tibial prosthesis. This then articulates with the single femoral replacement. A primary total knee replacement may or may not have the under-surface of the patella replaced.

Sex and Age

Primary total knee replacement has the lowest rate of revision compared to all other types of primary knee replacement. Men have a slightly higher rate of revision compared to women. The most important patient factor identified by the Registry that influences the rate of revision is age at the time of surgery, the younger the patient the higher the subsequent rate of revision. Patients less than 55 years of age at the time of surgery have a 16.0% chance of being revised at 20 years. However, the rate of revision is less for older patients.

Stability

An important difference between hip and knee replacement is what keeps the artificial joint surfaces from moving out of position. This is referred to as the stability of the joint. An unstable

joint has additional unnatural movements between the joint articulating surfaces. The very extreme example of this is when the articulating surfaces come apart. This is referred to as dislocation which unlike hip replacement is very rare following knee replacement. There can also be lesser degrees of unnatural movement that can cause problems with the function of an artificial joint without the joint actually dislocating. In general, the stability of the joint is dependent on the shape of the joint as well as the soft tissues (muscles and ligaments) around the joint. If everything is working correctly, the combination of these factors allows normal movement and prevents unnatural movements (sideways or back and forward) between the joint surfaces. As the hip is a ball inside a socket joint, there is a lot of stability simply because of the shape. This is not the case with knee replacement where the tibial surface is relatively flat. The stability of the knee joint is much more dependent on surrounding soft tissues and in particular ligaments that hold these joint surfaces in place and in the correct alignment. Quite often in patients receiving a knee replacement, one or more of these ligaments may already be damaged. In order to address this issue, primary total knee replacement can vary depending on the additional built in stability that may be required. In certain circumstances, it is necessary to use a replacement that is designed to substitute for one or more of the damaged ligaments.

Most knee replacements used do not require any additional stabilising, other than substituting for the anterior cruciate ligament. These are referred to as minimally stabilised knee replacements. The next most common group is posterior stabilised. These have additional stability built into the knee replacement so that the prosthesis substitutes for both the posterior and anterior cruciate ligaments. The vast majority of knee replacements used are either minimally or posterior stabilised prostheses. Minimally stabilised prostheses have a slightly better outcome than posterior stabilised prostheses. However, there is some difficulty in being too definite about this, as posterior stabilised prostheses may be used more often in difficult cases. If a case is more difficult, it has more potential to be revised.

Fixation

There is only a small variation in the outcome of knee replacement related to the type of fixation used to hold the tibial and femoral components tightly to bone. Hybrid fixation has the lowest rate of revision, but the difference is not major. Cemented fixation has a lower rate of revision compared to cementless fixation, but this varies depending on whether the total knee replacement is minimally or posterior stabilised. Minimally stabilised knees do best if at the very least the tibial component is cemented. Posterior stabilised knees do best when both the tibial and femoral components are cemented to the bone. However, after 1.5 years, cementless fixation has a lower rate of revision. Cemented fixation also had a lower rate compared to hybrid, for the first year, with no difference from1 to 6 years, after which hybrid has a lower rate of revision.

Other important ligaments around the knee are the medial and lateral collateral ligaments. These can also be substituted by what is often referred to as constrained knee replacements. These are not often required in primary operations. There is one final group of knee replacement when considering stability and these are hinged knees. These are used mostly when there is absolutely no ligament stability left in the knee. Their use is very rare for primary knee replacement. For osteoarthritis, both designs have higher rates of revision than minimally stabilised prostheses, and infection is the most common reason for revision, followed by loosening, fracture and instability.

Tibial Insert

Another general difference in the design of primary total knee replacement is the way the tibial insert is designed to move on the surface of the tibial tray. It may either be fixed to the tray (fixed insert) or designed to move slightly in one or more specific directions (mobile insert). Mobile inserts either rotate, slide or do both. For a number of years, the Registry has reported that in general, fixed inserts have a lower rate of revision. This year the Registry reports that after 7 years mobile inserts have a reduced rate of revision.

Bearing Surface

Unlike hip replacements, knee replacements only have two main types of bearings. They are a metal femoral component combined with polyethylene, either XLPE or non-XLPE. Comparing the outcome of XLPE to non XLPE across all knee replacements, there appears to be a benefit when XLPE is used. There is a lot of variation between the type of prostheses and the type of polyethylene used. As a consequence, any difference seen when comparing the overall result of XLPE to non XLPE may be in part due to the type of prosthesis, rather than the type of polyethylene. To try and overcome this problem, the Registry has undertaken analyses of specific designs of total knee replacement that have used both XLPE and non XLPE. There does not appear to be any situation where XLPE performs worse than non-XLPE. Sometimes it is better and sometimes it is the same.

When comparing XLPE sub-types, XLPE and XLPE with antioxidant show no difference in revision

rate for the first 2.5 years. After that point, XLPE with antioxidant has a lower rate of revision.

Surgeon Assistive Tools

The Registry has also carefully monitored the use and outcomes of computer navigation in primary total knee replacement. Computer navigation is computer-assisted surgery, which was first used over 20 years ago. It involves the use of intraoperative computer monitoring in an attempt to more accurately place the knee prosthesis. It is known that accurate positioning of the prosthesis is a very important factor in determining the result of the operation. The current information from the Registry suggests that there is no difference in revision rates when compared to procedures using traditional instrumentation, regardless of age or other factors.

There are also other techniques that surgeons are using in an attempt to improve the positioning of knee prostheses. Image derived instrumentation (IDI) is a technique that involves obtaining accurate images of the knee joint pre-operatively so that the instruments used to achieve the required alignment can be specifically made for that patient. In general, when IDI is used it is associated with a higher rate of revision compared to when traditional instrumentation is used.

In recent years, there has been an increase in the use of robotic surgery to aid with the accurate implantation of knee prostheses. Robotic assistance does not show any differences in revision rates or complications compared to procedures using traditional instrumentation, regardless of age, sex and other factors.

Shoulder Replacement

Shoulder replacement is also grouped into three different categories: primary partial, primary total, and revision shoulder replacement. Each of these categories is divided into a number of different classes. These are described in the Annual Report at the start of the section on shoulder replacement.

There were 12,764 additional shoulder replacements reported to the Registry in 2025. The number of shoulder procedures undertaken in 2025 increased by 736 (6.3%) compared to the number undertaken in 2024.

Primary total shoulders account for 84.0% of all shoulder replacements reported to the Registry since it commenced data collection. Primary partial shoulders account for 7.2% and revision shoulders 8.7%.

Due to the staged introduction of the Registry, the first full year that the Registry recorded complete national shoulder data was 2008. Since that time, the number of shoulder replacements reported to the Registry has increased each year. The number of shoulder replacements undertaken in 2025 was 369.7% more than undertaken in 2008.

However, there are differences in the rate of increase depending on the category of shoulder replacement. The number of primary partial shoulder replacements has decreased by 64.3% since 2008. The number of primary total shoulders has increased by 631.4%, and revision shoulder replacement has increased by 275.7% during the same time. In 2025, the revision burden is 7.9%.

Primary Partial Shoulders

The Registry subcategorises primary partial shoulder replacement into four main classes. These are defined by the type of prostheses used. The main report provides information on the most used class of partial shoulder replacement: hemi stemmed anatomic. This replaces the humeral head with a prosthetic head mounted on a stem. Hemi stemmed anatomic accounts for 74.1% of all primary partial shoulder replacements. Use of pyrolytic carbon rather than a metal humeral head decreases the rate of revision.

The second most used partial shoulder replacement is hemi resurfacing anatomic that uses a humeral prosthesis to replace the humeral articular surface only, without replacing the humeral head. Hemi resurfacing anatomic accounts for 21.6 of all primary partial shoulder replacements.

Partial resurfacing anatomic involves the use of one or more button prostheses to replace part of the natural articulating surface on one or both sides of the shoulder joint. Partial resurfacing anatomic accounts for 2.7% of all primary partial procedures. Hemi stemless anatomic is the least used type of primary partial shoulder replacement, accounting for 1.5%. It involves the resection of the humeral head and replacement with a humeral head and a humeral stem prosthesis. A humeral stem prosthesis may have metaphyseal (former growth area of the bone) or diaphyseal (shaft) fixation.

Primary Total Shoulders

There are five types of primary total shoulder replacement: total resurfacing anatomic, total stemmed anatomic, total stemless anatomic, total stemmed reverse and total stemless reverse.

Total Stemmed Reverse Shoulder Replacement

Total stemmed reverse accounts for 76.0% of all primary total shoulder replacements. It involves glenoid replacement with a glenosphere prosthesis combined with resection of the humeral head and replacement with humeral cup and humeral stem prostheses. A humeral stem prosthesis may have metaphyseal or diaphyseal fixation. The results of shoulder replacement surgery with a total stemmed reverse prosthesis are affected by patient factors like age, sex, body weight (BMI) and overall health (ASA score). In addition, prosthesis factors, bearing surface glenosphere size and material change the rate of revision. Implant sizing variations (modifications to prosthesis design range beyond simple size change) such as glenoid base plate augmentation and humeral stem length affected outcomes. The operative technique of rotator cuff repair reduced rates of total stemmed reverse replacements.

Total Stemmed Anatomic Shoulder Replacement

Total stemmed anatomic is the second largest group of primary total shoulder replacement, accounting for 17.1% of all primary shoulder procedures. This procedure involves glenoid replacement combined with resection of the humeral head and replacement with humeral head and humeral stem prostheses. A humeral stem prosthesis may have metaphyseal or diaphyseal fixation. There is no difference in rate of revision when cemented and hybrid fixations are compared. The implant configuration,

including use of implant size variations (augmented polyethylene glenoid components, and humeral stem length) prostheses factors humeral head size, and the bearing surface, play a significant role in outcome.

Total Stemless Anatomic Shoulder Replacement

Overall, total stemless anatomic replacement has been used less frequently accounting for 6.8% of all primary total shoulder replacements but was the most common anatomic shoulder replacement undertaken in 2025. This procedure involves glenoid replacement combined with resection of the humeral head and replacement with a humeral head with an epiphyseal (base of the head) fixation prosthesis. Age, sex and glenoid component type rather than other prostheses factors influence revision rates for stemless anatomic implants.

Surgeon Assistive Tools (SAT)

For the first time robotic assisted total shoulder replacements were recorded for both anatomic and reverse prostheses in 2025. In total stemless and stemmed anatomic shoulder replacement the use of SAT (IDI) increases the rate of revision. In total stemmed reverse an IDI reduces the revision rate in patients with osteoarthritis for the first 6 years, and after that time procedures using IDI has an increased rate of revision.

Total Stemmed Reverse with a standard baseplate compared to Total Stemmed Reverse with augmented baseplates, and Total Stemmed Reverse with personalised baseplates.

Total stemmed reverse shoulder replacement with a personalised (patient matched or custom made) baseplate has a higher rate of revision compared to total stemmed reverse shoulder replacement with a standard or augmented glenoid baseplate.

Total Stemmed and Stemless Anatomic with modified central peg glenoids compared to Hemi stemmed anatomic with pyrocarbon heads in patients under 60years of age.

There is no difference between these three categories of shoulder replacement in this age group. This analysis highlights a different option for surgically managing younger patients with shoulder arthritis.

Hip, Knee, Shoulder and Ankle Prostheses with a Higher than Anticipated Rate of Revision

The Registry reports on the results of individual prostheses in the different classes. There is variation in the revision rates for different types of prostheses in each class. Many of these differences are not statistically significant.

The Registry, however, does identify individual prostheses that have a statistically significant higher rate of revision. The threshold for that identification is that the revision rate is more than twice that of all other prostheses in the same class and the difference is statistically significant. In other words, the revision rate of these devices lies outside the expected norm. They are often referred to as outliers. These outliers are identified in the final chapter of the 2026 Annual Report.

This information highlights to surgeons, orthopaedic companies, and regulatory bodies worldwide, that something unexpected is happening with respect to the outcome of these prostheses. It enables consideration to be given as to the possible reasons for this difference and whether it is worthwhile or appropriate to continue to use these prostheses.

It is important to emphasise that there may be many reasons why the revision rate is twice that of other prostheses. Some of these may not necessarily be related or specific to the identified prostheses. The data relating to each of these prostheses have been carefully considered by an expert group of orthopaedic surgeons who have recommended these prostheses be identified and therefore be considered further as to whether or not they should continue to be used. When they undertake that consideration, all available data is reviewed and any subsequent investigation that they may request is undertaken and provided.

The consequence of this process is that not all outliers are recommended for identification. One of the main reasons that an outlier is not identified is because it is a non-standard prosthesis that is used in unusual or complex clinical situations associated with a higher risk of revision. In this situation, it is not fair to compare the results of these special devices to those of standard prostheses used in standard clinical situations.

This year, the Registry has identified for the first time 5 prostheses or prosthesis combinations with a higher than anticipated rate of revision. These are all conventional hip prostheses.

Identified prostheses are listed in one of three groups. The first group are those that have a higher rate of revision that are being identified for the first time and are still in use in Australia.

The second group includes prostheses that are being re-identified but are also still used. This list identifies that the prosthesis continues to have a higher than anticipated rate of revision and it provides updated information on its continued use. Most prostheses that are identified for the first time or re-identified prostheses decline in use with time. This is usually evident only after the first year because almost a full year of use has occurred prior to the identification in a previous Annual Report.

The third group are prostheses that are identified but are no longer used in Australia. Most of these have been previously identified. However, occasionally there is a prosthesis in this group that is identified for the first time. These are prostheses that are no longer available for use in Australia, and as time progresses the Registry is able to identify that this device has a revision rate that is subsequently identified to be higher than anticipated.

The Registry identification of prostheses with a higher than anticipated rate of revision has resulted in many of these prostheses being withdrawn from national and international markets. Only summary information is provided in the Annual Report. However, the full detailed analysis for each of these prostheses is available from the Registry website (Investigations of Prostheses with Higher than Anticipated Rates of Revision).

Conclusion

The purpose of the AOANJRR is to provide high-quality independent data on the results of joint replacement in Australia. The Registry provides this information to surgeons, and all other stakeholders to assist them to make informed judgments on the best approach to joint replacement surgery.

It is hoped that the information presented in this report is useful to people who are seeking additional information on joint replacement surgery, particularly those that are considering or have already undergone the operation. Registry information can be very complicated, as many factors interact to influence the outcome of the surgery. The intention of making this information available to everybody is to assist in promoting informed discussion about the outcome of joint replacement surgery, particularly between patients and their treating surgeons.



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