NOCA National Office of Clinical Audit

INOR Irish National Orthopaedic Register

IITOS THE IRISH INSTITUTE OF TRAUMA AND ORTHOPAEDIC SURGERY

IRISH NATIONAL ORTHOPAEDIC REGISTER

NATIONAL REPORT 2015-2024

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NATIONAL OFFICE OF CLINICAL AUDIT (NOCA)

The National Office of Clinical Audit (NOCA) was established in 2012 to create sustainable clinical audit programmes at national level. NOCA is funded by the Health Service Executive's office of the Chief Clinical Officer (CCO) Dr Colm Henry, and is managed by HSE Quality and Patient Safety via the HSE National Centre of Clinical Audit (NCCA). Audits are commissioned by the NCCA via the CCO. NOCA is based in and operationally supported by the Royal College of Surgeons in Ireland (RCSI), and is independently governed by a voluntary board.

"Clinical audit is a clinically-led quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit specific clinical standards or clinical guidelines and acting to improve care when clinical standards or clinical guidelines are not met. The process involves the selection of aspects of the structure, processes and outcomes of care which are then systematically evaluated against explicit specific clinical standards or clinical guidelines." (Patient Safety (Notifiable Incidents and Open Disclosure) Act, 2023) Following clinical audit, improvements, if required should be implemented at an individual, team or organisation level and then the care re-evaluated to confirm improvements. (DOHC, 2008).

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This work uses anonymised data provided by patients and collected by healthcare providers during the patient's journey (See Appendices 1 and 1.1). The National Office of Clinical Audit (NOCA) would like to thank all participating public and privately funded hospitals, especially their audit coordinators and clinical leads, for their valuable contributions to the register over the past 9 years. Without the hospitals' continued support and input, this audit could not produce the meaningful analysis of arthroplasty care and activity in Ireland that is presented in this report. The patients and representatives who took part in sharing the patients' perspective have made a most important contribution to this report, which we gratefully acknowledge. We also wish to thank our Irish National Orthopaedic Register (INOR) Governance Committee for their ongoing support, input and constructive feedback for this report.

NOCA greatly appreciates the ongoing commitment and support received from The Irish Institute of Trauma and Orthopaedic Surgery (IITOS).

NOCA greatly appreciates the ongoing commitment and support received from the Technology and Transformation Team, Health Service Executive (HSE) for providing project management support for the national implementation and rollout of INOR within the HSE. We would especially like to thank Dr Colm Henry, Chief Clinical Officer; Dr Orla Healy, National Clinical Director, National Quality and Patient Safety; and Majella Dally, Assistant National Director, Audit, Improvement and Education, National Quality and Patient Safety, HSE.

The INOR Governance Committee would also like to acknowledge those leaders who have been instrumental to the establishment and implementation of INOR nationally: Mr Paddy Kenny, Mr David Moore, Mr James Cashman, Catherine Farrell, and the former INOR managers Roseanne Smith, Suzanne Rowley and former assistant audit managers Deborah Mc Daniel and Michael Bailey.

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DESIGNED BY SWERVE

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NOCA National Office of Clinical Audit

Professor John Quinlan
Clinical Lead
Irish National Orthopaedic Register
National Office of Clinical Audit
4th Floor, 118 St Stephen's Green, Dublin 2

19th March 2026

Dear Professor Quinlan,

On behalf of the NOCA Governance Board, I wish to acknowledge receipt of the *Irish National Orthopaedic Register National Report 2015–2024*.

We extend our sincere congratulations to you and the entire INOR team, including the Audit Programme Managers, data analysts, Governance Committee, and the Patient and Public Interest Representatives, for producing this comprehensive and important report.

This report presents valuable insights into joint replacement surgery in Ireland, with over 43,000 hip and knee arthroplasty procedures included in the dataset between 2015 and 2024. The findings demonstrate the high quality and safety of these procedures, with very low rates of surgical site infection, complications, and mortality, alongside significant improvements in patient-reported outcomes following surgery.

The continued development of the Irish National Orthopaedic Register represents an important patient safety initiative, enabling the monitoring of implant performance and the rapid identification of patients in the event of an implant recall.

This letter serves as the formal endorsement of the NOCA Governance Board for the *Irish National Orthopaedic Register National Report 2015–2024*. The report provides an essential evidence base to support quality improvement, research, and the ongoing enhancement of orthopaedic care across Ireland.

Yours sincerely,

Mr Kenneth Mealy
Chair
NOCA Governance Board

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FOREWORD

This report includes data from the first decade of the Irish National Orthopaedic Register, reporting on more than 43,000 patients cared for by orthopaedic surgeons in Ireland. The register was set up as part of the national response to a patient safety incident arising from the global recall of an orthopaedic implant. It has now emerged as a powerful source of national clinical audit data, with an increasing number of participating hospitals. The Register not only supports local improvement at hospital level, but it also benchmarks Irish outcomes against those of other OECD countries.

High quality orthopaedic surgery plays a central role in population health. Successful management of orthopaedic trauma restores function and reduces disability in the young, and for older people timely intervention can improve mobility, alleviate pain and enable healthier ageing.

The Irish National Orthopaedic Register places the experience of patients at its heart, capturing in a systematic way a series of Patient Reported Outcome Measures (PROMs) that give voice to patients collectively. These data demonstrate that hip and knee joint replacement plays a very significant role in improving patients' quality of life and function.

A major body of work, like the establishment of a new Registry requires a strong team to enable it to come to life. I especially want to recognise its early leaders, Mr. Paddy Kenny FRCSI, Mr. David Moore FRCSI, and Mr. James Cashman FRCSI for their vision in identifying the need for the Register and their commitment to making it an exemplar. Development and operationalisation of the register could only happen with the organisational support and deep experience of the team in the National Office of Clinical Audit, especially Louise Brent, Pamela Hickey and Daragh Browne, and the INOR Governance Committee.

A commitment to transparently learning from experience is the cornerstone of good clinical governance and is a professional responsibility. I commend the surgeons of the Irish Institute of Trauma and Orthopaedic Surgery for their support of the Register and for their leadership of the local hospital teams who were instrumental in providing data, especially the hospital clinical leads, audit coordinators and the public and patient collaborators who supported this work in the participating hospitals, both public and private. Lastly, special thanks to Prof John Quinlan FRCSI who led the compilation and publication of this excellent report that represents a landmark publication in orthopaedic surgery in Ireland that will pay dividends in the years to come.

Deborah McNamara

Professor Deborah McNamara
President, Royal College of Surgeons in Ireland

"A commitment to transparently learning from experience is the cornerstone of good clinical governance and is a professional responsibility."

GLOSSARY OF TERMS AND DEFINITIONS

TERM	EXPLANATION
arthroplasty	A procedure where a natural joint is reconstructed with an artificial prosthesis. In this report, hip or knee replacement surgery is referred to as hip or knee arthroplasty.
ASA grade	The American Society of Anesthesiologists (ASA) physical status classification system is a scoring system for grading the overall physical condition of the patient.
ASR	articular surface replacement (hip resurfacing system)
BMI	body mass index – the index for weight compared to body length in kilograms per square metre
component/implant	An artificial or prosthetic component/implant is used to replace bone. In this report, we usually use these terms interchangeably.
DVR	Data Validation Report
elective surgery	Elective or planned surgery is defined as a non-emergency surgical procedure, although it can sometimes be urgent.
EQ-5D-5L	Is a standardised, 5- dimension 5-level instrument developed by EuroQol group to measure health related quality of life
ICT	information and communication technology
IPMS	Integrated Patient Management System
ISAR	International Society of Arthroplasty Registries

TERM	EXPLANATION
KQI	key quality indicator
NAP	NOCA Audit Portal or NOCA Audit Platform (interchangeable terms)
NCHD	non-consultant hospital doctor
NCPTOS	National Clinical Programme for Trauma and Orthopaedic Surgery
NJR	National Joint Registry (UK)
OA	Osteoarthritis
OECD	Organisation for Economic Co-operation and Development
OHS	Oxford Hip Score
OKS	Oxford Knee Score
PROM	Patient-Reported Outcome Measure
prosthesis	An artificial or prosthetic implant to replace bone
Rev THR	Revision total hip replacement
Rev TKR	Revision total knee replacement
revision arthroplasty	A revision is defined as a reoperation on a previous hip or knee joint where one or more of the prosthetic components is replaced or removed.
THR	Total hip replacement
TKR	Total knee replacement

EXECUTIVE SUMMARY

This is the second national report from the Irish National Orthopaedic Register (INOR). This is a significant milestone for the register as it presents 10 years of data about elective hip and knee arthroplasty in INOR. The data presented in this report cover the period 1 January 2015 to 31 December 2024. Over this period a total of 17 hospitals contributed to INOR, including both public and private hospitals. The hospitals included came on board at different times throughout this period.

INOR is managed by the National Office of Clinical Audit (NOCA) in collaboration with the Irish Institute of Trauma and Orthopaedic Surgery (IITOS), and it is both a registry for implants and a national clinical audit. It is a joint patient safety collaboration undertaken by NOCA and the Health Service Executive (HSE). INOR data are collected largely in real time or slightly retrospectively, and they describe the care of arthroplasty patients including pre-operative assessment, perioperative care and at defined periods following a patient's hip or knee arthroplasty, usually 6 months, 2 years, 5 years and every 5 years after that. Patients are required to provide consent to allow information that could identify them to be collected and stored in INOR.

The overall number of hip and knee arthroplasties included in this report is 43,291. The data provide insights into patient characteristics, processes of care, implant usage, clinical outcomes and Patient-Reported Outcome Measures (PROMs).

On 19 May 2025, INOR transitioned onto the NOCA Audit Platform (NAP) and INOR Version 2 was launched.

The INOR Governance Committee would like to thank all our participating hospitals, especially the teams who entered information directly into the system. We would like to thank our hospital clinical leads and audit coordinators, who INOR rely on to manage the register locally in each hospital.

"INOR data are collected largely in real time or slightly retrospectively, and they describe the care of arthroplasty patients including pre-operative assessment, perioperative care and at defined periods following a patient's hip or knee arthroplasty, usually 6 months, 2 years, 5 years and every 5 years after that."

KEY FINDINGS

- This report includes data from 17 hospitals contributing to INOR, of which 11 are publicly funded hospitals and 6 are private hospitals
- 43,291 cases were included in this report between 2015 and 2024
- Primary hip arthroplasty/total hip replacement (THR) (n=22249)
- Revision hip arthroplasty (Rev THR) (n=1864)
- Primary knee arthroplasty/total knee replacement (TKR) (n=18102)
- Revision knee arthroplasty (Rev TKR) (n=1076)
- Bilateral primary hip arthroplasties (n=274) and primary bilateral knee arthroplasties (n=a276)
- The most common implants for primary THR were cementless at 64% (14202)
- Ninety-two per cent of THRs were unilateral
- The average duration of surgery for a primary THR was 71 minutes, and 76 minutes for a primary TKR
- Less than 1% of primary arthroplasties and 2% of revision arthroplasties had a surgical site infection (SSI) diagnosed by a clinician within 30 days
- One per cent of primary arthroplasties had a revision documented on INOR
- Less than 1% of arthroplasties had recorded periprosthetic fractures
- Less than 1% of arthroplasties had a dislocation recorded
- The mortality rate for primary and revision patients recorded within 30 days was 0.1%
- Patient Reported Outcome Measures (PROMs) show significant improvements when compared to pre-operative scores, and these improvements are sustained at 5 years
- The EQ-5D-5L quality-of-life measure shows significant improvements in the primary THR and TKR populations when comparing the pre-operative scores to the 6-month postoperative scores across each of the following areas: mobility, self-care, usual activities, pain/discomfort and anxiety/ depression.

KEY FINDINGS

IRISH NATIONAL ORTHOPAEDIC REGISTER

KNEE FINDINGS

18,102 Total knee replacement (TKR) surgeries | **1076** Revision TKR

97%
97% of patients who had TKR were diagnosed with osteoarthritis

MEAN AGE
72 YEARS OLD PRIMARY TKR | **72** YEARS OLD REVISION TKR

SEX
57% FEMALE | **43%** MALE

BMI
Patients with a Body Mass Index (BMI) over 30, which means the person is in the obesity range.
33% PRIMARY TKR | **32%** REVISION TKR

AVERAGE DURATION OF SURGERY
76 MINUTES PRIMARY TKR | **122** MINUTES REVISION TKR

HIP FINDINGS

22,249 Total hip replacement (THR) surgeries | **1864** Revision THR

94%
94% of patients who had THR were diagnosed with osteoarthritis

MEAN AGE
70 YEARS OLD PRIMARY THR | **73** YEARS OLD REVISION THR

SEX
51% FEMALE | **49%** MALE

BMI
Patients with a Body Mass Index (BMI) over 30, which means the person is in the obesity range.
27% PRIMARY THR | **26%** REVISION THR

AVERAGE DURATION OF SURGERY
71 MINUTES PRIMARY THR | **127** MINUTES REVISION THR

TYPE OF FIXATION
Type of fixation describes how the artificial hip joint is attached to the bone during hip replacement surgery. Some implants are fixed using bone cement, while others are designed to allow the bone to grow onto the implant over time. In some cases, a hybrid approach is used.

64% THR IMPLANT WITHOUT CEMENT | **24%** HYBRID IMPLANT | **9%** THR IMPLANT WITH CEMENT

OUTCOMES: All procedures combined

Less than 1% of THR and TKR surgeries had a surgical site infection (SSI) documented by a clinician within 30 days of surgery. **<1%**

Less than 2% of revision joint replacements had an SSI documented by a clinician within 30 days of surgery. **2%**

1% of THR and TKR had a revision surgery performed within 1 year after surgery. **1%**

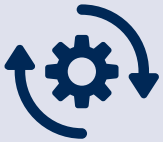
Less than 1% of joint replacements had a bone fracture around the implant recorded within 30 days of surgery. **1%**

Less than 1% of joint replacements had a dislocation recorded within 30 days of surgery. **<1%**

Less than 0.1% of primary and revision joint replacement patients died within 30 days of surgery. **0.1%**

Patient Reported Outcome measures, which are tools to measure quality of life, show very significant improvements compared to pre-operative scores, and these improvements are sustained at 2 years following surgery.

KEY RECOMMENDATIONS

KEY RECOMMENDATIONS		NOCA
1	**To progress the implementation of INOR to all sites providing surgery for hip and knee arthroplasty and expansion to include other joint arthroplasties in order to have a full national registry of hip, knee and other joint implants to support recall and ensure patient safety.**	
2	**NOCA will conduct an organisational survey of all participating sites to document the patient pathways, resources, policies and procedures in each hospital during 2026.**	

CAPTURING PATIENT PERSPECTIVES - PIETER'S STORY

Background

I describe myself as a very active person with a huge interest in sports of all varieties. Growing up in South Africa, my mother often described me as a bit of an accident looking for a place to happen. It's just that I like to live life on the edge: I've done 165 bungee jumps, I've dived out of 33 aeroplanes, I've spent over 2,000 hours underwater scuba diving. I hunt, I fish, I golf, I played rugby, I played soccer, I played squash, hockey and badminton. I have cups, certificates and boxes of accolades from my growing up and being an active person. I wanted to be active, and sports were a central part of my progression in life. I suffered extensive trauma to my left side from a motorbike accident in my late twenties, resulting in ankle reconstruction surgery, vertebral fractures and head trauma.

With my history of previous trauma, osteoarthritis and what I now know to be a diagnosis of caisson disease, I really started to suffer with my left hip to start off with, which I had replaced in January 2022 abroad. I had my right hip replaced in 2025in Ireland, and that is when I was made aware of the Irish National Orthopaedic Register (INOR). Caisson disease is now a well-documented condition that was first being diagnosed back in the late 1800s or early 1900s when workers were sent underwater during the construction of foundations of the Brooklyn Bridge. My passion for underwater scuba diving played a significant role in the degradation of my hip joint, and the surgeon took great time and effort explaining this to me. I found it very interesting and informative in so many aspects relating to the major bone joints and their degradation.

I want to highlight how much pain I suffered prior to my hip replacement surgery and how debilitating this was for me both physiologically and psychologically. I was unable to work freely and felt like my active years were slipping away and that I was falling into a very dark place. I feel that having the hip surgery in a way has saved my life, as living life with chronic pain was having such a negative impact on all aspects of my life. The hip surgery has been a huge positive transition in my life: no more pain medication, no more sciatic pain, and a better mindset, and I am slowly returning back to employment, although at times I feel a bit stigmatised as I still have a limp.

The Surgery

The hip surgery itself was a positive experience. From the initial day at pre-operative assessment to the day of surgery, I felt ready, listened to and prepared for my surgery. Three weeks before my surgery I was invited to attend what was called a Joint School in the afternoon and this was brilliant. The Joint School is where you meet other people who are having hip or knee surgery, and it is a focused afternoon of education on what to expect for hip and knee surgery. At the session that I attended I was the only person who was having hip surgery as opposed to knee surgery, but the surgeon took the time to speak to me about the operation, the implants they tend to use, and it was just so reassuring. I felt really informed and prepared for my surgery.

On the day of my hip surgery, the staff on the ward and in the theatre were brilliant. I felt safe and the checks and preparation done in the operating theatre made me feel at ease despite undergoing major surgery. I was in for 2 nights and home on day 3 after my surgery. All the staff, the surgeon and his team, the nurses, the physiotherapists and the arthroplasty nurse were brilliant, and I must say the food during my stay was lovely too. Reflecting on my experience in this hospital has made me realise how fortunate we are to have access to surgery, and from my perspective we have a good healthcare system in Ireland. I would hope that my story would encourage others not to continue living in chronic pain and help alleviate any fears about having this surgery done.

Participating in INOR

As I have participated in the audit aside from my routine clinical follow up at 6 weeks, I will be followed up by the arthroplasty nurse now again at 6 months, which is brilliant. I think it is a fantastic initiative, and it is reassuring that the implants used in my hip surgery are recorded nationally. Finally, as I reflect on my recovery since surgery, I feel that staying active is very important, and I embarked on a Tai Chi exercise programme which was brilliant, really proved beneficial and was very reasonably priced too.

"Arthritis Ireland recognises the realities of living with a chronic condition and is committed to supporting those affected. There are over 100 types of arthritis, each bringing its own unique set of characteristics and challenges."

PATIENT AND PUBLIC PARTNERSHIP

Data from the past 10 years within this report have identified that osteoarthritis is the main indication for both hip and knee arthroplasty surgeries. Arthritis affects people of all ages and can significantly affect daily life through pain, stiffness and fatigue. These symptoms are often disruptive and can make everyday activities more challenging. Arthritis Ireland recognises the realities of living with a chronic condition and is committed to supporting those affected. There are over 100 types of arthritis, each bringing its own unique set of characteristics and challenges.

While osteoarthritis (OA) used to be thought of as a degenerative or 'wear and tear' joint disease, it is now understood to be a complex disease which involves abnormal repair processes and inflammation in the joint. Since the mid-2010s there have been significant advances made in understanding the processes that contribute to OA and between now and the mid-2030s these new insights will hopefully lead to more optimal approaches to managing OA.

OA typically develops slowly over many years and can involve multiple joints. For some, the progression is subtle and barely noticeable; for others, symptoms gradually worsen, leading to pain and reduced mobility, particularly in major joints such as the hips and knees. With appropriate management and small lifestyle adjustments, most people with OA can continue to lead active, fulfilling lives.

A range of strategies can help ease symptoms and slow progression. Regular physical activity, a balanced diet and maintaining a healthy weight are especially important, as excess weight places additional strain on joints.

Although many people with arthritis will never require surgery, it can be an effective option for those with severe OA, helping to reduce pain, improve movement and relieve stiffness. Surgery is generally considered only after all other suitable treatments have been explored and when joint damage is significant.

Arthritis Ireland provides extensive resources for individuals considering surgery, along with expert recorded interviews with orthopaedic surgeons and supports such as its helpline and the STEPS programme, which are designed to help people manage their condition and maintain quality of life. Visit **https://www.arthritisireland.ie/** or call **0818 252 846**.

Tara Regan, Patient and Public Interest Representative, Irish National Orthopaedic Register

WHAT IS A HIP/KNEE REPLACEMENT (ARTHROPLASTY)?

WHAT IS A HIP REPLACEMENT?

A hip replacement simply means replacing the hip joint with artificial implants. The main reason for this is to restore the function of the joint and reduce pain. The term arthroplasty is often used interchangeably with joint replacement.

The hip joint is shaped like a ball and socket, with the ball at the top of the long thigh bone (Figure 1). The main reason for a hip replacement is osteoarthritis, which occurs when the surface of the joint becomes roughened and worn, resulting in pain and stiffness limiting a person's ability to move properly, e.g. walking, getting in and out of the car.

A hip replacement (Figure 2) can include resurfacing the ball part of the joint (hip resurfacing) or using implants to create an artificial joint (hip replacement).

WHAT DOES THE SURGERY INVOLVE?

The surgeon makes a cut (incision) in the skin, and depending on the technique being used the length of the incision will be different. The location of the incision can also differ, being either to the front, side or back of the hip. The worn-out parts of the bone and cartilage are removed. The socket has a cup implant inserted into it, and in certain circumstances cement and screws are used to secure the implant. At the top of the thigh bone where the ball has been removed, an implant is inserted to create a new ball that then fits into the new cup implant. These implants mimic a real hip joint.

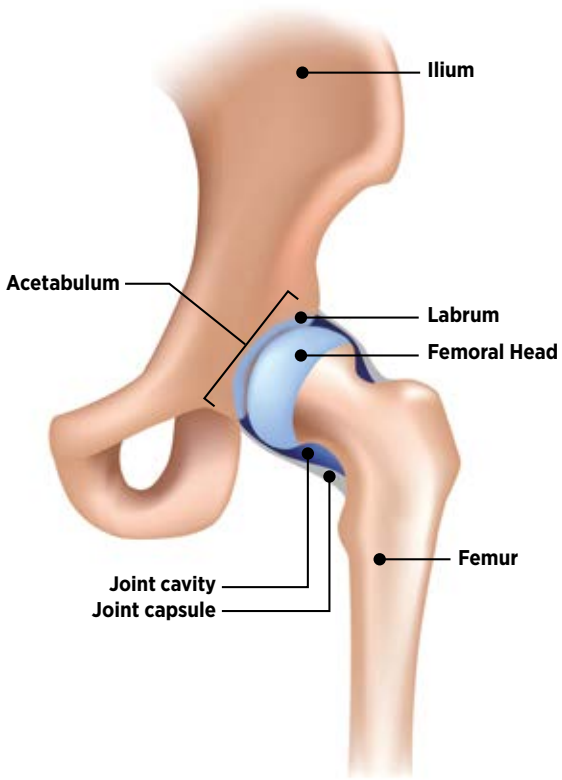


FIGURE 1: ANATOMY OF THE HIP JOINT

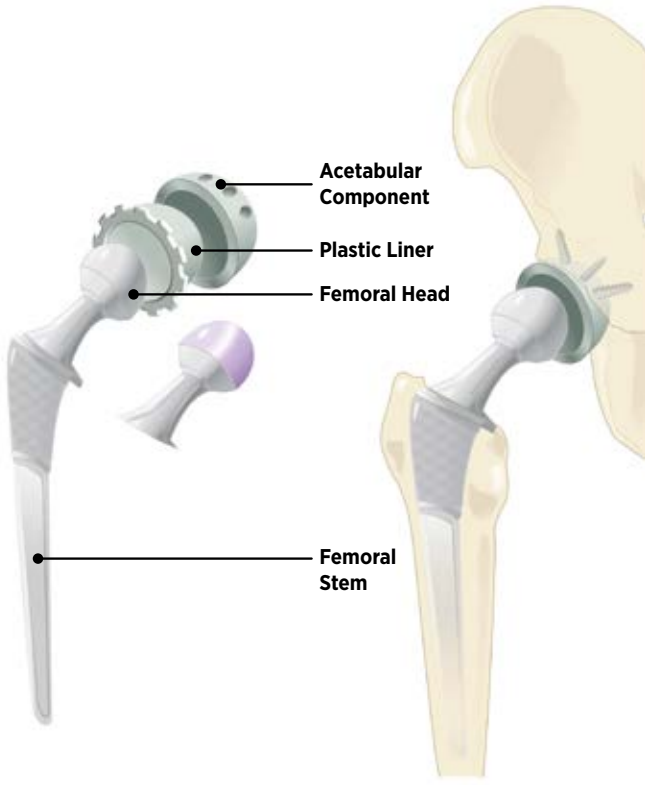


FIGURE 2: HIP REPLACEMENT SURGERY AND IMPLANTS

WHAT IS A KNEE REPLACEMENT?

A knee replacement simply means replacing the joint with artificial implants.

The knee is a joint that functions like a hinge (Figure 3). It is formed by the end of the thigh bone (femur) and the top of the shin bone (tibia) and includes the kneecap (patella). The knee joint is made stable with the support of strong ligaments and powerful muscles (e.g. quadriceps) around it, allowing movement.

A knee replacement or arthroplasty is a surgery that is performed to fully or partially replace a knee joint that has been damaged, usually by arthritis (Figure 4). The main reason for a knee replacement is osteoarthritis, which occurs when the surface of the joint becomes worn and can result in pain and stiffness limiting a person's ability to walk, climb stairs or bend down to the ground.

WHAT DOES THE SURGERY INVOLVE?

The surgeon makes a cut (incision) in the skin, and depending on the technique being used the length and location of the incision will be different. The worn-out parts of the bone and cartilage are removed. The end of the thigh bone and the top of the tibia are replaced, with an artificial spacer put between them to restore space lost in the knee joint when it wore down and to enable the new implants to mimic a healthy knee joint. The kneecap may also have a resurfacing added to it. The implants used for knee replacements surgery can be cemented or uncemented.

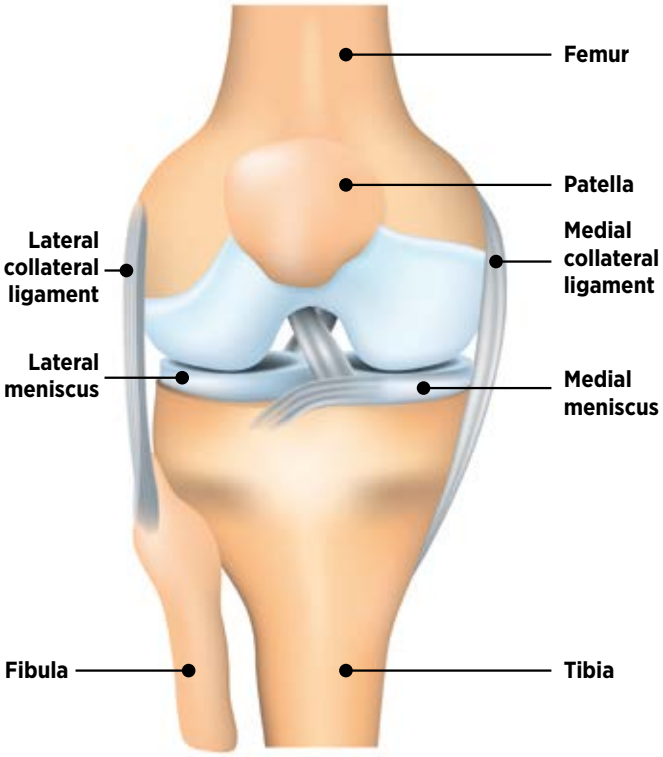


FIGURE 3: ANATOMY OF THE KNEE JOINT

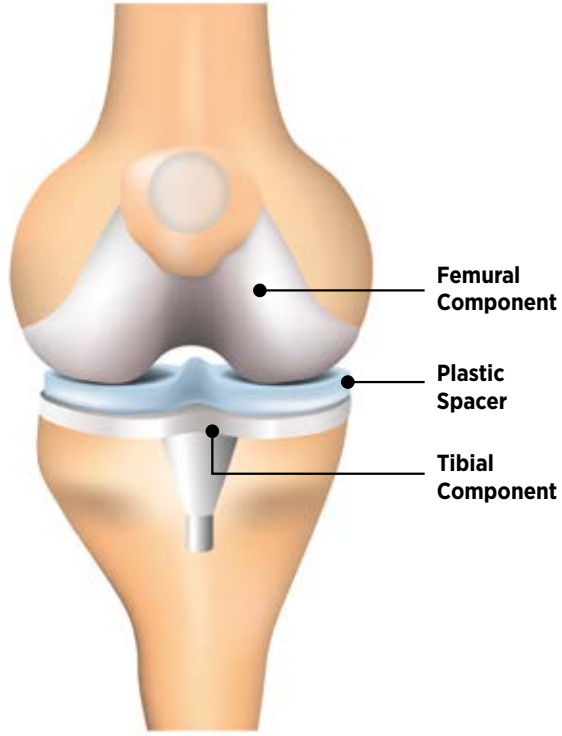
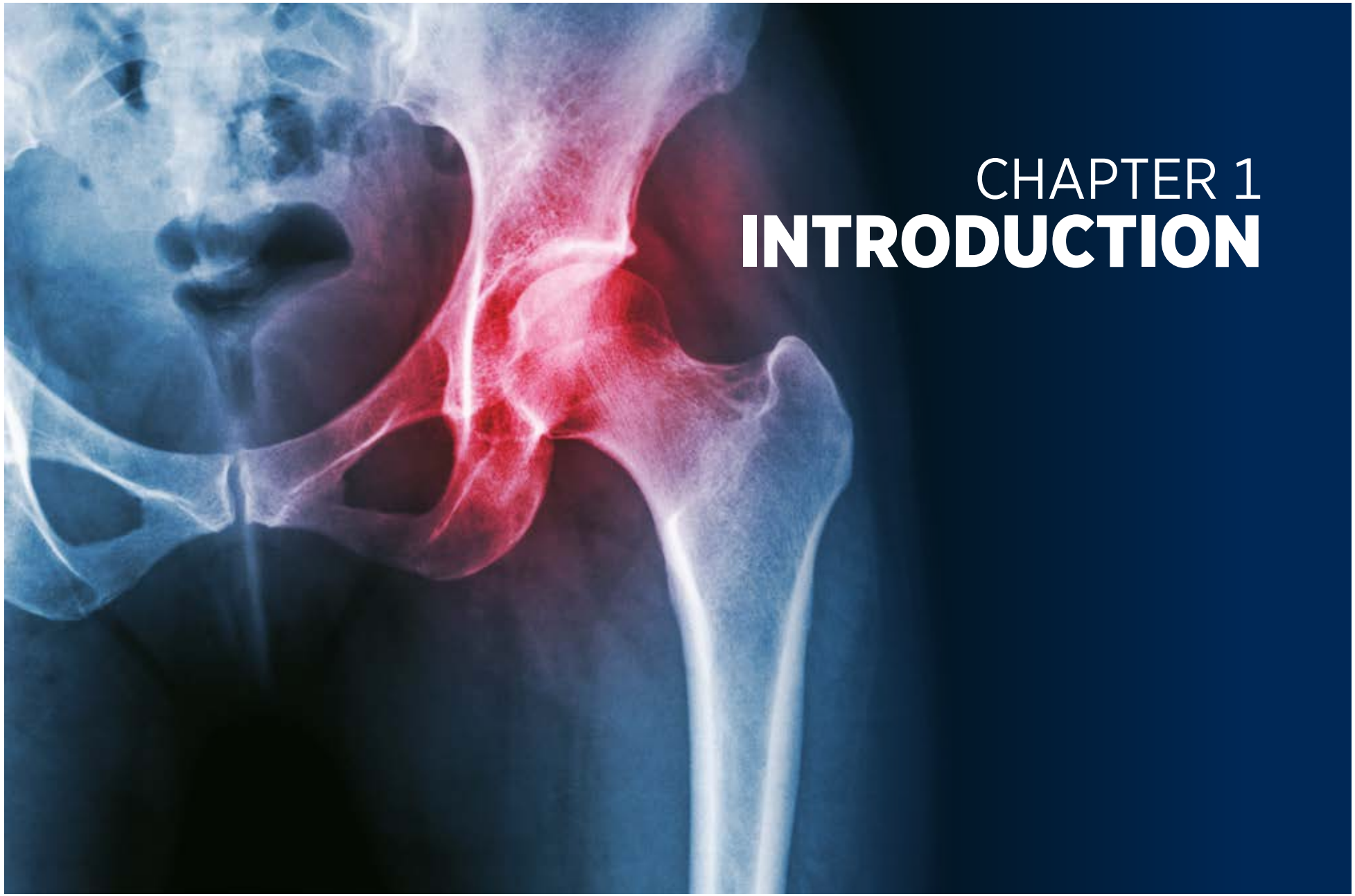


FIGURE 4: KNEE REPLACEMENT SURGERY AND IMPLANTS



CHAPTER 1
INTRODUCTION

CHAPTER 1: **INTRODUCTION**

The Irish National Orthopaedic Register (INOR) is managed by the National Office of Clinical Audit (NOCA) in collaboration with the Irish Institute of Trauma and Orthopaedic Surgery (IITOS). NOCA was established in 2012 and is funded by the Health Service Executive (HSE) through the office of the Chief Clinical Officer. It is managed by the Quality and Patient Safety Directorate via the National Centre of Clinical Audit (NCCA). Audits are commissioned by the NCCA. NOCA is based in the Royal College of Surgeons in Ireland (RCSI) and is independently governed by a voluntary board.

National joint replacement registries play an important role in prospectively monitoring the short- and long-term outcomes of joint replacement surgery, including risks (e.g. revision) and benefits, and Patient-Reported Outcome Measures (PROMs) (French et al., 2024). In time reporting will be enabled at surgeon level.

To date, there are 17 hospitals contributing to INOR, including 11 public hospitals and 6 private hospitals (Figure 1.1). Additional information about the hospitals and people INOR works with can be found in Appendix 1.

INOR is a national arthroplasty register which facilitates the systematic collection of data on patient characteristics, procedures, implants used and outcomes (both clinical and patient-reported measures) for patients who have elective hip or knee replacement surgery. It also facilitates national and local clinical audit to measure the standards of care and support quality improvement.

ESTABLISHMENT OF INOR

2000	2010	2012	2012-2014	2016	2020
Orthopaedic surgeons have long advocated for a national register. Many surgeons have collected data locally in their own practice and within their hospitals to monitor outcomes and use international registers during training.	Support for a national orthopaedic register gains urgency due to the articular surface replacement (ASR) recall. ASR recall and business case for the establishment of INOR is submitted to the HSE.	The development of the INOR project begins.	Data are collected on paper from 01/12/2014 in South Infirmary Victoria University Hospital (SIVUH) while the electronic system is under development. The development and funding for INOR is included in the National Model of Care for Trauma and Orthopaedic Surgery (2015).	Electronic system is built, and the system goes live on 4 May.	First private hospital comes on board. During this period there is significant disruption to elective surgery due to the COVID-19 pandemic.

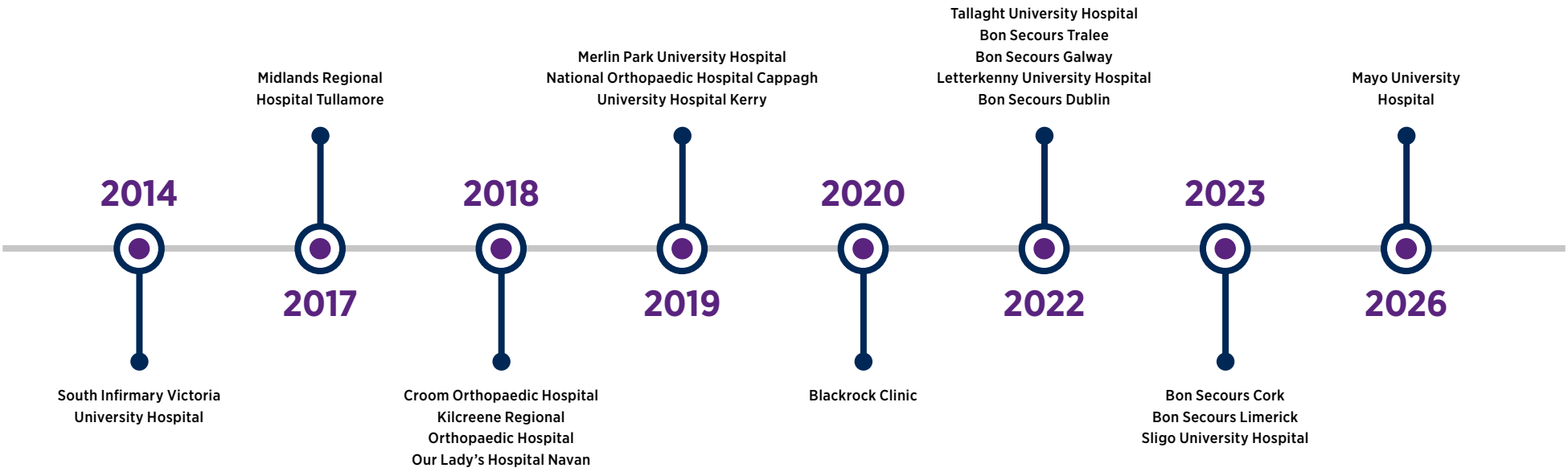


FIGURE 1.1: TIMELINE OF HOSPITAL IMPLEMENTATION FOR INOR

AIMS AND OBJECTIVES

AIM

The aim of INOR is to monitor the quality and safety of arthroplasty surgery, identify areas for improvement and support hospitals should an implant recall occur.

OBJECTIVES

The objectives of INOR are to:

- provide timely and high-quality data to the hospitals
- describe the epidemiology of arthroplasty patients
- provide information on patient outcomes, including PROMs
- identify potential issues with implant or surgical performance
- support hospitals to identify areas for quality improvement
- support surgeons for training and education
- provide data for hospital, national and international research.

WHO IS THIS REPORT AIMED AT?

NATIONAL REPORT	SUMMARY REPORT	HOSPITAL REPORTS
Healthcare professionals	Patients and carers	Healthcare professionals
Hospital managers Integrated Healthcare Area Managers	Patient organisations	Hospital managers
Regional Executive Officers – HSE Health Regions	Healthcare professionals	
Patients and carers		
Patient organisations		
Implant suppliers and manufacturers		

CHAPTER 2
METHODOLOGY

CHAPTER 2: **METHODOLOGY**

INOR collects data on elective hip and knee arthroplasties (replacements), both primary and revision surgery, that are carried out in participating hospitals. The inclusion and exclusion criteria are presented in Table 2.1.

The scope of the delivery of INOR implementation was divided into three phases:

Phase 1 includes 12 public 'scheduled care' hospitals and 15 private hospitals.
Phase 2 will involve 10 'non-elective' hospitals.
Phase 3 will include the expansion to other joints.

The majority of patients have their surgery in elective hospitals; however, for some the requirement for intensive care unit support for various reasons, including patient's pre-existing condition(s), requires surgery to be completed in the 'non-elective' hospital.

TABLE 2.1: INCLUSION AND EXCLUSION CRITERIA FOR IRISH NATIONAL ORTHOPAEDIC REGISTER

- All elective hip and knee joint replacement surgery and revisions that are carried out in participating public and private hospitals.
- Including:
  - Revision of total hip replacement (Rev THR)
  - Revision of total knee replacement (Rev TKR)
  - Post periprosthetic fracture where a revision arthroplasty procedure takes place, e.g. arthroplasty components are revised.
- Detailed inclusion and exclusion criteria can be found in Appendix 2.

DATA COLLECTION

INOR can facilitate prospective and retrospective data collection on a web-based platform in each participating hospital. INOR interfaces with some hospital administration systems like the Integrated Patient Management System (IPMS) to retrieve details from the specialist arthroplasty register, as displayed in Figure 2.1.

1 INOR is a secure web based application hosted as part of the NOCA Audit Portal (NAP)

2 Interfaces with each hospital's Patient Administration System PAS (e.g. iPIMs).

3 PAS filters patients to NAP Interface engine based on IPMs Arthoplasty register, elective waiting list entry or orthopaedic procedures codes

4 Consent is recorded prior to data being added to INOR Register. Patients can change with consent status at any time.

5 Due to patient safety aspects of register, some data is collected for non-consented patients to support finding patient for an implant recall and their data is pseudonymised. Their data is excluded from reports or research.

FIGURE 2.1: DATA FLOW

Data entry is separated into records that follow the patients' journey from pre-operative assessment to postoperative follow-up (Figure 2.2). Each part of the journey can be completed prospectively by members of the team, i.e. pre-operative nurses, non-consultant hospital doctors (NCHDs), theatre nurses and clinicians, or retrospectively by the audit coordinator. For this reporting period, the prospective model of data collection was the predominant method used.

In order to facilitate INOR's primary function of identifying patients in the component recall process, the system needs to capture identifiable patient information while also adhering to the *General Data Protection Regulation* (GDPR) (Regulation (EU) 2016/679) and the *Data Protection Act 2018 (Number 7 of 2018)*. Patients are invited to participate in the Register and must provide written informed consent that allows transfer of their identifiable data to NOCA when their consent status is 'Yes'. Patients can opt not to consent; if they do so, their consent status is 'No' and their identifiable data are not shared with NOCA. INOR uses an opt-in consent model for participation in the Register. Patient identifiable data can be collected using GDPR Art. 6 (1)(a) "consent", and for the surgical information including implants, the Register relies on GDPR Art. 9(2)(i) for the traceability of implants for all patients, "ensuring high standards of quality and safety of health care and of medicinal products or medical devices". The standard consent process is completed prior to surgery, generally by the pre-operative assessment nurse. There is a patient safety safeguard in place to allow for the system to record the components electronically to support patient contact in the event of a recall if the patient gets to theatre without following the standard consent process. The patient's consent status is set to 'Unknown' in such instances, the local audit coordinator must follow up and gain their consent at the next appropriate time. The 'Unknown' is treated like a 'No' in terms of consent until a patient indicates otherwise in writing. In some hospitals, where resources allow, the local audit coordinator will visit the patient on the ward after surgery and ask them to sign the consent form; otherwise, consent is collected at the 6-month postoperative assessment clinic. Patient consent for INOR is very high, at 99%.

A research consent function was introduced into INOR in September 2021 using GDPR Art. 6(1)(a) "consent" and Art. 9(2)(j) "scientific or historical research purposes or statistical purposes". Like the Register consent, research is collected prior to surgery, generally by the pre-operative nurse. Research consent rate for the patients in this report is 77%. The standard consent process is completed prior to surgery, generally by the pre-operative assessment nurse. If a patient does not consent to participate in the INOR Register, their data are excluded from research, and the patient is not asked about participating in research.

The local audit coordinator manages the data quality of INOR data within their own hospital. In conjunction with the local clinical lead, the local audit coordinator is responsible for the hospital's data quality and integrity. NOCA provides them with a validation process that requires management of the data for accuracy, validity, completeness and reliability within their own hospital. The inclusion of data was closed out for surgery completed on 31 December 2024.

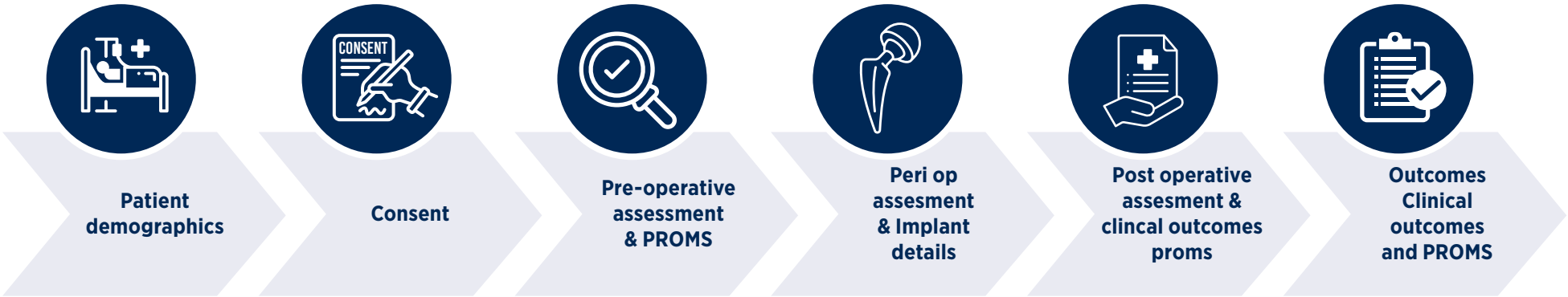


FIGURE 2.2: DATA ENTRY PROCESS

DATA ANALYSIS

The data included in this report are from 1 January 2015 to 31 December 2024. Manual data collection using paper records was done in South Infirmary Victoria University Hospital (SIVUH) while the electronic system was being built, and electronic data capture commenced on 4 May 2016. The retrospective data were added to INOR. Table 2.2 outlines the 17 hospitals included in this report along with the dates for which they have collected data.

TABLE 2.2: GO-LIVE DATES FOR HOSPITALS PARTICIPATING IN INOR

Hospital abbreviation	Hospital	Go-live date
SIVUH	South Infirmary Victoria University Hospital	01/12/2014
MRHT	Midland Regional Hospital Tullamore	10/04/2017
COH	Croom Orthopaedic Hospital	05/03/2018
KROH	Kilcreene Regional Orthopaedic Hospital	30/04/2018
OLHN	Our Lady's Hospital, Navan	17/09/2018
MPUH	Merlin Park University Hospital	04/03/2019
NOHC	National Orthopaedic Hospital Cappagh	10/06/2019
UHK	University Hospital Kerry	01/10/2019
BRC	Blackrock Clinic	01/10/2020
TUH	Tallaght University Hospital	18/04/2022
BSHT	Bon Secours Hospital Tralee	08/08/2022
BSHG	Bon Secours Hospital Galway	19/09/2022
LUH	Letterkenny University Hospital	07/11/2022
BSHD	Bon Secours Hospital Dublin	24/11/2022
BSHC	Bon Secours Hospital Cork	17/01/2023
BSHL	Bon Secours Hospital Limerick	13/02/2023
SUH	Sligo University Hospital	22/06/2023

INOR data analysis was completed and categorised by hip (primary and revision) and knee (primary and revision) surgery data. Only patients who consented to be in the register are included in this report. Only national-level data are reported; hospital-level and trend analysis reporting will be delivered in subsequent national reports. Analysis for the national report was completed by the NOCA data science team.

CHAPTER 3
DATA QUALITY

CHAPTER 3: **DATA QUALITY**

The purpose of the data quality statement (Table 3.1) is to highlight the assessment of the quality of the INOR data contained in this report using dimensions of data quality as laid out in the Health Information and Quality Authority's (HIQA's) *Guidance on a data quality framework for health and social care* (HIQA, 2018).

This data quality statement supports the interpretation and judgement of the information gathered during the reporting period from 1 January 2015 to 31 December 2024 and identifies strengths and areas for improvement, such as the creation of Data Validation Reports and reports within the NOCA Audit Platform (NAP).

DATA QUALITY STATEMENT

TABLE 3.1: OVERVIEW OF DATA QUALITY FOR IRISH NATIONAL ORTHOPAEDIC REGISTER DATA

DIMENSIONS OF DATA QUALITY	DEFINITION (HIQA, 2018)	ASSESSMENT OF DIMENSION (INOR)
RELEVANCE 	**"Relevant data meet the current and potential future needs of users."**	The INOR dataset facilitates a national implant register and a clinical audit. The data are collected once and used for either or both purposes depending on the consent from the patient. Data including demographics, comorbidities and Patient-Reported Outcome Measures (PROMs) are collected pre-operatively, during the hospital admission (including surgery and postoperative care) and after discharge at 6 months, 2 years and 5 years, when further PROMs data are collected. These data are particularly relevant from a clinical audit perspective and to support the monitoring of implant performance through the Register. The dataset is reviewed annually by a multidisciplinary governance committee (additional information on the INOR Governance Committee and attendance at meetings for 2025 can be found in Appendices 3 and 4) and key stakeholder groups, including the INOR audit coordinators and clinical leads, to ensure relevance and take account of any changes in practice or standards. During 2015–2024 some additions/amendments to the dataset included: • additions to the comorbidities • additions to reasons for withdrawal of consent • modifications to consent to reflect the changes of data collection method during the COVID-19 pandemic • additions to reasons for PROMs data being missing • additions to reasons for postoperative assessment not being completed • changes to antibiotic names to use generic names rather than brand names • changes to indications for surgery • changes to postoperative assessment form • changes to track when a subsequent revision was performed and to close out of the follow-up forms for this procedure • modifications to the postoperative note follow-up instructions and inclusion of blood loss. Aligning the implant catalogue to the National Joint Registry (NJR) in the UK in May 2025 was a key step to ensure INOR stayed as relevant as possible in terms of the implant catalogue it includes. In 2024, INOR transitioned onto the NOCA Audit Platform (NAP), and the dataset was reviewed and updated to ensure relevance and accuracy.

TABLE 3.1: OVERVIEW OF DATA QUALITY FOR IRISH NATIONAL ORTHOPAEDIC (CONTINUED)

DIMENSIONS OF DATA QUALITY	DEFINITION (HIQA, 2018)	ASSESSMENT OF DIMENSION (INOR)
ACCURACY AND RELIABILITY 	**"The accuracy of data refers to how closely the data correctly describes what it was designed to measure. Reliability refers to whether that data consistently measures, over time, the reality of the metrics that it was designed to represent."**	The scope of delivery of INOR includes all elective hip and knee arthroplasty patients who undergo surgery in the Republic of Ireland. The inclusion criteria are available in Chapter 2 and Appendix 2. Calculation of national coverage is currently not within the scope of the audit as it is in an implementation phase, as previously discussed. Activity in the private hospitals overall is not known; it can only be estimated for those participating, so it is not currently possible to ascertain coverage across all hospitals. All users of the INOR system are trained by either the NOCA team prior to the system going live in each hospital or by a local audit coordinator after the system is implemented. A user cannot access the system without a username and password or without completing training on how to navigate the data entry system. User guidance handbooks, presentations, recordings and simple instruction sheets are available to inform system users and enhance data quality. Audit coordinator teleconferences and annual workshops are held monthly to support ongoing training and data quality along with an annual full day workshop Over the period covered by this report, data went from being collected on paper in the first hospital, South Infirmary Victoria University Hospital (SIVUH) to integrating with some hospital IT systems like the Integrated Patient Management System (IPMS) and having audit data added either prospectively or retrospectively. Each process raises different challenges and successes, which have informed the new NAP. Data Validation Reports (DVRs) have been built and regularly disseminated to the audit coordinators to enhance data accuracy and reliability, and further measures have been built into the NAP to reduce the opportunity for data entry error. Data from the final months of 2024 were not fully validated at the hospital level due to the changeover from one platform to the other; however, a significant clean-up of the data was conducted by the NOCA data science team. For that reason, this report only presents data at national aggregated level. During data preparation and analysis for this report, areas of variation in data quality have been identified, including some missing data in terms of pre-operative assessment, body mass index (BMI), duration of surgery, PROMs and discharge date, together with inconsistencies in collection of data on anaesthesia, component type and complications. These areas are now a focus of improved data validation at point of data capture.
COHERENCE AND COMPARABILITY 	**"Coherent and comparable data is consistent over time and across providers and can be easily combined with other sources."**	The INOR dataset reflects the other international arthroplasty registers in terms of what it collects clinically and from an implant perspective. It was the first international register to scan the implants in real time in theatre and have an integrated component catalogue. INOR is a member of the International Society of Arthroplasty Registries (ISAR), a worldwide organisation made up of member registries. The aim of ISAR is to improve the outcomes for individuals receiving arthroplasty surgery worldwide. In 2022, INOR hosted the ISAR Conference in the Royal College of Surgeons in Ireland, Dublin. The minimum dataset from the ISAR *Recommended National Arthroplasty Registries Essential MDS* 2017 is incorporated into INOR. Since 2021, INOR's PROMs data have been submitted annually as part of the Organisation for Economic Co-operation and Development's (OECD's) *Health at a Glance* report, thus ensuring comparability across OECD countries.

TABLE 3.1: OVERVIEW OF DATA QUALITY FOR IRISH NATIONAL ORTHOPAEDIC (CONTINUED)

DIMENSIONS OF DATA QUALITY	DEFINITION (HIQA, 2018)	ASSESSMENT OF DIMENSION (INOR)
TIMELINESS AND PUNCTUALITY 	"Timely data is collected within a reasonable agreed time period after the activity that it measures. Punctuality refers to whether data are delivered on the dates promised, advertised or announced."	INOR data are collected largely prospectively but can also be collected retrospectively. During surgery, implants can be scanned into the register from theatre. Reporting from INOR has been ad hoc, with varying types of reports issued, including hospital reports demonstrating activity and summary details about the cohort, surgeon-level reports and DVRs. Data were also provided to the former hospital groups at intervals. The first national report, published in 2019, was the most substantial publication using the INOR data to date. To improve reporting and access to the data locally, INOR has been moved to the NAP. This allows for real-time access to the data submitted locally. Additionally, summary reports describing activity and completeness are available. It is envisaged that quarterly reports will be provided within the NAP and additional dashboards created and made available at hospital, regional and national level in line with other NOCA audits. This new reporting structure will facilitate hospitals to observe trends, conduct quality improvement and enhance pathways of care. During the reporting period it is important to note that the cyberattack on the Health Service Executive that occurred in May 2021 led to INOR collecting data on paper for 5 months before the system was fully restored.
ACCESSIBILITY AND CLARITY 	"Data are easily obtainable and clearly presented in a way that can be understood."	Data will be accessible directly at hospital level through the NAP with additional access to a NOCA dashboard for INOR. These data will be presented as summary statistics as well as trends, using run and statistical process control charts. Infographics will help to make the dashboard and consultant-level reports visual and impactful as well as easy to interpret and share with key stakeholders.

DATA COVERAGE

While INOR implementation is progressing well, it is not currently implemented in all the sites; thus, coverage is hard to estimate. The National Clinical Programme for Trauma and Orthopaedic Surgery (NCPTOS), using National Quality Assurance and Improvement System clinical data, reports that in publicly funded hospitals there are approximately 6,021 hip and knee arthroplasty surgeries completed annually. As data on activity outsourced from the HSE via the National Treatment Purchase Fund are not publicly available, it is estimated that an equivalent number is completed within the private sector. This report includes data on 43,291 cases where patients consented to participation in INOR. Each year since its inception INOR has increased the number of cases captured, with 10,266 cases recorded in the most recent year for 2024. Figure 3.1 shows the volume of data submitted per year since INOR's inception. Additional supporting supplementary tables can be found in Appendix 5.

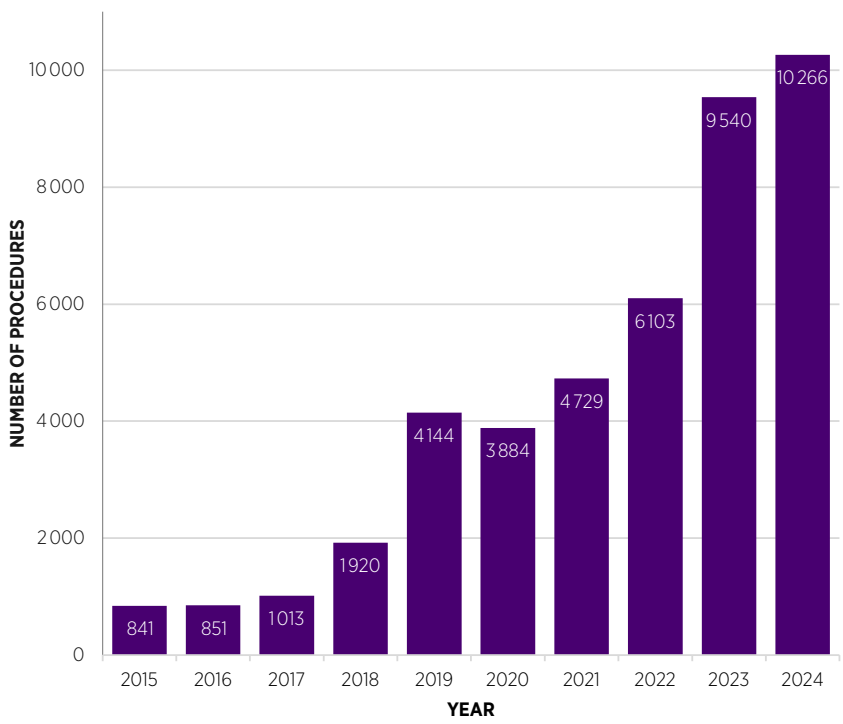


FIGURE 3.1: INOR TOTAL ACTIVITY BY YEAR, CONSENTING PATIENTS ONLY (N=43291)

CONSENT

INOR requires patient consent as it is a register. The consent rate from patients to have their details recorded on INOR has been high at 99%. Patients' data included in this report are from the following options:

- Patient has consented to use their information, status equals "Yes".
- Any patient who did not consent is deemed non-consenting, and their status is No.

CHAPTER 4
CASE MIX AND ACTIVITY

CHAPTER 4: **CASE MIX AND ACTIVITY**

This chapter will describe the case mix and activity recorded in the INOR data from 1 January 2015 to 31 December 2024. This will include four main cohorts of patients:

- Primary hip arthroplasty/total hip replacement (THR)
- Primary knee arthroplasty/total knee replacement (TKR)
- Revision hip arthroplasty/replacement (Rev THR)
- Revision knee arthroplasty/replacement (Rev TKR)

ARTHROPLASTY SURGERY ACTIVITY BY YEAR

Figure 4.1 shows the number of primary and revision hip and knee arthroplasties carried out between 2015 and 2024 (N=43291). This includes THR (n=22249), Rev THR (n=1864), TKR (n=18102) and Rev TKR (n=1076). Within the 43,291 surgeries, 274 bilateral primary hip arthroplasties and 276 primary bilateral knee arthroplasties were performed; fewer than 5 patients had bilateral revisions. As more hospitals came on board over this period, the volume of data increased annually, with more than 10,000 arthroplasties recorded in 2024.

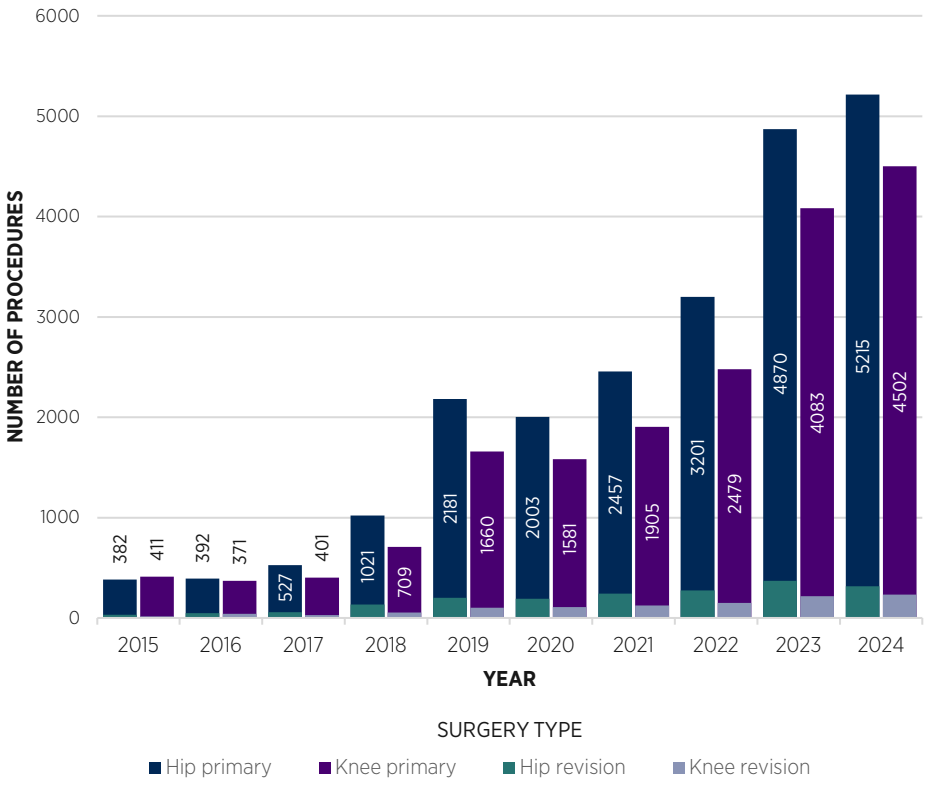


FIGURE 4.1: ARTHROPLASTY SURGERY ACTIVITY BY YEAR, 2015–2024 (N=43291)

AGE

Figure 4.2 displays the type of arthroplasty procedure by age band. The mean and median age for primary hip arthroplasty is 70 and 71 years, respectively, and the mean and median age for a revision hip arthroplasty is slightly older, at 73 and 75 years, respectively. The mean and median age for a total knee arthroplasty are both 72 years, and the mean and median age of Rev TKR are 72 and 73 years, respectively.

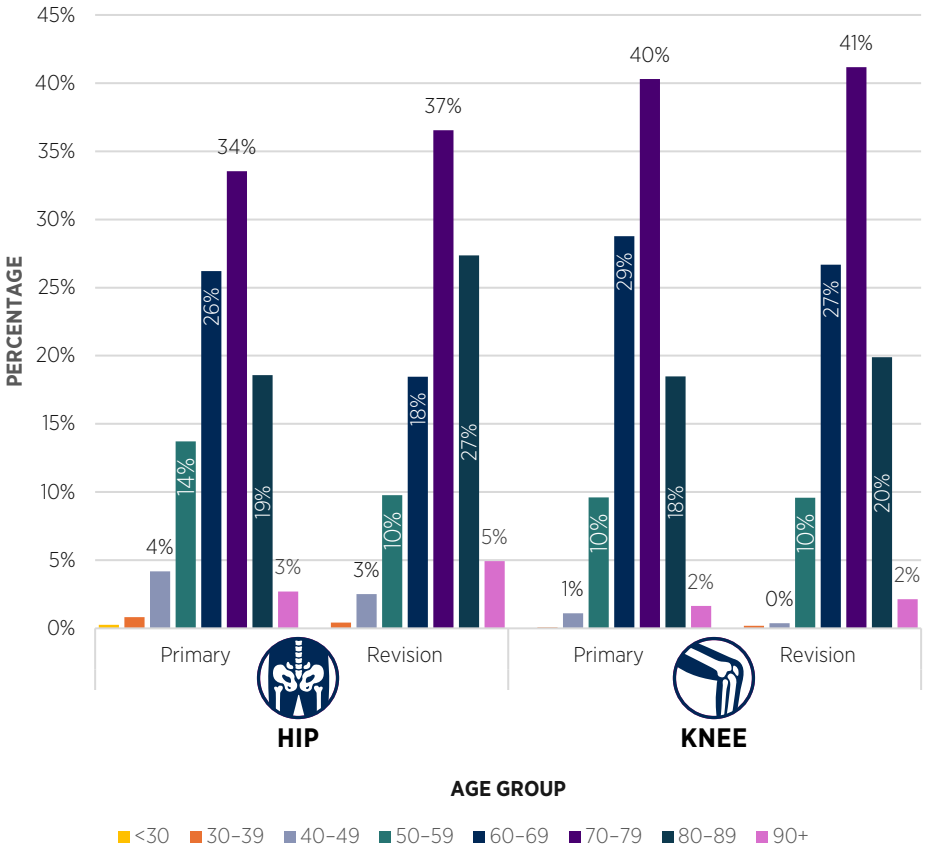


FIGURE 4.2: AGE GROUP BY SURGERY TYPE (N=43291)

Figure 4.2.1 displays the mean age over time and volume of cases for all procedures. The trend shown may not be a true reflection of the arthroplasty population as the audit is still in implementation and many of the participating hospitals joined incrementally over the reporting period.

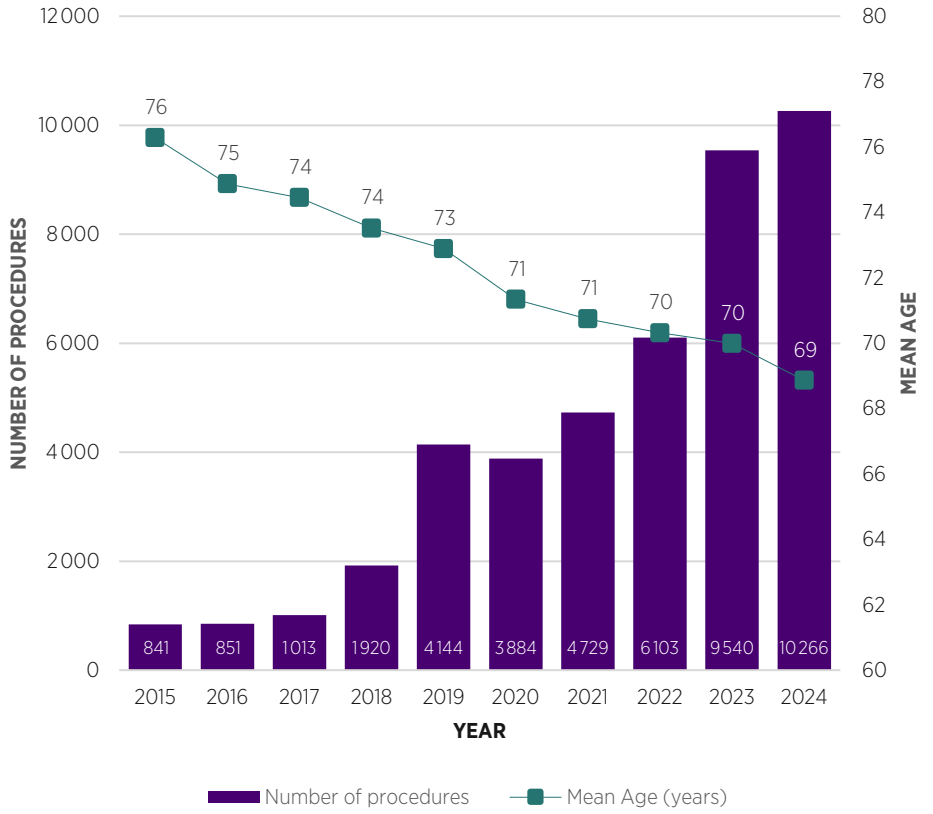


FIGURE 4.2.1: MEAN AGE OVER TIME AND NUMBER OF PROCEDURES (N=43291)

SEX

The ratio of patient sex per surgery type is shown in Figure 4.3. There is very little difference in the ratio for primary hip arthroplasty, with 51% (11,261) female and 49% (10,988) male. There is a more male-dominated ratio in the revision hip arthroplasty group, with 47% (879) female and 53% (989) male.

In the primary knee arthroplasty group, there is a notable difference between the sexes, with females recorded at 57% (10252), compared with 43% (7850) in males. This difference is also seen in the revision knee arthroplasty group, with 53% (573) females recorded, compared with 47% (503) males.

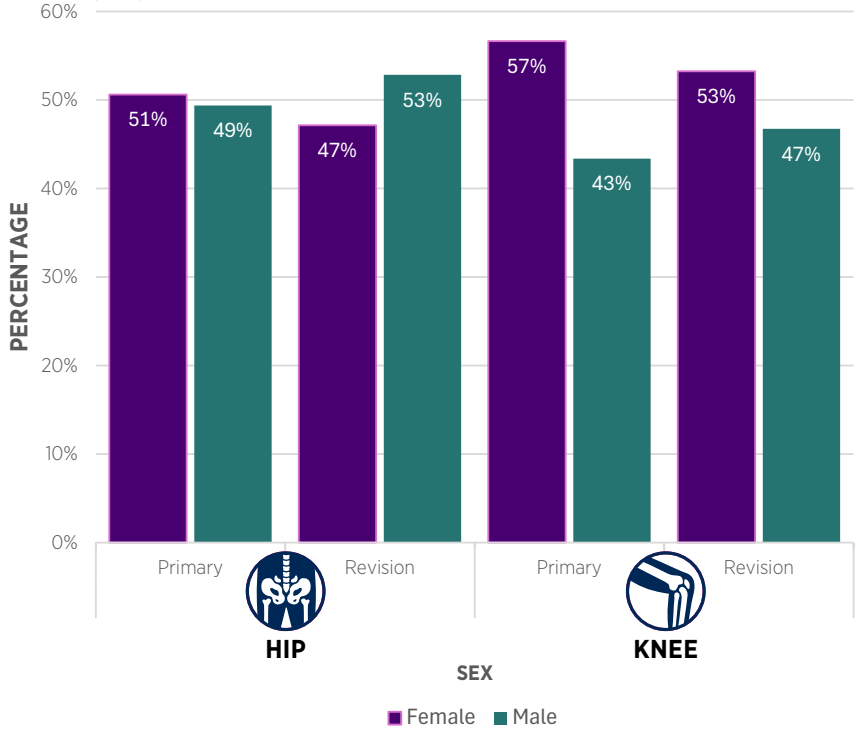


FIGURE 4.3: PATIENT SEX RATIO BY SURGERY TYPE (N=43291)

BMI BY SURGERY TYPE

BMI is an important metric in the arthroplasty cohort because it can impact eligibility for surgery and functional outcomes. It is calculated using the BMI weight management treatment algorithmic chart (Table 4.1). Over 80% of all patients are in BMI brackets over 25 kg/m², which are considered overweight. A significant proportion of patients in the primary arthroplasty groups for hips and knees are considered obese class I BMI (30.0–34.9 kgs/m²) and obese class II BMI (35.0–39.9 kgs/m²). The proportion of patients with a class I and class II BMI is similar in the primary and revision arthroplasty groups for both hips and knees (Figure 4.4).

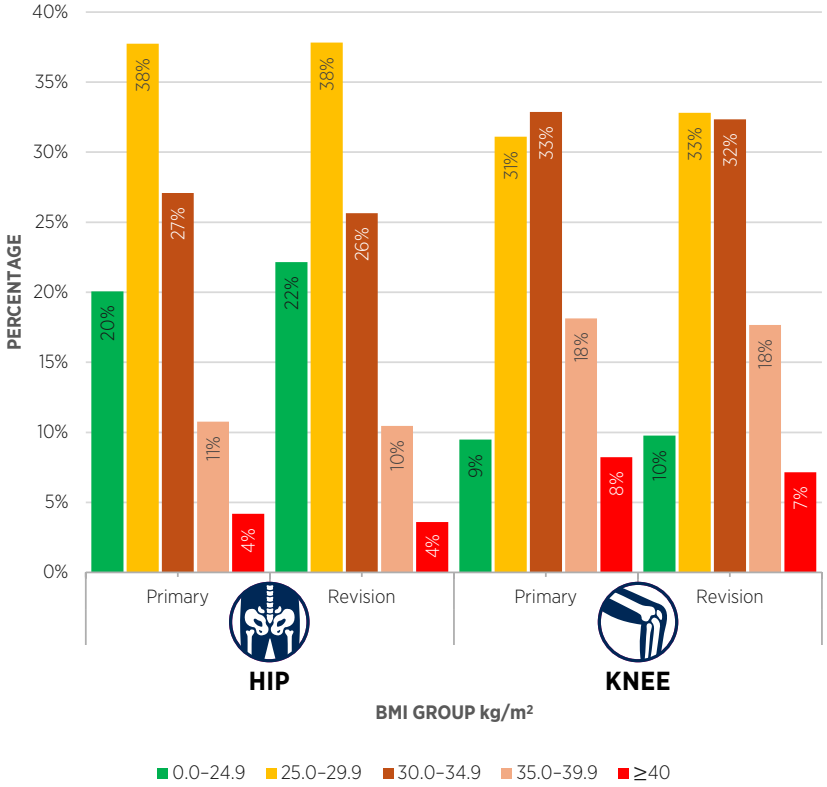


FIGURE 4.4: PATIENT BODY MASS INDEX BY SURGERY TYPE (N=43208[1])

[1] Eighty three cases are missing data required to calculate BMI.

TABLE 4.1: BMI CHART

Underweight	Healthy weight	Overweight	Obese Class I	Obese Class II	Obese Class III
(<18.5 kgs/m²)	(18.5 - 24.9 kgs/m²)	(25 - 29.9 kgs/m²)	(30 - 34.9 kgs/m²)	(35 - 39.9 kgs/m²)	(> 40 kgs/m²)

Figure 4.4.1 displays the percentage of patients in the five BMI bands over time for all arthroplasty procedures, with a slight increase seen in the ≥40 BMI band in 2024. The INOR will continue to monitor this trend over time and explore different categories in subsequent reports.

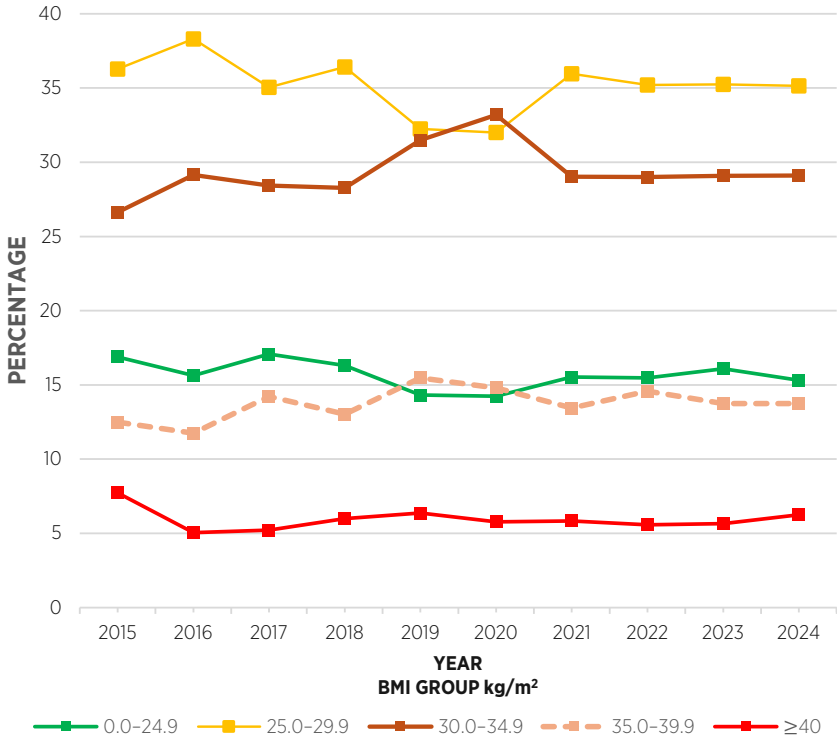


FIGURE 4.4.1: PATIENT BODY MASS INDEX OVER TIME, ALL PROCEDURES (N=43208[2])

[2] Eighty three cases are missing data required to calculate BMI.

AMERICAN SOCIETY OF ANESTHESIOLOGISTS (ASA) PHYSICAL STATUS CLASSIFICATION GRADE BY SURGERY TYPE

The ASA grade is a measurement used to classify the physical status as defined by (ASA,1963) as

1. Healthy person
2. Mild systemic disease
3. Severe systemic disease
4. Severe systemic disease that is a constant threat to life
5. A moribund person that is not expected to survive without the operation

There are similar distributions of ASA grades (ASA, 2014) for both primary and revision hip and knee arthroplasty patients (Figure 4.5). Most patients in all groups have mild systemic disease recorded (ASA Grade 2). In both revision arthroplasty groups, there is a higher proportion of patients with severe systemic disease (ASA Grade 3).

The HSE's *National clinical guidance for elective care facilities* (HSE, 2025) also recommends that patients with an ASA physical status classification higher than Grade 3 should not have elective surgery carried out in an elective care facility or surgical hub.

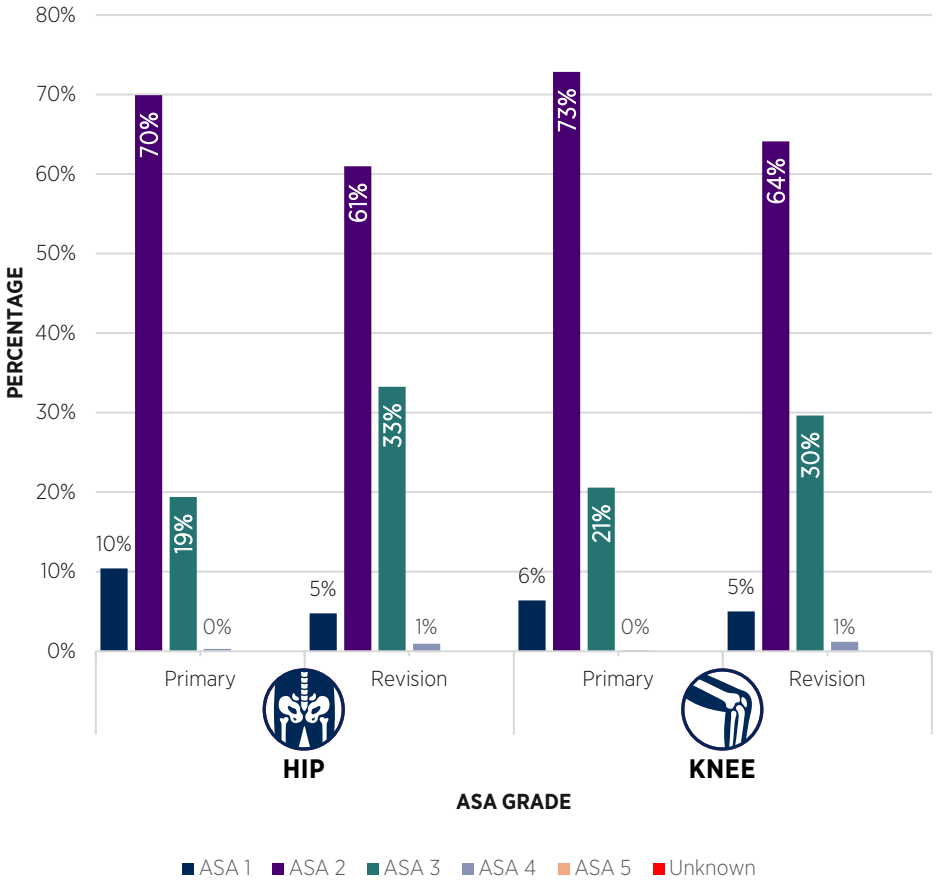


FIGURE 4.5: AMERICAN SOCIETY OF ANESTHESTIOLGISTS PHYSICAL STATUS CLASSIFICATION GRADE BY SURGERY TYPE (N=43291)

COMORBIDITIES AND PRE-OPERATIVE ASSESSMENT

The number of comorbidities per surgery type is recorded in Figure 4.6. Both revision groups have a higher proportion of multiple comorbidities. The most common types of comorbidities recorded in all surgery groups were cardiac (>53%) and endocrine (>18%).

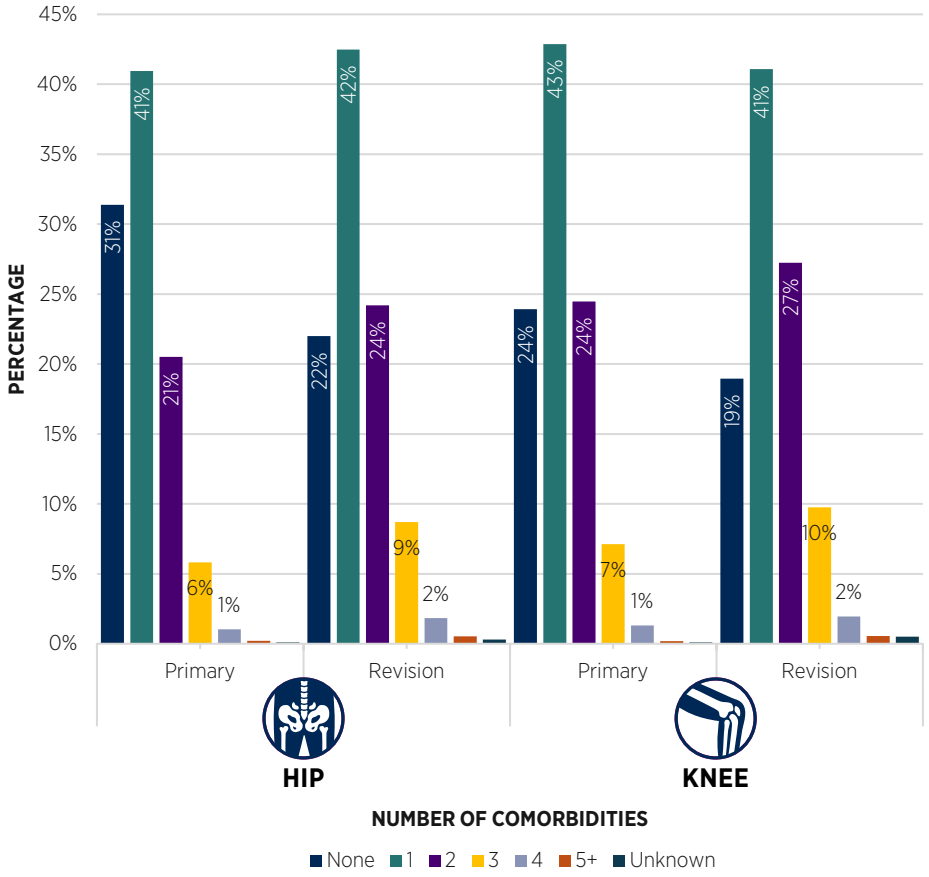


FIGURE 4.6: NUMBER OF COMORBIDITIES BY SURGERY TYPE (N=43291)

INOR captures withdrawals from surgery at the pre-operative assessment stage. Figure 4.6.1 shows that less than 5% of patients(n=1861) had recorded a completed withdrawal from surgery form, with "Other" being the most reported reason for withdrawal. In INOR Version 2 (V2) a free text box appears when the user selects "Other", enabling future reports to describe what categories are listed in "Other" and allowing for refinement of the multiselect options.

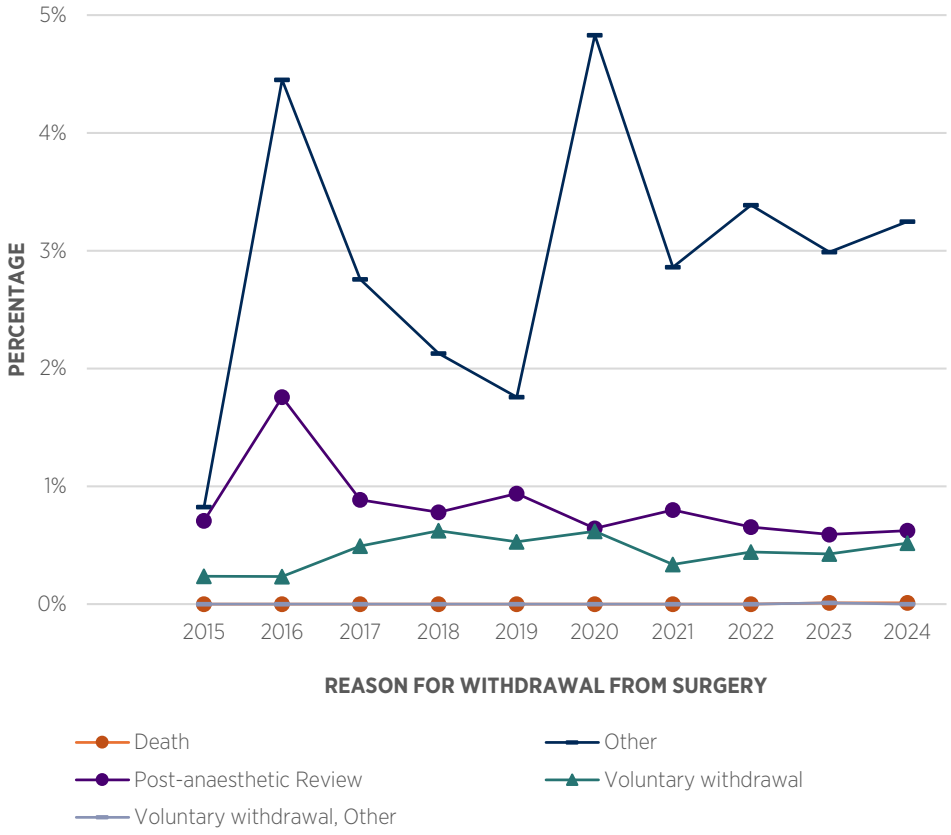


FIGURE 4.6.1: REASONS FOR WITHDRAWAL FROM SURGERY (N=1861)

Figure 4.6.2 shows variation in the time between pre-operative assessment and surgery. The range is significant, from 6 weeks to 2 years. The majority of patients (>60%) receive their assessment within the recommended time, but significant improvement is required.

Key recommendations from the National clinical programme for anaesthesia within the *Model of Care for Preassessment Services* (HSE, 2024) outline how all patients due to attend for elective procedures involving the services of an anaesthesiologist should be pre-assessed within 6 weeks of their surgery and have their risk factors identified, and that the patient should be supported to optimise their health.

The HSE's *National clinical guidance for elective care facilities* also recommends this (HSE, 2025). Furthermore, it outlines how patients who are ASA Grade 3 or 4 or any patient for whom major surgery is planned, should attend in person for preassessment. This guidance recommends standards for screening, assessing, educating and managing patients going for elective surgery.

The audit highlights the need to conduct an organisational survey of all participating hospitals to understand how each pathway is resourced and managed to provide clarity on areas like pre-operative assessment.

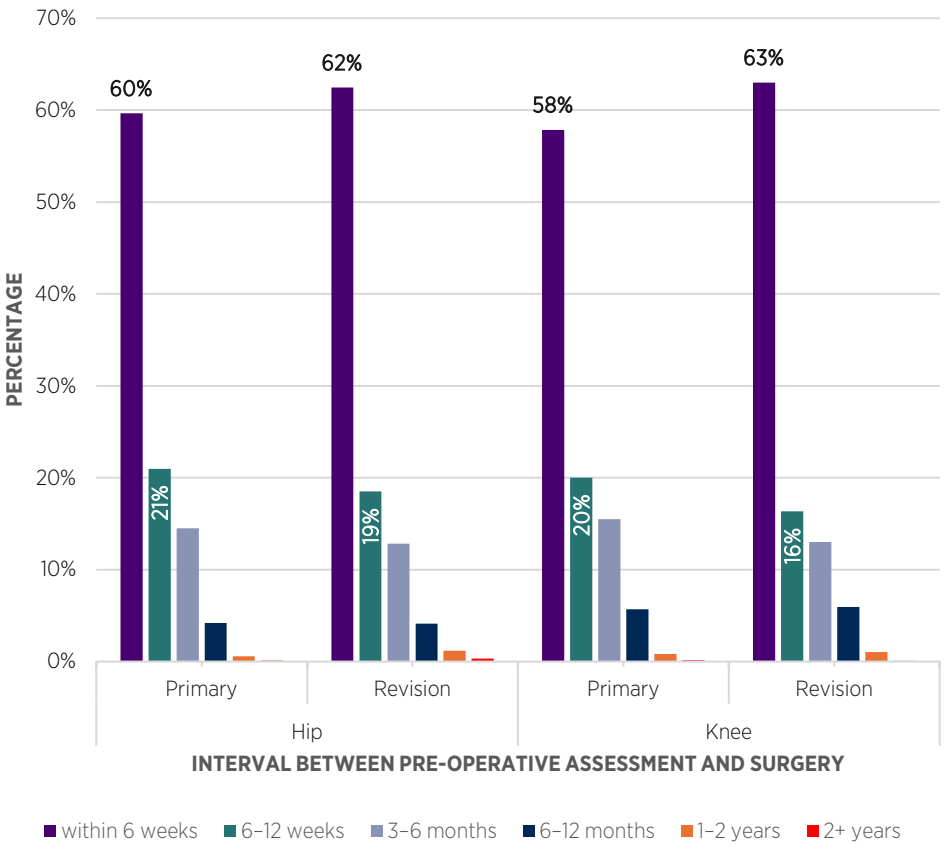


FIGURE 4.6.2: INTERVAL BETWEEN PRE-OPERATIVE ASSESSMENT AND SURGERY, ALL PROCEDURES (N=43266[3])

[3] 25 cases were excluded due to invalid pre-operative assessment dates.

CHAPTER 5
SURGERY

CHAPTER 5: **SURGERY**

INDICATIONS FOR SURGERY

Osteoarthritis is the most common indication documented for primary elective hip and knee arthroplasty, accounting for 94% and 97% of cases, respectively (Figure 5.1).

INDICATIONS FOR REVISION SURGERY

Of the patients recorded on INOR as having had a revision surgery aseptic loosening is the most common reason for revision hip arthroplasty, at 46% (857), followed by infection at 20% (367). "Other" has been recorded in 19% (358) of cases. "Other" is the most commonly recorded indication for revision knee arthroplasty, at 28% (302). Infection is the second most recorded reason, at 26% (284), followed by instability at 22% (242). INOR will work with hospitals to better describe the category captured as "Other "to better describe this category in future reports. These data are collected via the peri operative form in participating hospitals.

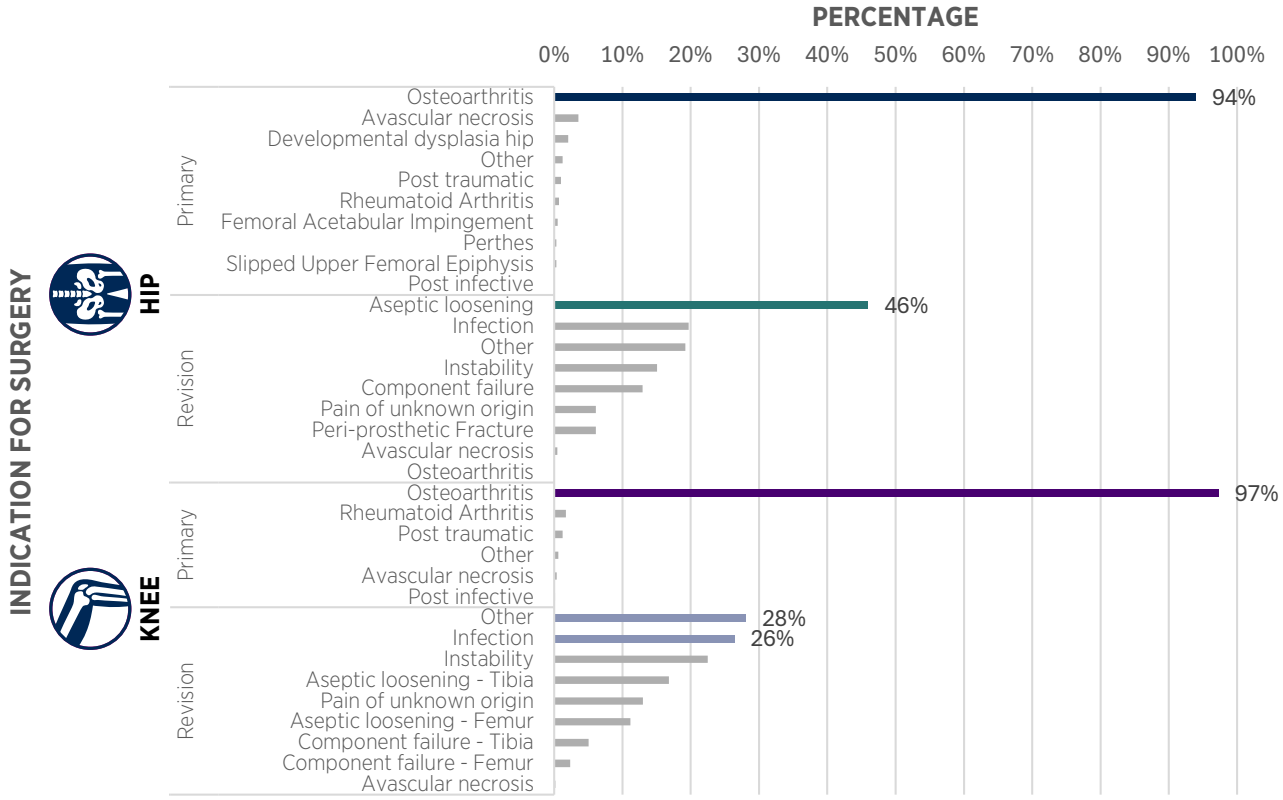


FIGURE 5.1: INDICATIONS FOR SURGERY (N=43291)

TYPE OF ANAESTHETIC

Spinal anaesthetic (SA) is the predominant type of anaesthesia recorded for all primary and revision procedures. This includes SA on its own or as a combination of local, sedation and regional (Figure 5.2).

For revision arthroplasty there is an increase in the use of a combination of general anaesthetic (GA), epidural, local and/or regional anaesthesia compared to the primary revision data. A high proportion of cases are recorded as "Other", this is a multiselect option within the perioperative dataset work will continue to improve the data quality of this field.

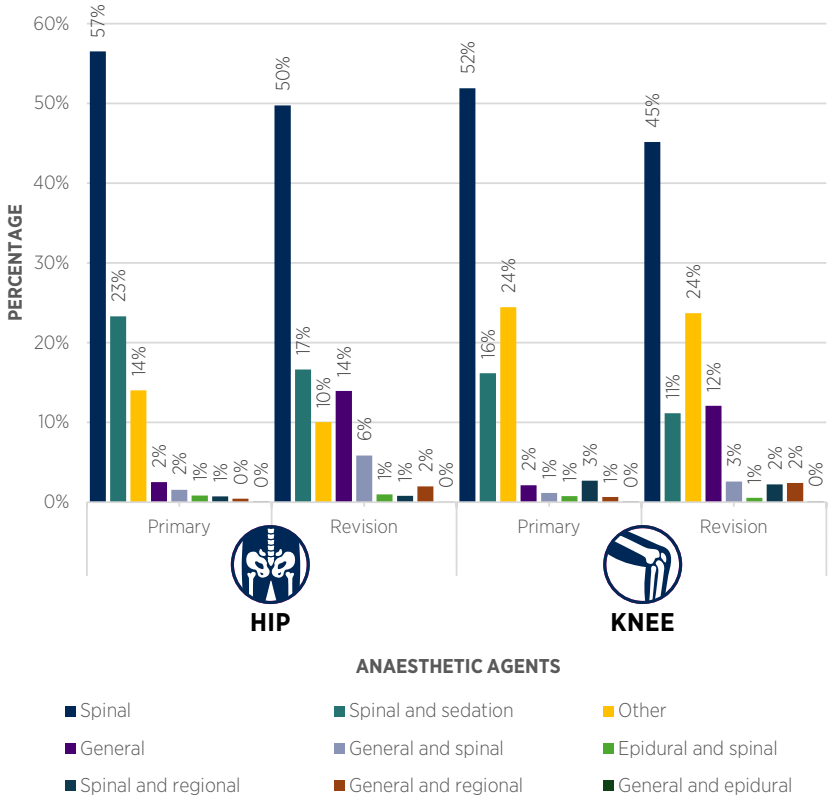


FIGURE 5.2: TYPE OF ANAESTHETIC USED, PRIMARY AND REVISION ARTHROPLASTY (N=43291)

SURGICAL ANTIBIOTIC PROPHYLAXIS

The administration of surgical antibiotic prophylaxis (SAP) is essential in inhibiting microorganism growth at the operative site, thereby reducing the risk of surgical site infection (SSI) developing. The HSE Antimicrobial Resistance and Infection Control (AMRIC) Team SSI *Prevention of Surgical Site Infections* guidance (HSE, 2024c) recommends that SAP is provided as clinically indicated, using the right agent at the right time by the right route and for the right duration, in accordance with national and local SAP guidance.

The data show that over 94% of patients who underwent a primary total hip or knee replacement received the antibiotic Cefuroxime, followed by 2% receiving Teicoplanin (Table 5.1). The timing of administration is unknown. The SAP guidance would recommend that this be administered before 60 minutes of knife-to-skin incision to allow time to establish adequate tissue and serum antibiotic level by the time of knife-to-skin incision (CDC, 2025). Similar percentages of SAP were seen in the revision arthroplasty cases, but with a slightly lower percentage (83%) receiving Cefuroxime and a wider selection of antibiotics being used including (e.g. Clindamycin, Gentamicin, Rifampicin, Teicoplanin and Vancomycin).

TABLE 5.1: SURGICAL ANTIBIOTIC PROPHYLAXIS (N=43291)

	Arthroplasty Type				
Antibiotic	**Primary**		**Revision**		**Total**
	n	**%**	**n**	**%**	**N**
Cefuroxime	37977	*94*	2191	*75*	40168
Cefuroxime plus other	512	*1*	266	*9*	778
Teicoplanin	892	*2*	134	*5*	1026
Teicoplanin plus other	127	*0*	42	*1*	169
Other antibiotic(s)	843	*2*	307	*10*	1150
Total	**40351**		**2940**		**43291**

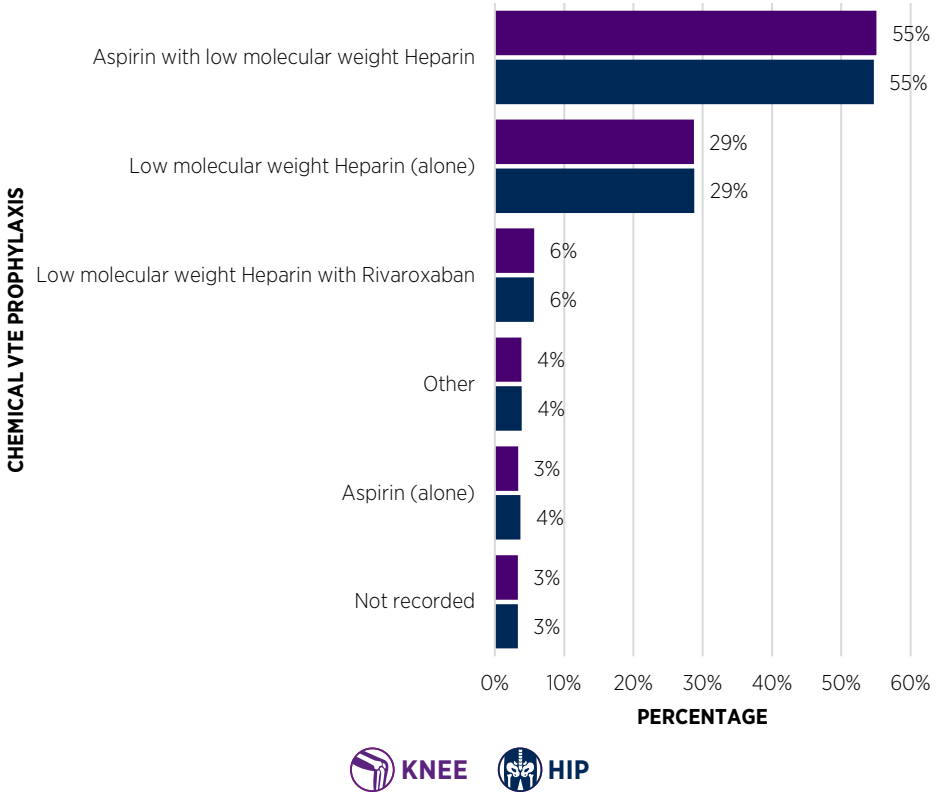
VENOUS THROMBOEMBOLISM PROPHYLAXIS

Venous thromboembolism (VTE) is a complication that can occur due to surgery. VTE prophylaxis can be chemical and/or mechanical.

Figure 5.3 shows the chemical VTE prophylaxis used across all primary arthroplasty surgeries. A combination of aspirin with low molecular weight heparin (LMWH) was the most commonly used chemical prophylaxis, at 55%for both primary hip knee arthroplasty.

In 2025, the HSE launched Eve's Protocol, which aims to standardise VTE care in Irish hospitals, thus reducing preventable harm caused by VTE. Within this protocol is the VTE risk assessment toolkit that can be used locally (HSE, 2025). The National Clinical Programme for Anaesthesia model of care for preassessment service agrees with this recommendation for elective surgery to optimise care and minimise the risk of developing VTE. Additional information and resources are available via the HSE website at Programme Documents & Resources – HSE.ie.

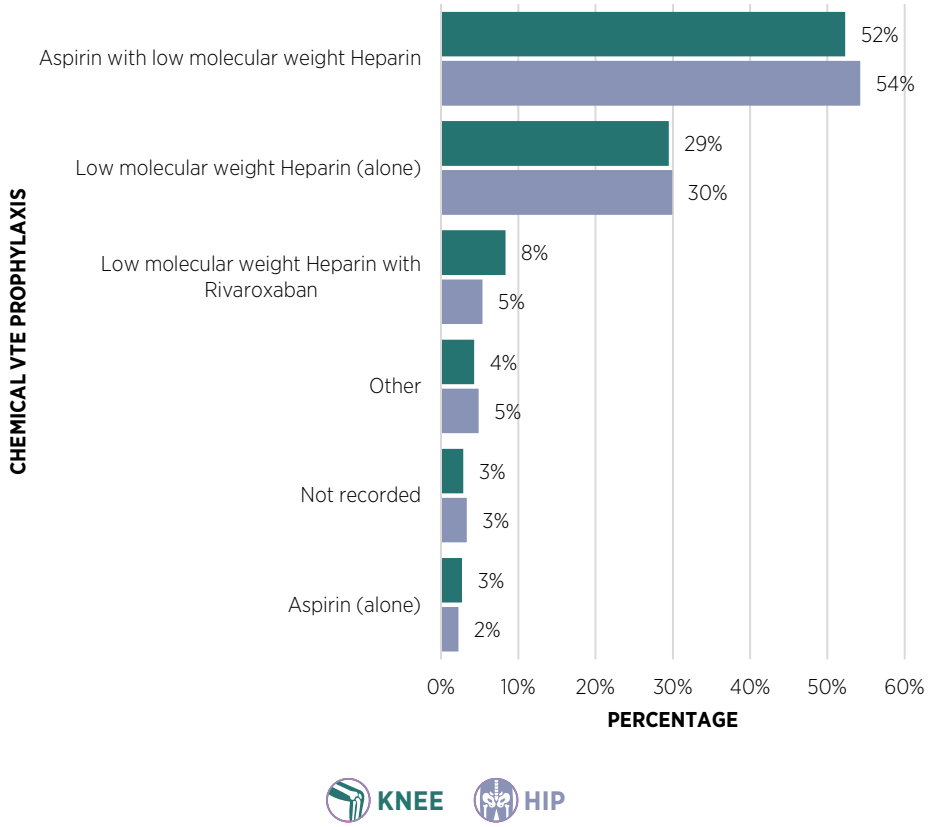
Factors that can mitigate the patient's risk of developing a VTE that are outlined in the resources mentioned above include preventative measures such as chemical and mechanical prophylaxis treatment and early mobilisation.



Note: VTE = venous thromboembolism

FIGURE 5.3: CHEMICAL VENOUS THROMBOEMBOLISM PROPHYLAXIS, PRIMARY ARTHROPLASTY (n=40351)

Similar results can be seen in the revision arthroplasty VTE prophylaxis (Figure 5.4), with aspirin and LMWH at 54% for revision hip and 52% for revision knee arthroplasty, followed by LMWH alone at 30% for revision hip arthroplasty and 29% for revision total knee arthroplasty.



Note: VTE = venous thromboembolism

FIGURE 5.4: CHEMICAL VENOUS THROMBOEMBOLISM PROPHYLAXIS, REVISION ARTHROPLASTY (n=2940)

Figure 5.5 displays the mechanical prophylaxis used to reduce the risk of patients developing a VTE while undergoing arthroplasty surgery. Thrombo-embolism deterrent stockings (TEDS) are the most commonly prescribed mechanical VTE prophylaxis across all surgical cohorts. Followed by a combination of Foot pumps and TEDS. Foot pumps are a device applied externally to the patients' feet to stimulate blood flow and offer intermittent pneumatic compression, i.e. mimicking walking while resting.

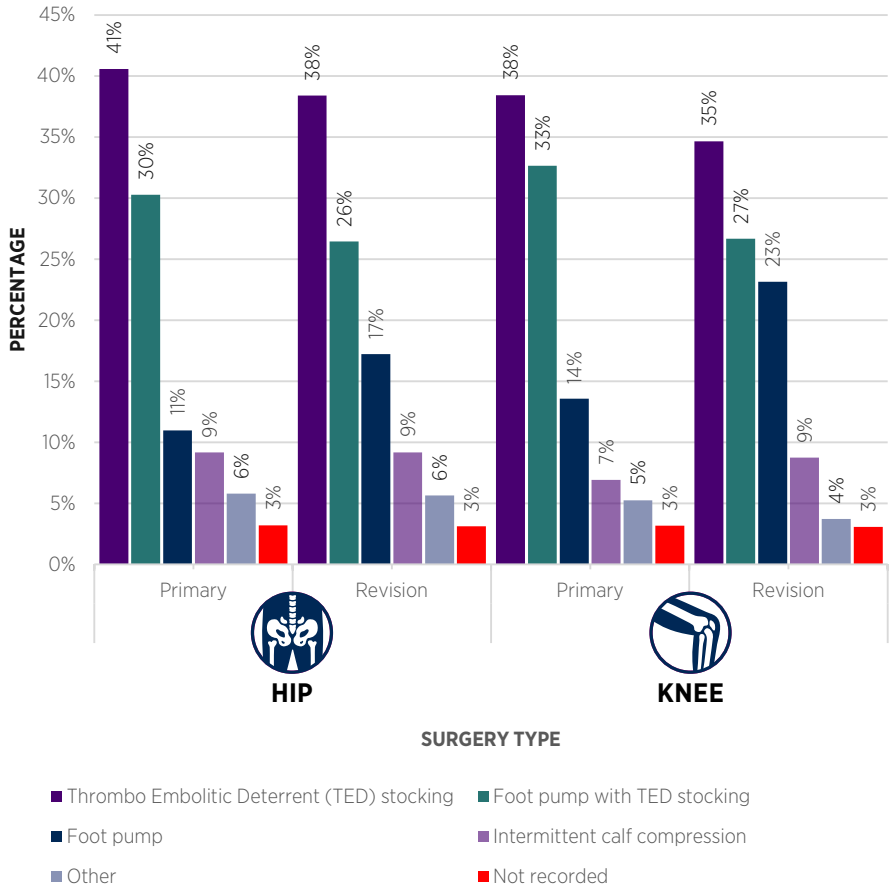


FIGURE 5.5: MECHANICAL VENOUS THROMBOEMBOLISM PROPHYLAXIS BY ARTHROPLASTY SURGERY (N=43291)

TRANEXAMIC ACID

Tranexamic acid (TXA) is commonly used in elective arthroplasty surgery to reduce postoperative blood loss and reduce the need for transfusion. TXA acts as an antifibrinolytic shown to reduce bleeding (Kirwan *et al.*, 2024). Figure 5.6 shows that between 2015 and 2024 97% of primary THRs and 93% of TKRs used TXA, while 97% revision THRs and 96% of revision TKRs used TXA. This shows a high level of compliance with best practice evidence.

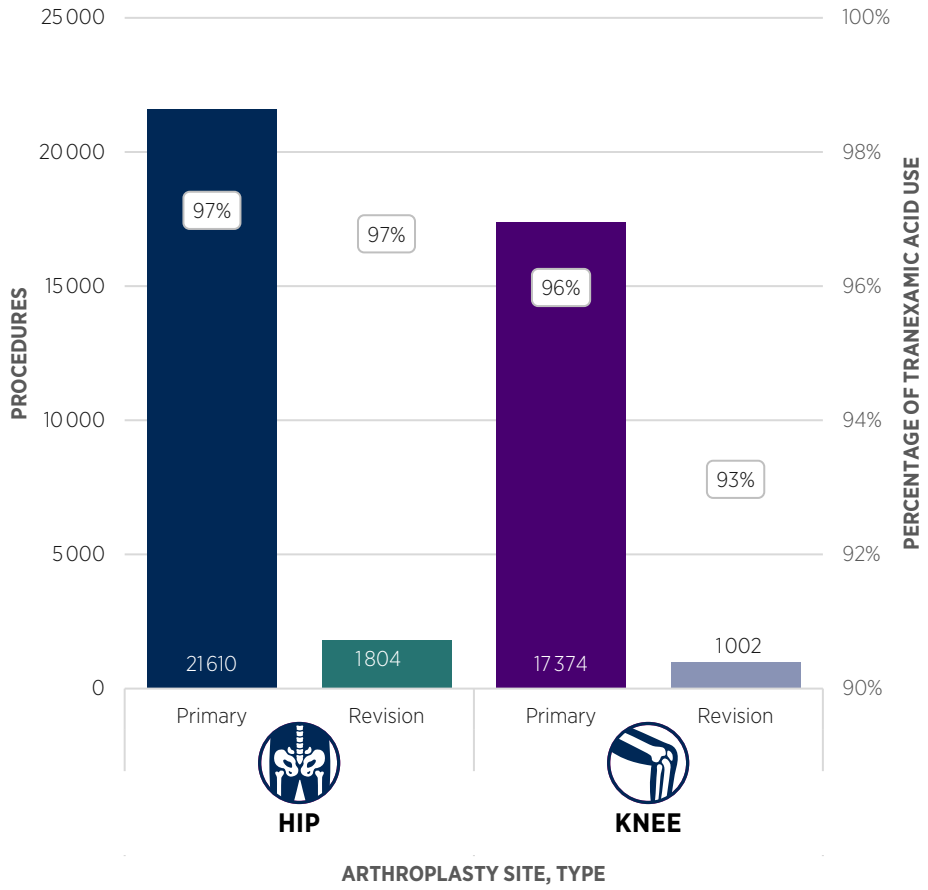


FIGURE 5.6: TRANEXAMIC ACID USE IN ARTHROPLASTY (N=43291)

SURGICAL APPROACH

The most common surgical approach for both primary and revision hip arthroplasty was posterior/posterolateral (posterior), with 65% of primary and 74% of revision hip arthroplasties being performed using this approach (Figure 5.7.1). A lateral approach was recorded in 24% of primary hip arthroplasties and 20% in revision hip arthroplasties.

The most common surgical approach for both primary and revision knee arthroplasty was the medial parapatellar approach, with 98% of primary and 99% of revision knee arthroplasties being performed using this approach (Figure 5.7.2).

Seven per cent of primary hip patients were recorded as having an anterior and lateral approach. This has been identified as a potential data quality issue, as the term anterolateral approach is often used synonymously with the lateral approach. To address this, the INOR Governance Committee has agreed to add the word "direct" as a prefix to "anterior approach" in 2026 in order to provide greater distinction between approaches and improve data quality and consistency in interpretation. Figure 5.7 displays infographics of the most commonly used approaches for THR.

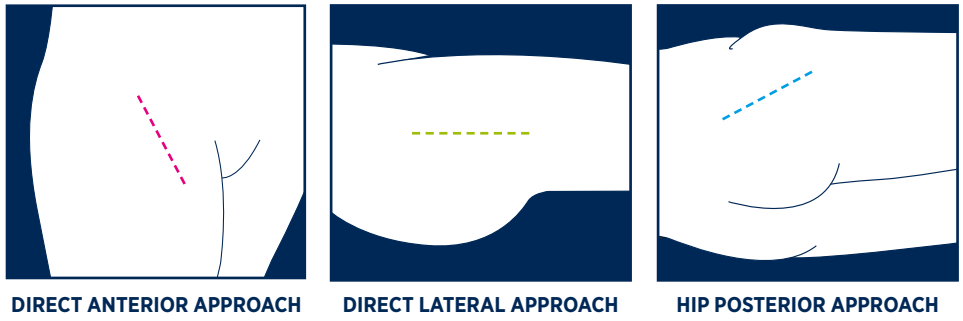


FIGURE 5.7: HIP SURGICAL APPROACH

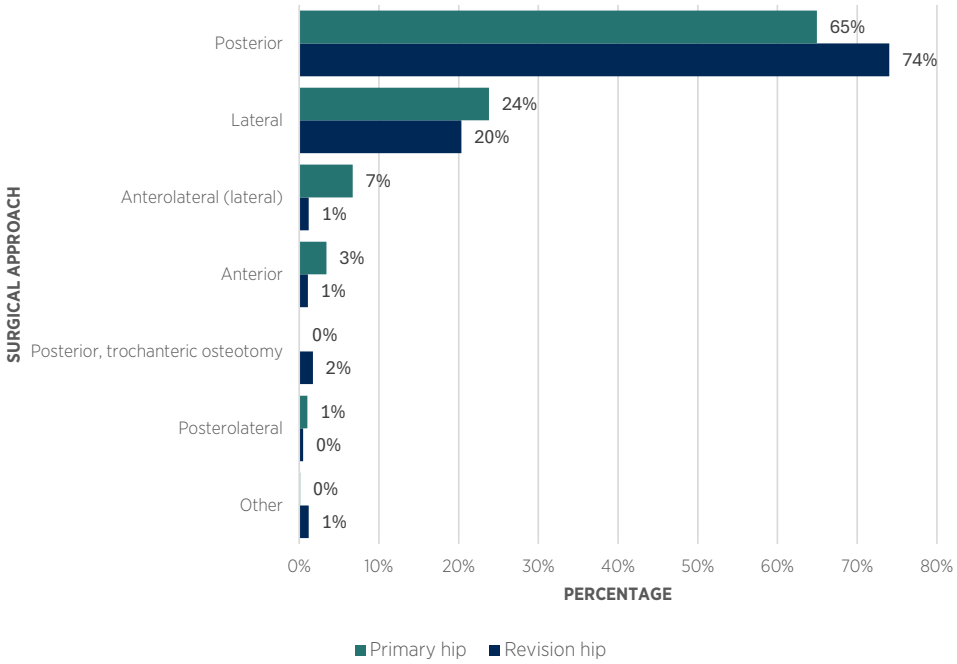


FIGURE 5.7.1: HIP ARTHROPLASTY SURGICAL APPROACH (n=24113)

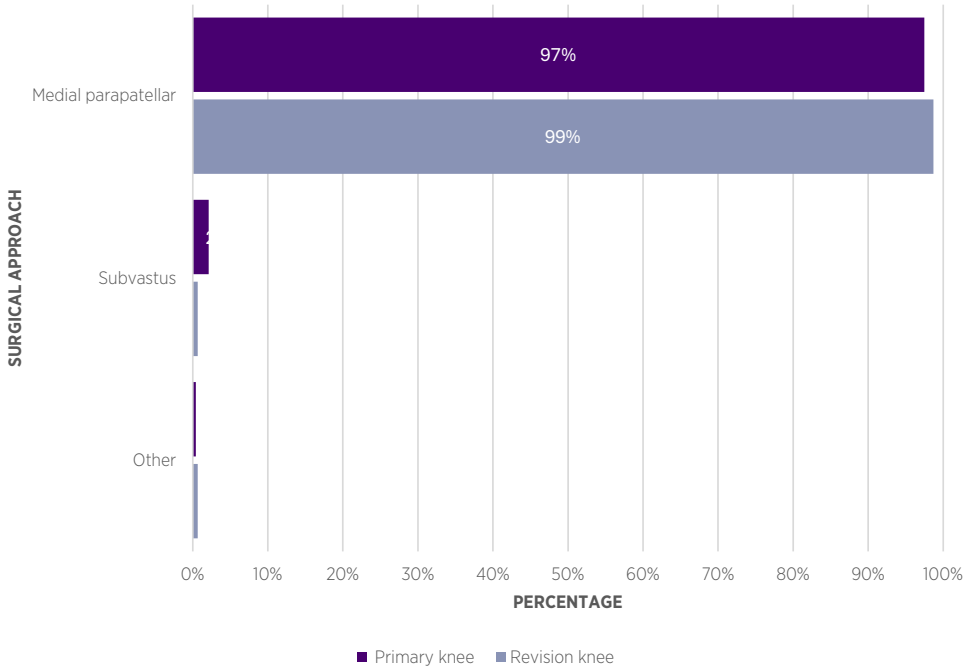


FIGURE 5.7.2: KNEE ARTHROPLASTY SURGICAL APPROACH (n=19178)

IMPLANTS

The term 'implant' is often used interchangeably with the term 'component'. For primary and revision THR the following implants are used: shell/cup (acetabular implant), femoral stem (femoral implant) and femoral head, which fits into the shell/cup. Similarly, for primary and revision TKR the following implants are used: femoral implant, tibial implant and tibial insert. It is worth noting that for many revision arthroplasties there are more than the major implants used, and this is due to the reconstruction and complexity of revision arthroplasty. Figure 5.8 demonstrates primary cementless THR implants, and Figure 5.9 demonstrates primary TKR implants.

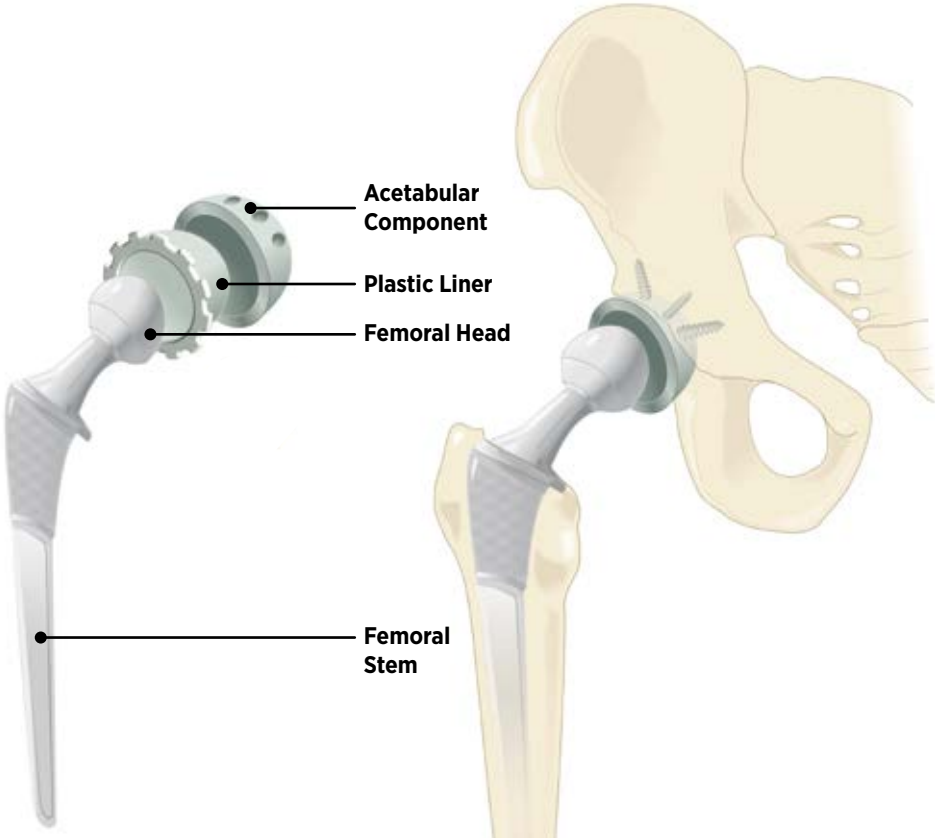


FIGURE 5.8: GENERIC PRIMARY HIP IMPLANTS

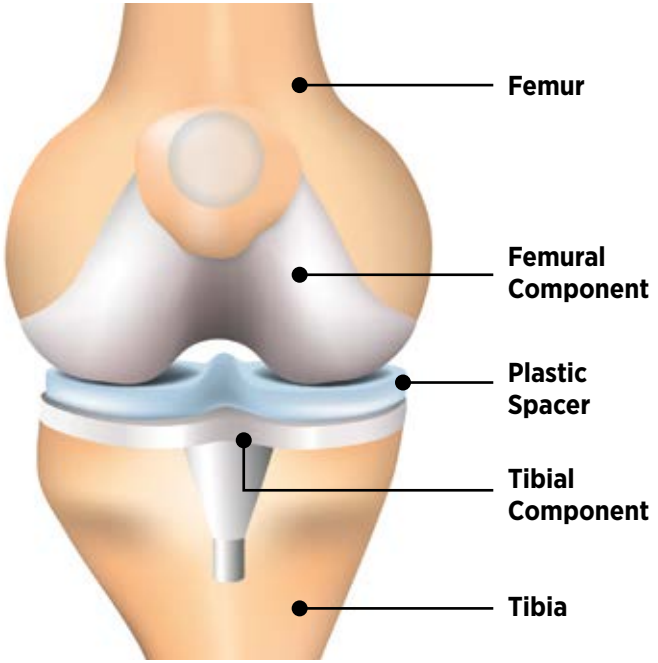


FIGURE 5.9: GENERIC PRIMARY KNEE IMPLANTS

Implant details can be entered into INOR by scanning the implant barcodes at the time of surgery or retrospectively from the patient's chart. Since May 2025 INOR has utilised the National Joint Registry (NJR) UK component catalogue, which is a robust component catalogue. Prior to this, INOR used the Irish National Component Catalogue which had been built, maintained and managed internally by NOCA since its foundation in 2014. INOR captures the reference and lot number for each implant; this is automatically configured within each barcode, and if there is no barcode available, one can simply enter in the reference and lot number to retrieve the implant details. If the implant is not found within the catalogue, then one can request the implant to be added to the catalogue. Once an implant request is created, a message is sent to the support team, who will verify the implant with the manufacturer and confirm it can be added to the catalogue. This process is key to capturing all implant information accurately for traceability and patient safety. INOR captures data on all major components used for primary and revision arthroplasties.

PRIMARY THR IMPLANTS

For primary THR the implants can be explored by the method of fixation used by the surgeon. There are two types of fixations that a surgeon can opt to use:

1. Cemented fixation using a polymethylmethacrylate substance.
2. Cementless fixation (biological fixation) using bone ingrowth and bone ongrowth.

A surgeon can also opt to use a mixture of both fixations, often referred to as hybrid or reverse hybrid arthroplasty. Figure 5.10 shows that for primary THR, cementless fixation accounts for the majority, at 64% (n=14202), followed by hybrid at 24% (n=5309), cemented at 9% (n=1991) and reverse hybrid at 0.5% (n=105). Cementless hip fixation has steadily increased year on year, from 165 cementless hip arthroplasties recorded in 2015 to 3,683 recorded in 2024. The indications for using cementless femoral stems include younger patients and older patients with good bone stock.

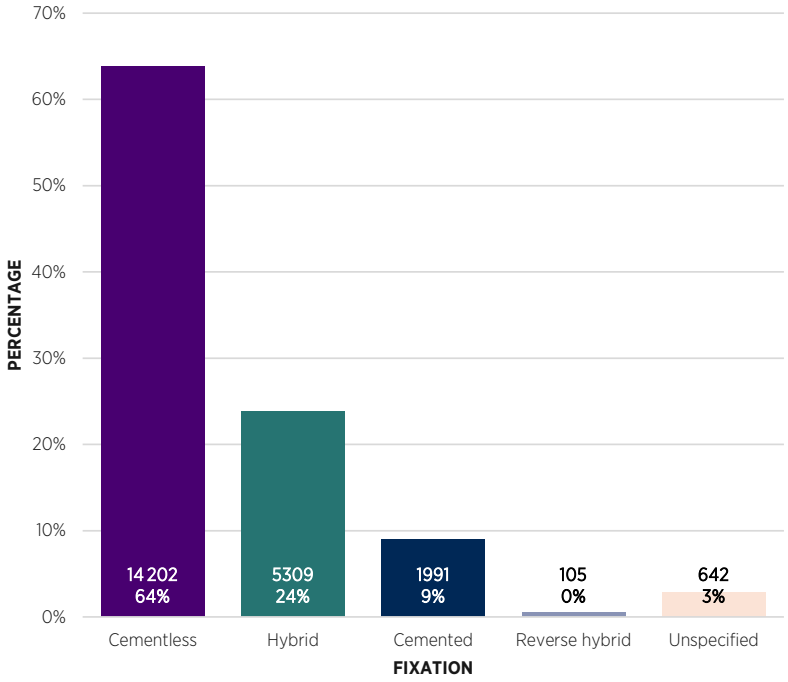


FIGURE 5.10: METHOD OF FIXATION PRIMARY HIP ARTHROPLASTY (n=22249)

For cementless implants the Corail stem from DePuy was the most commonly used stem, accounting for 42% of the total (n=4896), as shown in Figure 5.11. The Trident acetabular shell was the most popular cementless acetabular implant used, at 49% (n=9398), followed by the Pinnacle shell, accounting for 44% (n=8309), with the remainder as displayed in Figure 5.12.

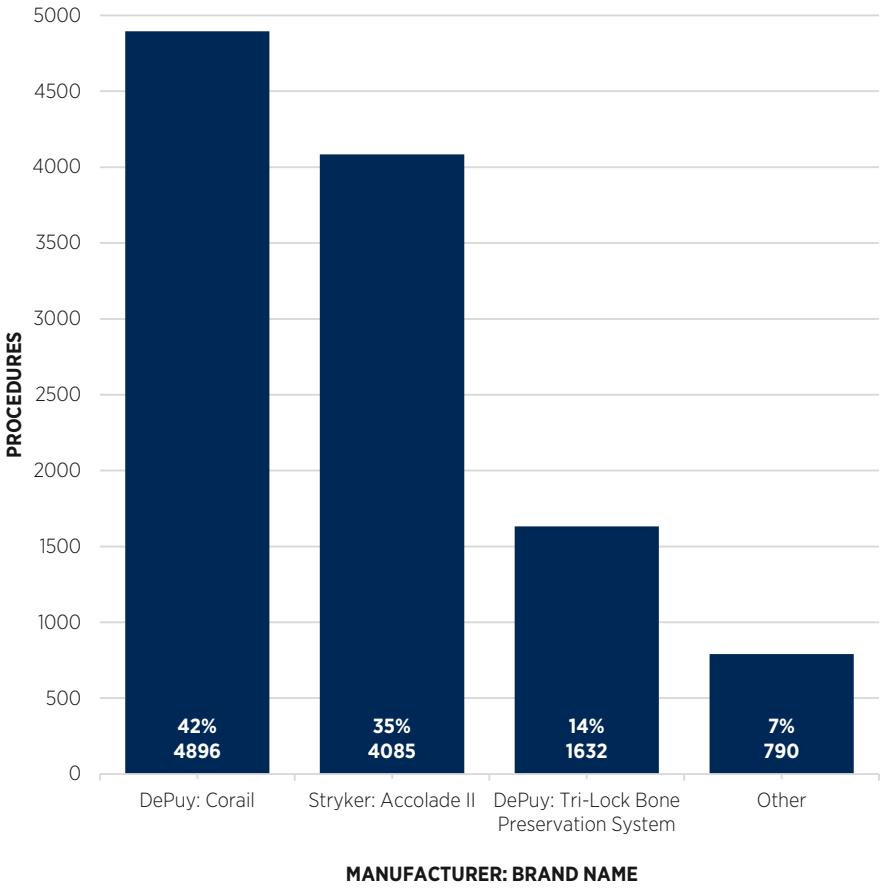


FIGURE 5.11: PRIMARY HIP ARTHROPLASTY CEMENTLESS FEMORAL STEM IMPLANTS (n=11709)

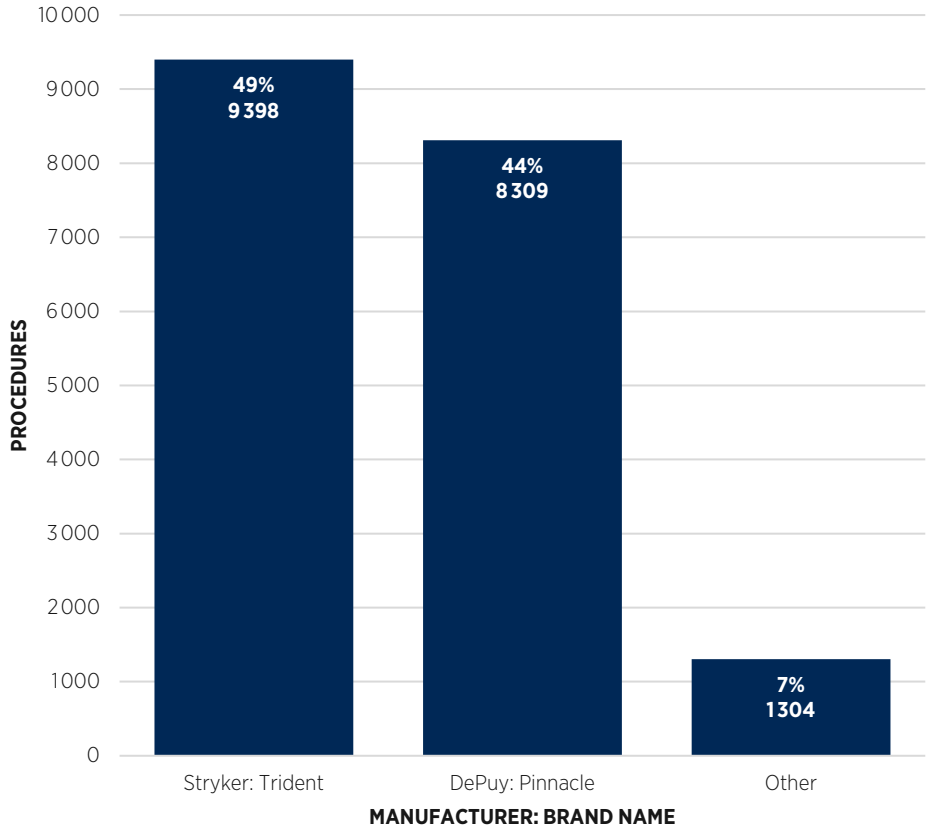


FIGURE 5.12: FIGURE 5.12: PRIMARY HIP ARTHROPLASTY CEMENTLESS ACETABULAR SHELLS (n=19011)

For cemented primary THR, the Exeter stem accounts for 89% (n=6459) of all cemented stems used in INOR. Regarding cemented acetabular cups, RimFit, Contemporary and Marathon were the top three most-used cups. These three combined accounted for 87% of cemented primary THR (n=1678).

The bearing surface materials for primary THR depend on the method of fixation, and the data demonstrated that the two most commonly used materials are a ceramic head on polyethylene (CoP) at 66% (n=9260), followed by metal head on polyethylene (MoP) at 31% (n=4427), as displayed in Figure 5.13.

Ceramic heads are the most popular type of femoral head used in all primary THRs. The data showed that 71% (n=14718) of all femoral heads used are ceramic, with metal heads making up 29% (n=6098). Femoral head size captured in INOR shows that size 32 was the most popular, at 51% (n=10549), followed by size 36 at 34% (n=7192), with smaller sizes 28, 26 and 22 making up the remaining 15% (n=3083).

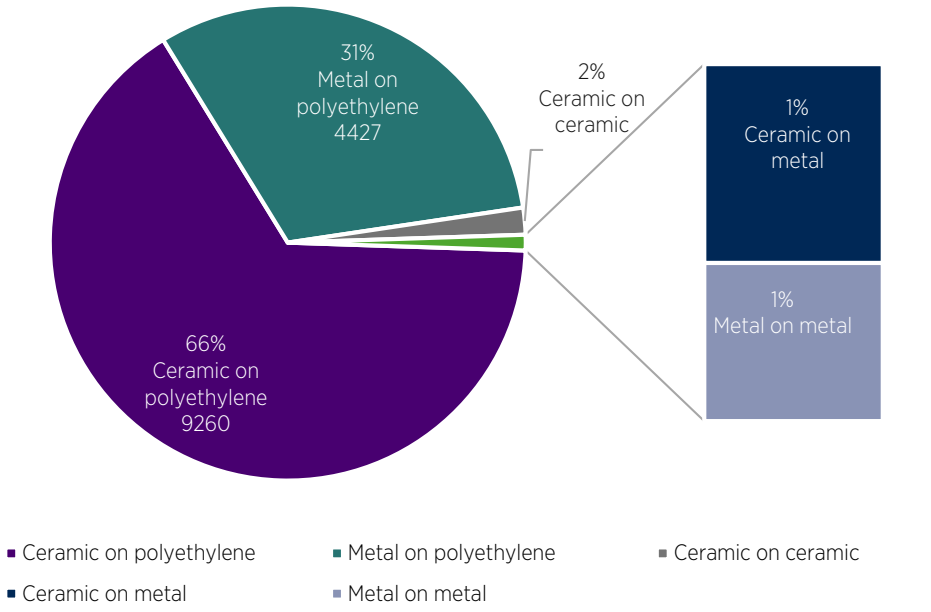


FIGURE 5.13: BEARING SURFACE PRIMARY HIP ARTHROPLASTY (n=14094)

Figure 5.14 shows the use of cementless fixation for primary THR between 2015-2024. Over this period the range is from 43% in 2015 to 71% in 2024 with a definite trend upwards over the more recent years. As INOR continues to increase coverage through implementation this trend will be monitored to see if cementless hip fixation continues in an upward trend.

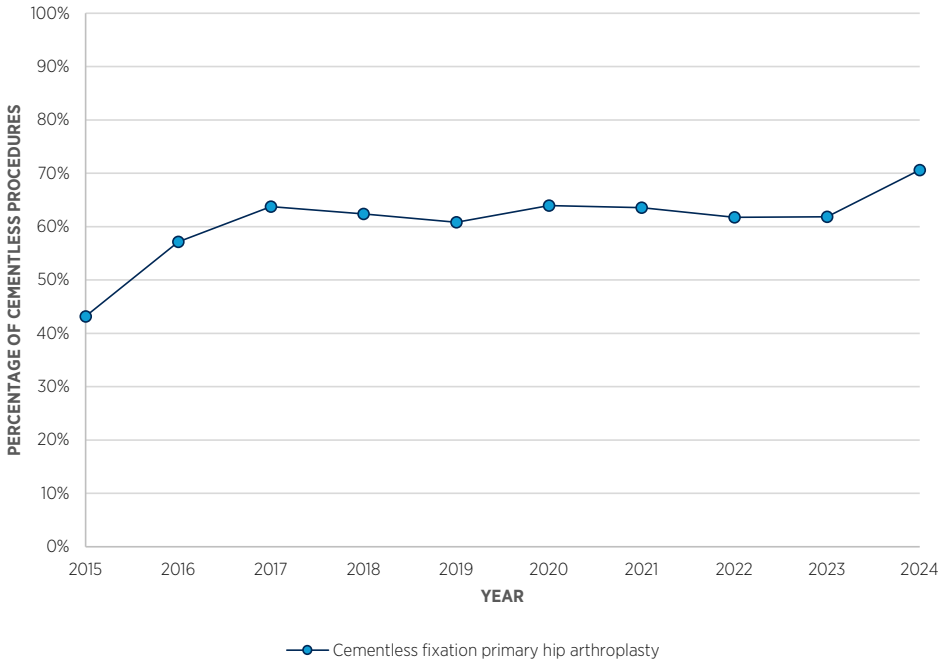
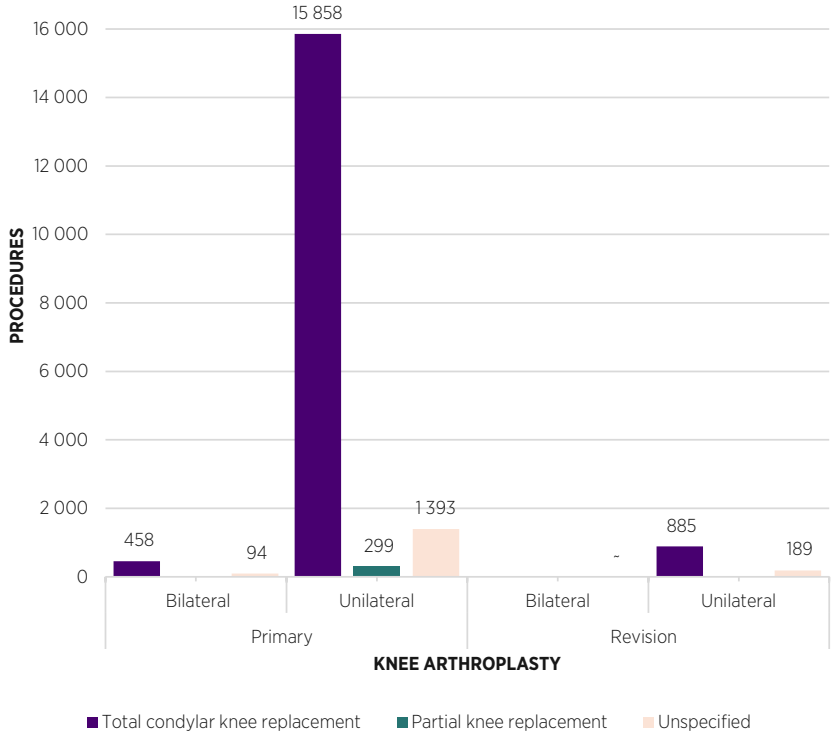


FIGURE 5.14: PRIMARY HIP ARTHROPLASTY CEMENTLESS FIXATION OVER TIME (n=22249)

PRIMARY TKR IMPLANTS

TKR data were captured and categorised by the type of surgery: primary TKR, partial knee replacement and Rev TKR (Figure 5.15). The term partial knee replacement in these data incorporates both uni-condylar knee replacements and patellofemoral joint replacements. The data showed that primary partial knee replacements accounted for less than 2% (n=299) of all knee surgeries, with Rev TKR accounting for 5% (n=885) and unspecified (other) accounting for 8%. For future reports, the introduction of the procedure description codes from the National Joint Registry will allow for better mapping of all knee surgeries reducing the number of unspecified reporting. Unilateral TKR was overwhelmingly the most common type of surgery, at 91% (n=15858), and 458 primary bilateral TKRs reported in the data.



- Denotes five cases or fewer

FIGURE 5.15: TYPE OF KNEE SURGERY (N=19178)

For primary TKR, data were recorded on the most-used knee implant manufacturer and system. Across all primary procedures, implants were categorised according to their level of constraint, ranging from unconstrained designs such as cruciate-retaining, cruciate-substituting and posterior-stabilised systems, through mid-level constrained options including condylar-constrained constructs, to highly constrained rotating-hinge designs. In addition to constraint level, implants were further differentiated by bearing type, which could be either fixed or mobile, and by fixation method, which was performed using either cemented or cementless techniques.

The data demonstrated that the Triathlon knee system was the most popular system used across primary and revision knee arthroplasty, accounting for 57% (n=10029), followed by Attune knee systems at 9% (n=1682), with a variety of other knee systems accounting for the remaining 33%.

REVISION THR IMPLANTS

Revision surgeries are complex surgeries that often require extensive planning and specialist input. They account for approximately 6% of all surgeries recorded within INOR.

For Rev THR, INOR captured data on the implants revised during these complex surgeries. This is displayed in Figure 5.16, which clearly shows that 51% of all Rev THRs required the full removal of all implants from the primary surgery, whereas 6% required only the bearing surface (liner and femoral head) to be exchanged.

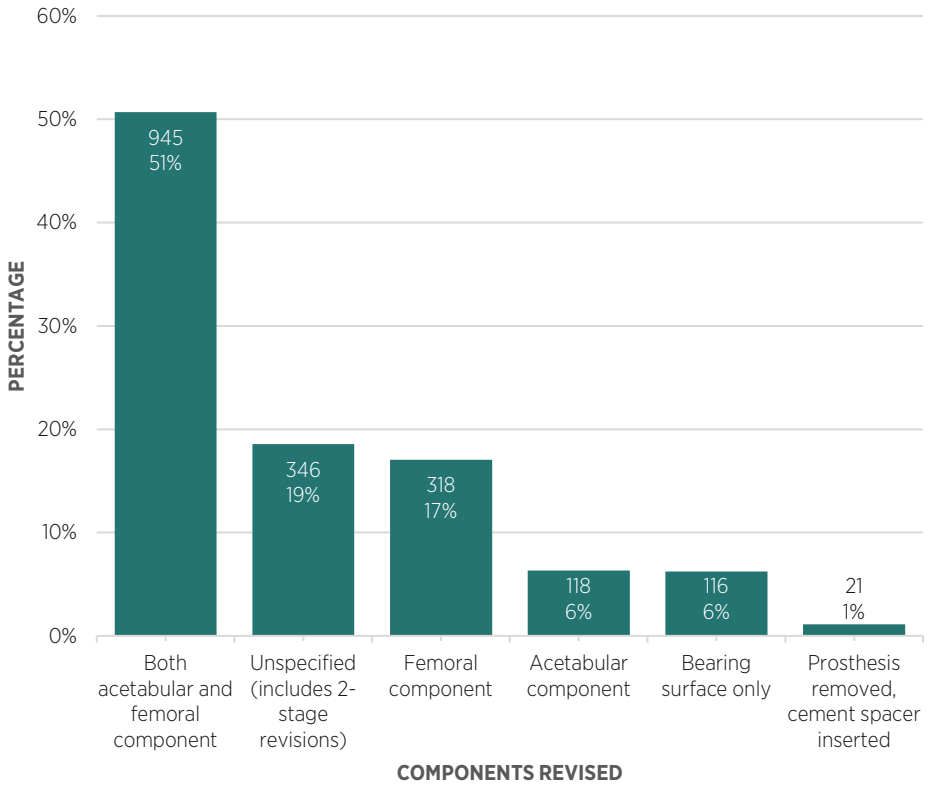


FIGURE 5.16: COMPONENTS REVISED, HIP REVISION ARTHROPLASTY (N=1864)

Data were captured on the manufacturer and the implants used for all Rev THRs. Figure 5.16.1 summarises the femoral hip stems used, and the data demonstrated that the Stryker Exeter V40 stem was the most popular choice for Rev THRs, at 41% (n=450), followed by Stryker restoration modular at 26% (n=285), then DePuy C-Stem AMT at 9% (n=102), with other stems accounting for the remaining 24%.

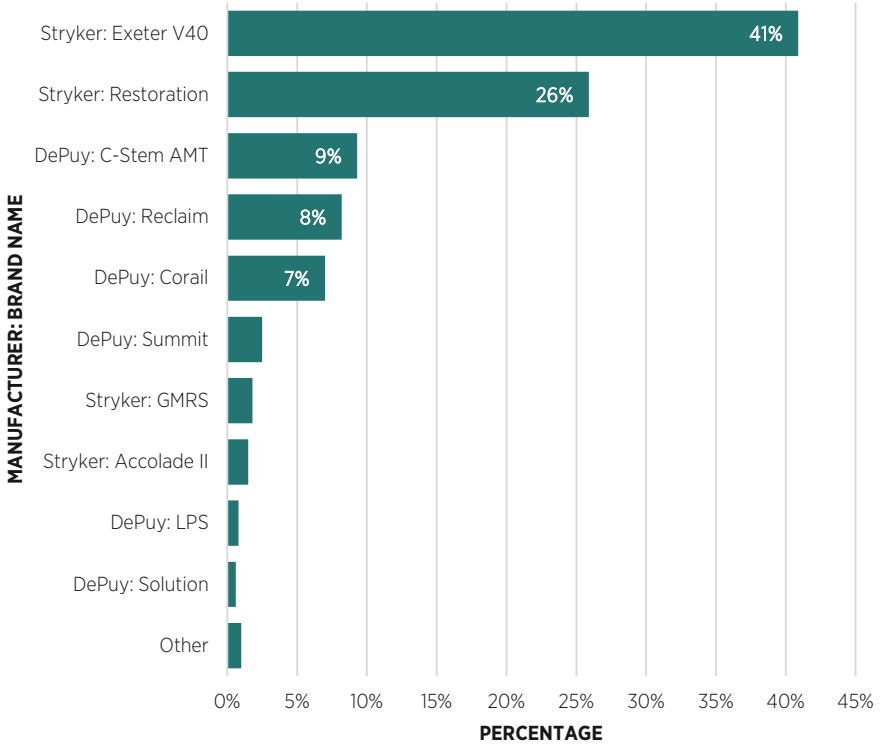


FIGURE 5.16.1: REVISION FEMORAL STEM USED, REVISION HIP ARTHROPLASTY (n=1099)

Similarly, implant data were captured on revision acetabular shells used, and Figure 5.16.2 demonstrates how Stryker Tritanium shells were the most used, at 37%, followed by DePuy Pinnacle at 26%, then Stryker Trident shells at 20%, with others accounting for the remaining 17%.

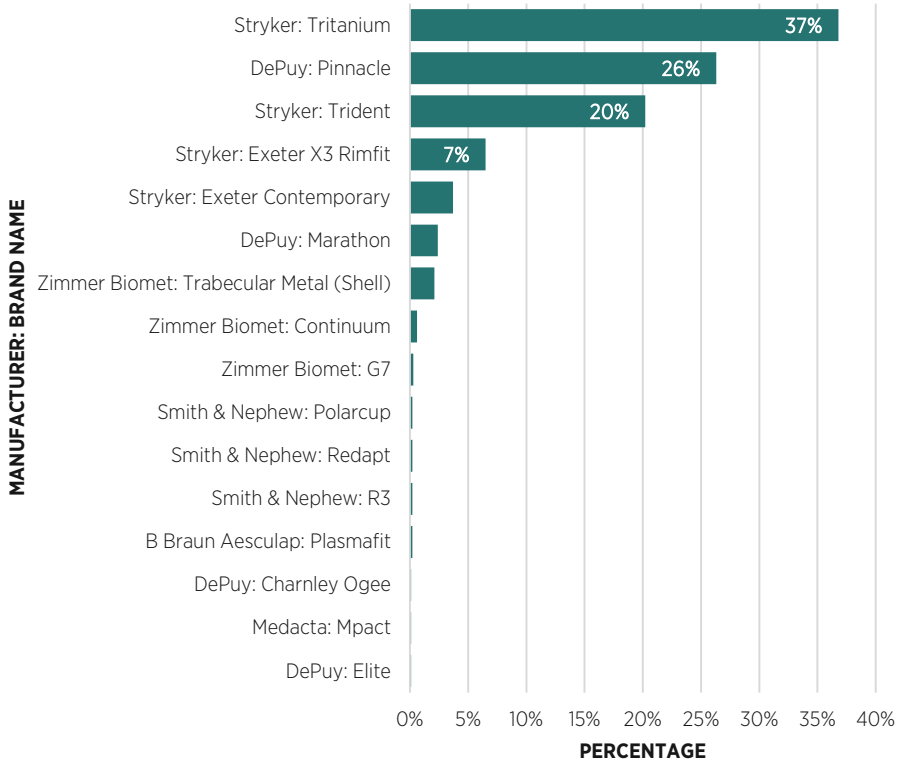


FIGURE 5.16.2: ACETABULAR CUP COMPONENTS USED, REVISION HIP ARTHROPLASTY (n=1151)

REVISION TKR IMPLANTS

Revision TKR accounted for 2% (n=1076) of surgeries captured in INOR. Data were captured on the manufacturer and knee system used for these complex surgeries. Figure 5.17 summarises the knee systems used, and the data showed that the Stryker Triathlon Revision knee system remains the most commonly used, at 59%, followed by the DePuy Attune revision knee system at 12%.

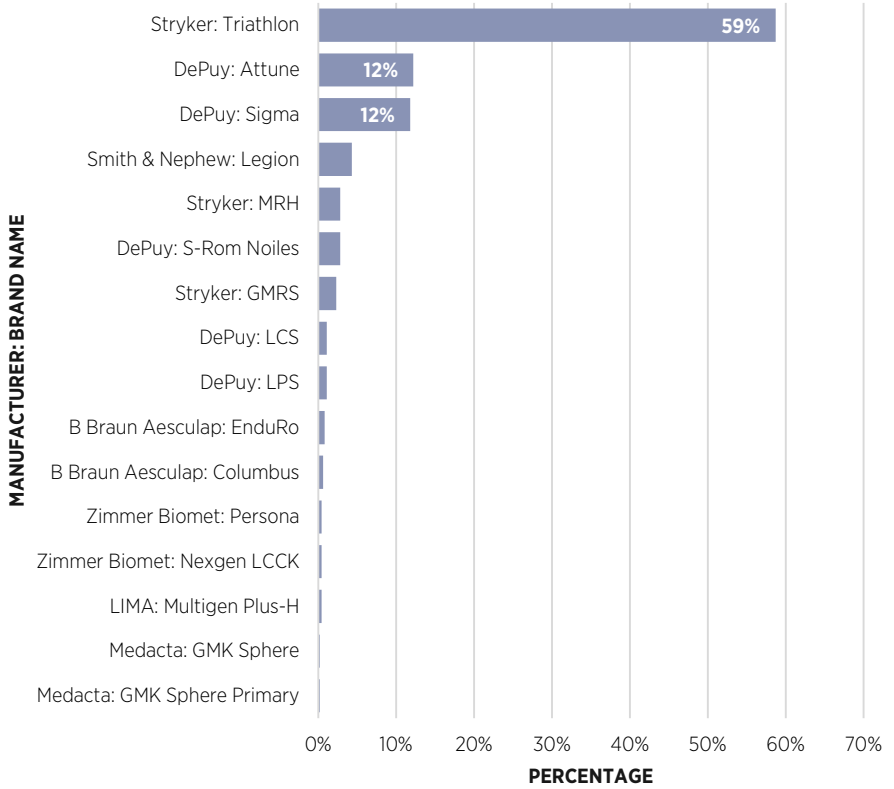


FIGURE 5.17: KNEE REVISION SYSTEMS (N=533[4])

[4] Not all components are revised during knee revision arthroplasty

DURATION OF SURGERY

Duration of surgery was captured in the component log dataset within the audit. It is defined as the time from knife to skin until wound closure measured in minutes. The data demonstrated that the average duration of surgery for primary THR was 71 minutes, whereas the average duration of surgery for Rev THR was 127 minutes. For primary TKR, the average duration of surgery was 76 minutes, whereas the duration of surgery for Rev TKR was reported as 122 minutes. The Transforming Theatre Programme (McNamara & Dineen, 2023), now known as the National Perioperative Patient Pathway Enhancement Programme, has developed a set of standard timestamps to track the patient journey through the operating theatre department, supporting patient safety and quality improvement. Since its establishment in 2014, INOR has being collecting data on three out of the five standards as shown in Figure 5.19. Anaesthesia finish time and time the patient is transferred from theatre to recovery are the two additional time stamps not currently collected within INOR. The time stamps as defined in Figure 5.19 denote five time-critical points in the surgical patient's theatre journey and recording them is standard practice within operating theatres in Ireland. As the data quality for these time stamps improves, future reports will explore analysis of duration of surgery and confounding factors such as fixation type, patient characteristics and surgeon grades.

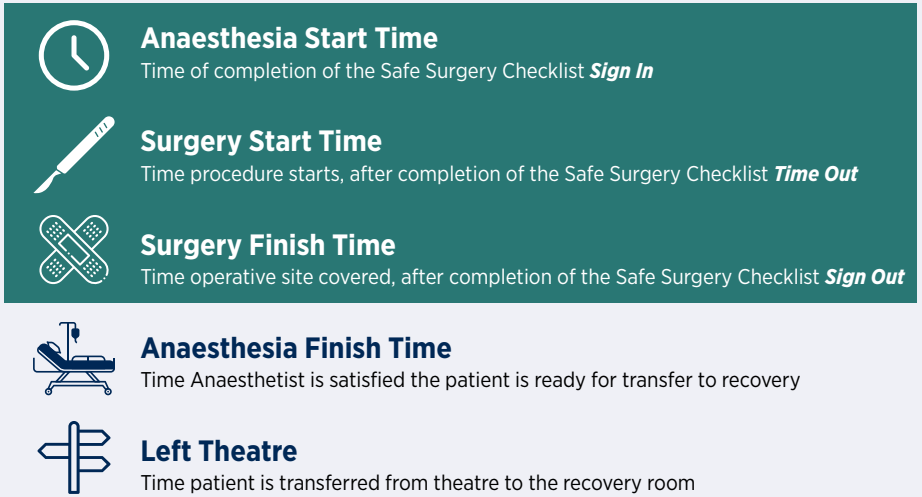


FIGURE 5.18: NATIONAL PERIOPERATIVE PATIENT PATHWAY ENHANCEMENT PROGRAMME KEY TIME STAMPS COLLECTED BY INOR MDS

WOUND CLOSURE TYPE

Wound closure method is captured in the perioperative dataset, and this is a multiselect question. For primary THR, staples were used in 51% of procedures, followed by sutures at 35% and a combination of both staples and sutures at 14%. Rev THR data were similar, with staples used in 51% of surgeries, sutures used in 31% and a combination of both in 18%. For primary TKR, staples were used in 57% of surgeries, followed by a combination of both staples and sutures at 22% and sutures only at 21%. In the Rev TKR data, staples were the most common choice for wound closure at 45% of procedures, followed by sutures and staples at 33% and sutures only at 21%. The option to select glue for wound closure was added into the dataset in May 2025 with the launch of INOR Version 2 (V2).

DRAIN USAGE

Across both primary and revision arthroplasty, the use of drains was low, at 7% in primary hip arthroplasty and 16% in primary knee arthroplasty.

CHAPTER 6
OUTCOMES

CHAPTER 6: **OUTCOMES**

This chapter presents data on clinical outcomes, which include the proportion of patients who had complications following their hip or knee arthroplasty, the type of complications they experienced. This information is collected by trained audit coordinators who follow up consenting patients at 6 months, 2 years, 5 years postoperative and every 5 years thereafter for the lifespan of the implant or until the patient's death. INOR provides data collection forms for the defined intervals as listed above. An extraordinary presentation form is available for collection of data on the patients presenting outside of that schedule. The data described in this chapter are completed by the patients guided by the audit coordinator. Thus, the information collected is as reported by the patients themselves.

There are no internationally agreed standards for quality indicators for hip and knee arthroplasty. INOR is developing a number of important metrics to measure outcomes following arthroplasty surgery in INOR. The INOR Governance Committee has identified five major complications that can occur in hip or knee arthroplasties. These complications are measured within 30 days of surgery, unless otherwise stated. The local audit coordinator in each hospital captures the complication data within INOR during the patient-reported follow-up or review as described above.

INFECTION DIAGNOSED WITHIN 30 DAYS OF SURGERY

To ensure that an infection in a patient is appropriately diagnosed, it is categorised as diagnosed by an orthopaedic surgeon. The incidence of infection for both primary and revision hip arthroplasties within 30 days of surgery is very low overall, at less than 1% in primary arthroplasty groups and less than 2% in the revision arthroplasty groups.

Primary hip arthroplasty SSI was recorded as 0.5% (n=107) of 22,259 patients who underwent primary hip arthroplasty, with 1.8% (n=33) recorded in the 1,864 patients who had a revision hip arthroplasty. Similar results are seen in the primary total knee replacements, with 0.5% (n=88) reporting an SSI, and in revision arthroplasty, at 0.9% (n=10).

The international recommendation for SSI surveillance when an implant is in place is to monitor SSIs for 90 days following arthroplasty surgery (CDC 2021, ECDC 2026, HSE 2024). Learnings from the successful inclusion of the SSI data collection the Irish Hip Fracture Database (IHFD) can be applied to INOR. This will include capturing the type of SSI, i.e., superficial, deep or organ/space within the INOR data set.

EARLY REVISION

A revision is defined as reoperation on a previous primary arthroplasty where one or more prosthetic components is replaced, removed or added. An early revision is classified as having taken place within 1 year of the date of the primary surgery. Early revision can occur for various reasons and represents a significant event in a patient's arthroplasty journey. While early revision surgeries are uncommon within this reporting period, 1% (n=217) of patients who had a primary hip arthroplasty had a revision procedure within the first year after surgery, with 0.8% (n=139) of patients who had a primary knee arthroplasty having a revision knee replacement.

PERIPROSTHETIC FRACTURE

A periprosthetic fracture is a broken bone that occurs around the implants of a THR. With hip arthroplasty, a periprosthetic fracture is classified as a serious complication and almost always results in further arthroplasty. The percentage of incidences of periprosthetic fractures that occurred within 30 days of primary or revision hip arthroplasty was low (<1%). Within the reporting period, a very small number (n=27; 0.1%) of primary hip arthroplasty patients experienced a periprosthetic fracture within 30 days of their surgery; in the revision group, the proportion was 0.3% (n=6). For knee arthroplasty, 0.05% (n=9) of patients experienced a periprosthetic fracture within 30 days of their surgery in the primary group, and 0.5% (n≤5) in the revision group.

INCIDENCE OF DISLOCATION WITHIN 30 DAYS OF SURGERY

Patients can experience instability or dislocation following their surgery and may have multiple dislocations over time, but for the purposes of this report, only the initial dislocation is reported. For both primary and revision arthroplasty, the incidence of dislocation within 30 days of the procedure was lower than 1%.

INCIDENCE OF VTE WITHIN 30 DAYS OF SURGERY

The HSE prevention of blood clots guidance states that 60% of VTEs happen in hospital or within 90 days of hospital admission (HSE, 2024a). Of all primary hip arthroplasty patients, 0.7% (n=150) experienced either a pulmonary embolism (PE) or deep vein thrombosis (DVT) which are both recorded as VTEs Primary knee arthroplasty incidence was similar, with 1.2% (n=224) reporting VTE. Within the revision surgery data, 0.9% (n=16) of Rev THRs and 0.2% (n<5) of Rev TKRs reported having VTE within 30 days. The overall VTE incidence recorded at 30 days after surgery was less than 1%. Future reports will align with the national guidance and report on VTE within 90 days of hospital admission.

30-DAY MORTALITY

The death of a patient following arthroplasty surgery is very rare. The crude mortality incidence recorded within 30 days of surgery among INOR patients was 0.1% for both primary and revision arthroplasty for both hips and knees.

PATIENT-REPORTED OUTCOME MEASURES

INOR collects Patient-Reported Outcome Measures (PROMs) , specifically the EQ-5D-5L, a quality-of-life measure which comprises of five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension has five levels: no problems, slight problems, moderate problems, severe problems and extreme problems. INOR has licensed permission from EuroQol to use this tool.

INOR also captures joint-specific measures: the Oxford Hip Score (OHS) and Oxford Knee Score (OKS). These tools are designed to assess symptoms and function in patients undergoing joint replacement surgery. There are 12 multiple-choice questions relating to the patient's experience of pain, ease of joint movement and ease of undertaking normal domestic activities. Each question is scored in the same way, with the score decreasing as the reported symptoms increase, i.e. the difficulties become worse. Use of these tools is licensed by Oxford University Innovation Limited.

This report includes PROMs data recorded from 2016 onwards on primary arthroplasty only at the following intervals: pre-operatively, and postoperatively at 6 months, 2 years and 5 years. As INOR matures, data will continue to be collected every 5 years thereafter for the life of the implant or patient. Currently only South Infirmary Victoria University Hospital (SIVUH) has collected 10-year data as it was the first hospital to enter data on INOR.

EQ-5D-5L (2016–2024)

Figure 6.1 shows that for both primary hip and knee replacements there is a significant improvement and a sustained improvement in the scores when compared to the pre-operative scores. It is reassuring to see the steep improvement in the first 6 months after surgery, but also the enduring improvement at 2 years and 5 years after surgery. This directly reflects the impact and success of arthroplasty surgery.

The PROMs data displayed in this report use the EQ Ireland Hobbins algorithm, which differs somewhat from the EQ Crosswalk US algorithm that is used by the OECD to report on PROMs using the same data.

Figure 6.1.1 and 6.1.2 shows the individual components that make up the EQ-5D-5L score for both primary THR and primary TKR pre-operatively and at 6 months postoperatively. The scores are rated as follows: no problems, slight problems, moderate problems, severe problems and extreme problems. In both groups there was a very significant improvement after surgery, with the largest improvements noted in the severe problem and moderate problem groups. The proportion of patients reporting no postoperative problems in all the categories was very significant.

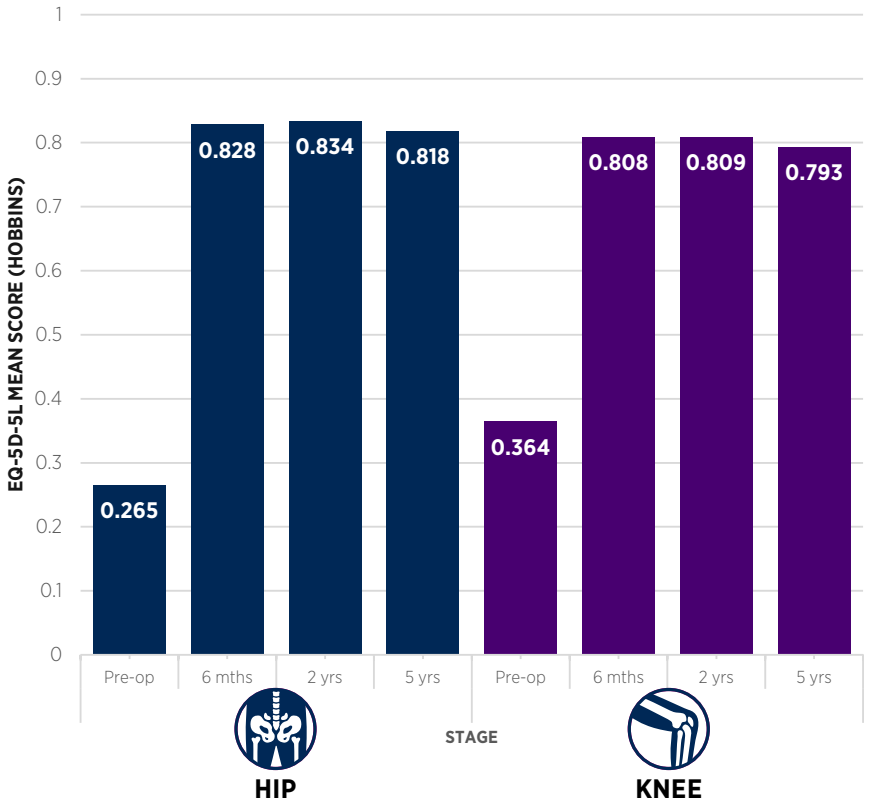


FIGURE 6.1: EQ-5D-5L MEAN SCORE BY STAGE PRIMARY ARTHROPLASTY (N=74197)

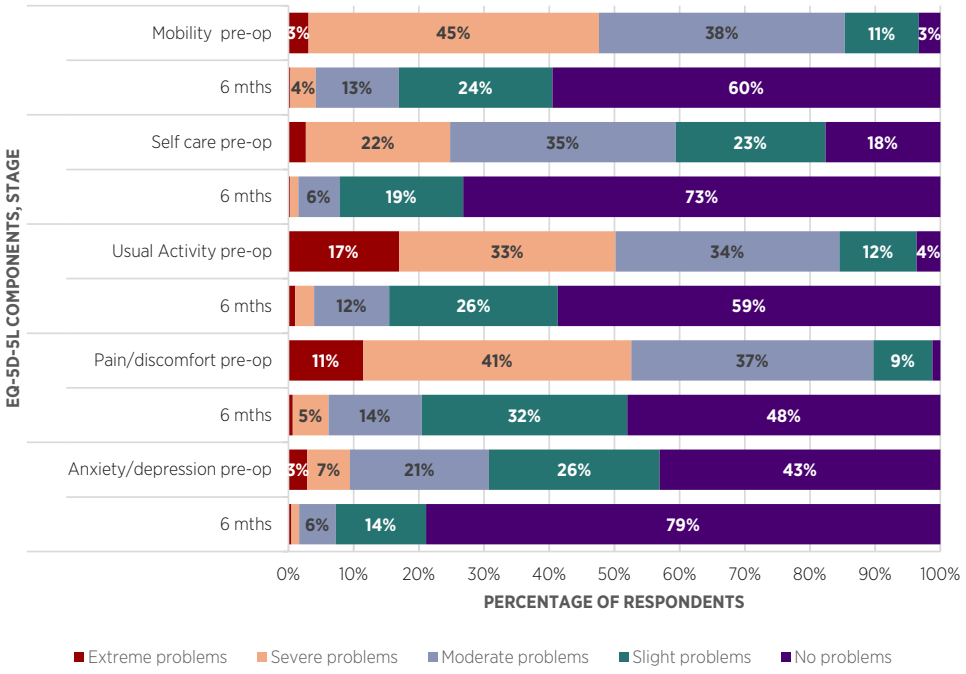


FIGURE 6.1.1: EQ-5D-5L COMPONENTS PRE-OPERATIVELY AND AT 6 MONTHS POST PRIMARY HIP ARTHROPLASTY

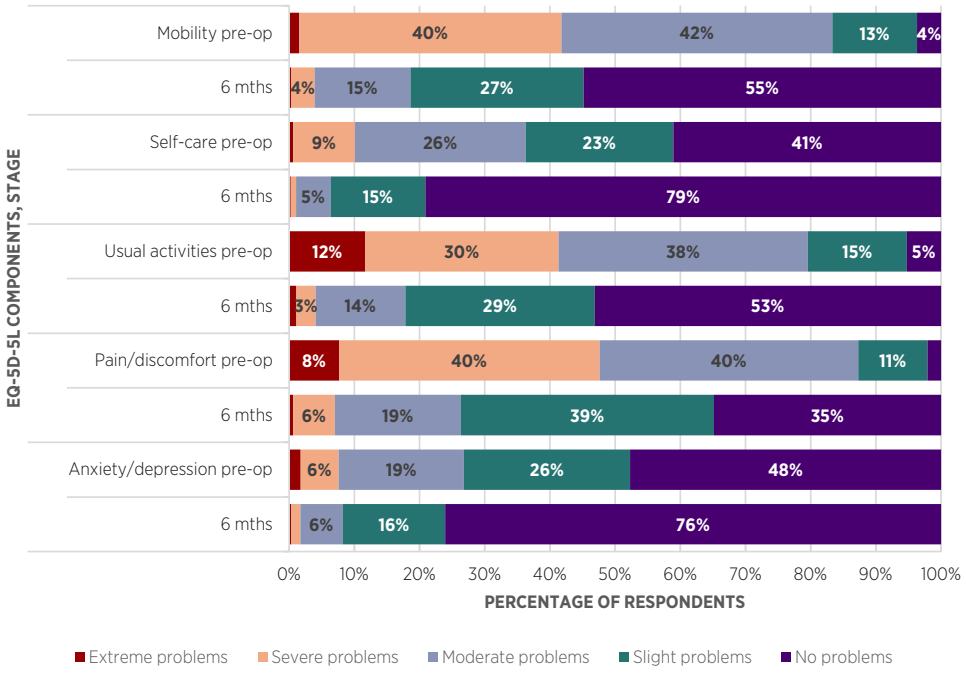


FIGURE 6.1.2: EQ-5D-5L COMPONENTS PREOPERATIVELY AND AT 6 MONTHS POST PRIMARY KNEE ARTHROPLASTY

OXFORD HIP AND KNEE SCORES

Figure 6.2 shows that both the OHS and OKS demonstrate significant improvement at 6 months post-surgery and show continued improvement at the follow-up stages of 2 years and 5 years.

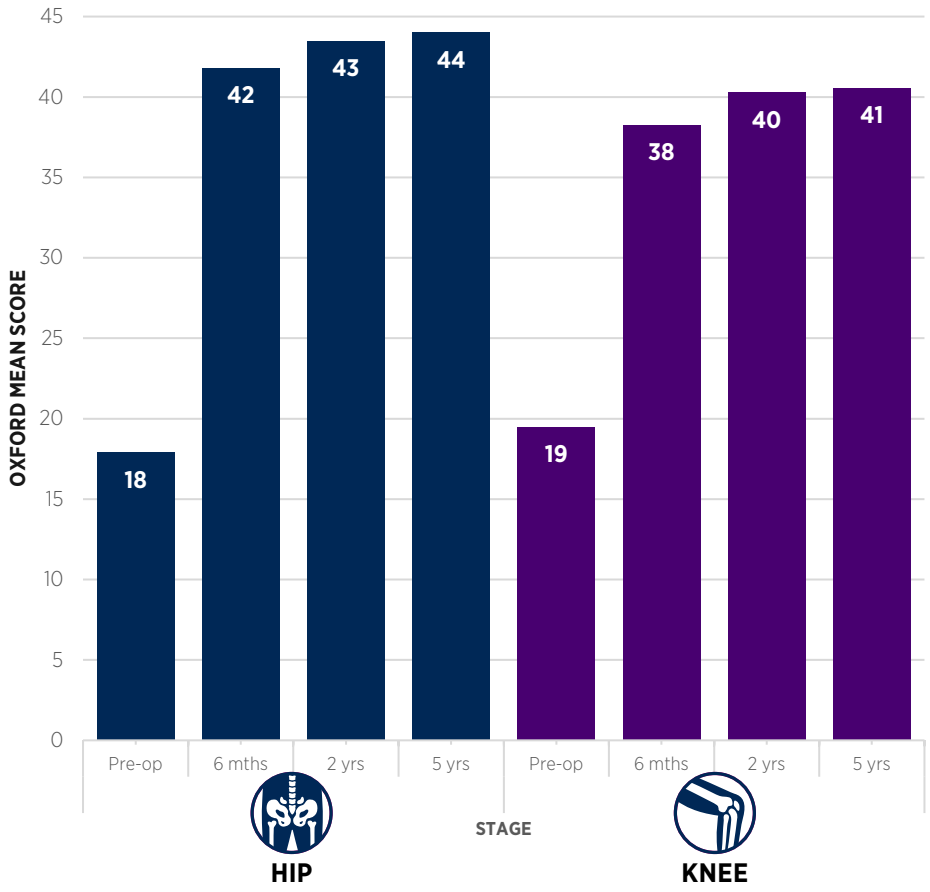


FIGURE 6.2: MEAN OXFORD HIP AND KNEE SCORE, PRIMARY ARTHROPLASTY BY STAGE (N=74199)

CHAPTER 7
AUDIT UPDATE AND QUALITY IMPROVEMENT

CHAPTER 7: **AUDIT UPDATE AND QUALITY IMPROVEMENT**

AUDIT UPDATE

On 19 May 2025, INOR transitioned onto the NOCA Audit Platform (NAP) and INOR Version 2 (V2) was launched. During May and June of that year, several hundred users from the 17 participating sites were given access to INOR. The launch was a significant milestone for the audit. This transition aims to enhance the accuracy and efficiency of data entry, reporting and management and allows hospitals access to their own hospital-level data through a simple export function.

INOR was the first audit within NOCA to go live on this new platform, which will significantly enhance every user's ability to contribute to INOR, ensuring efficient data entry which will contribute positively towards patient safety and national clinical audit. At the time of writing this report, INOR has > 500 active users entering data to the NAP.

Primary goals of the NAP

- **Improve the accuracy of input, update and management of patient data in the Register.**
- **Ensure information is organised, accessible and easily retrievable for analysis, reporting, decision-making and operational tasks.**
- **Improve efficiency and scalability in the management of national clinical audit information.**

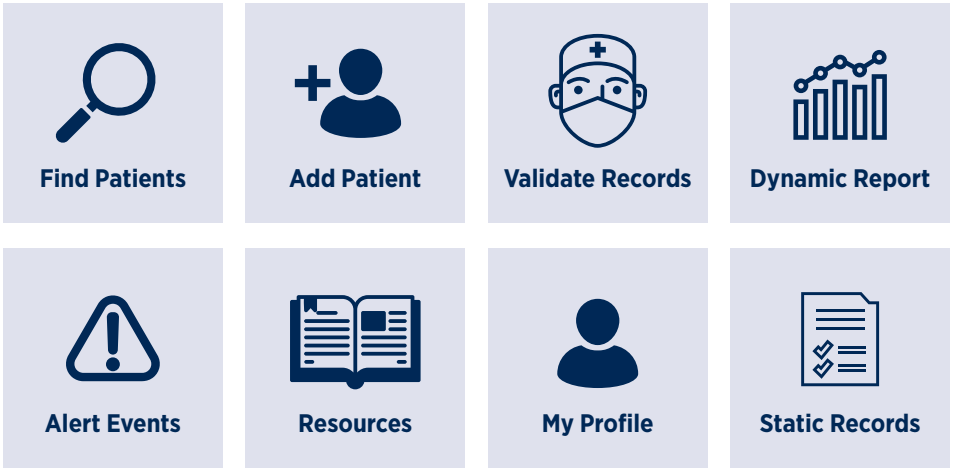
Key enhancements for hospital:

- **streamlined data entry**
- **data edit facility**
- **data validation**
- **inbuilt dynamic and static reports**
- **alignment to the National Joint Registry (NJR) procedures codes for implant mapping and reporting and access to the NJR component catalogue for components**
- **ability to export hospital-level data via simple export function for use in audit, quality improvement and research**

Current reports available in the INOR NAP

Static Reports	Dynamic Reports
• Implant reports • Recall report • Audit coordinator reports for follow-up clinics	• Consent rates to the Register • Activity figures • Demographics data • PROM data and completion statistics detailing overall pre-operative, perioperative, postoperative data.

Training resources are available within the resources section by simply clicking on the resources tile:



The resources include simple how-to videos and a PDF user guide on the system:

NOCA User Guides
1. NOCA User Guide 1 2. NOCA User Guide 1 3. NOCA Signin Video 1.5 4. NOCA Intro Video 1.5

The HelpHub support desk has been live since 15 October 2025, allowing all audit coordinators to request new user accounts, report a fault or raise a query directly and log any incidents. HelpHub is an efficient, user-friendly resource and acts as a host or central repository to log any and all issues.

QUALITY IMPROVEMENT

The new platform will allow INOR to improve data quality, standardise data definitions and develop reporting metrics that will enable quality improvement (QI) and better outcomes at both a local and national level. The NOCA Trauma and Surgery programme management team is committed to providing and disseminating training and implementing dashboards to support the front-line ownership of QI, embedding QI as a cornerstone within the audit is a key strategic goal for 2026.

Training will continue via workshops on QI methodology among the INOR co-coordinators and clinical leads. This will build on previous work, which included developing a shared repository for audit coordinators to access current information and resources.

With the welcomed functionality of INOR V2 to facilitate local data extraction via the simple export function, a need has been identified to upskill and train many of the audit coordinators in managing, manipulating, extracting and displaying INOR data results. The INOR team have prepared a portfolio of training which includes a 'how to' on poster templates and PowerPoint, drawing on resources available via the National Quality and Patient Safety, Quality Improvement Toolkit.

In September 2025 a survey issued to the participating hospitals on what reporting would be of benefit locally showed that hospital staff would welcome the NOCA Analytical dashboards being provided on a quarterly basis. Other NOCA audits with established dashboards (Irish Hip Fracture Database, Major Trauma Audit, Irish Heart Attack Audit, Irish National Audit of Stroke) have been hugely positive for QI, as sites can easily identify trends of success or outliers within the KQIs and formulate QI action plans, if necessary, in real time.

The development of KQIs is based on clinical evidence to support improvement in patient care, and the INOR KQIs will be developed and approved by the INOR Governance Committee, with multisite feedback from participating INOR hospitals.

Enhancing collaboration for QI: Aligning principles, leadership and collaborative efforts

Clinical governance in surgery is a structured framework through which surgical departments and healthcare organisations maintain and continuously improve patient safety, clinical effectiveness, and professional accountability (RCSI, 2026).

Implementing a structured guide will allow hospital staff to maximise the use of the data to improve services, promote collaboration and enhance patient-centred care. It is crucial for success in these areas that clinical practice and clinical governance align and are not treated as separate entities.

INOR local hospital committee meetings

INOR commits to carrying out an organisational survey to identify current gaps within local governance structures for reviewing the data with the register.

Following a series of audit coordinator calls in February 2025, a QI initiative was commenced by the INOR programme management team for trauma and surgery to create a governance an INOR meeting pack to assist teams in improving or developing their local meetings regarding INOR (Figure 8.1).

The pack included templates for terms of reference, agendas, minute taking and structured PowerPoint slides. NOCA will endeavour to support this process further by running an additional training session with audit coordinators involving specific training on reporting and presenting data. This will ensure that all audit coordinators will have the confidence and ability to present and contribute key information at these meetings.

INOR HOSPITAL MEETING GROUP

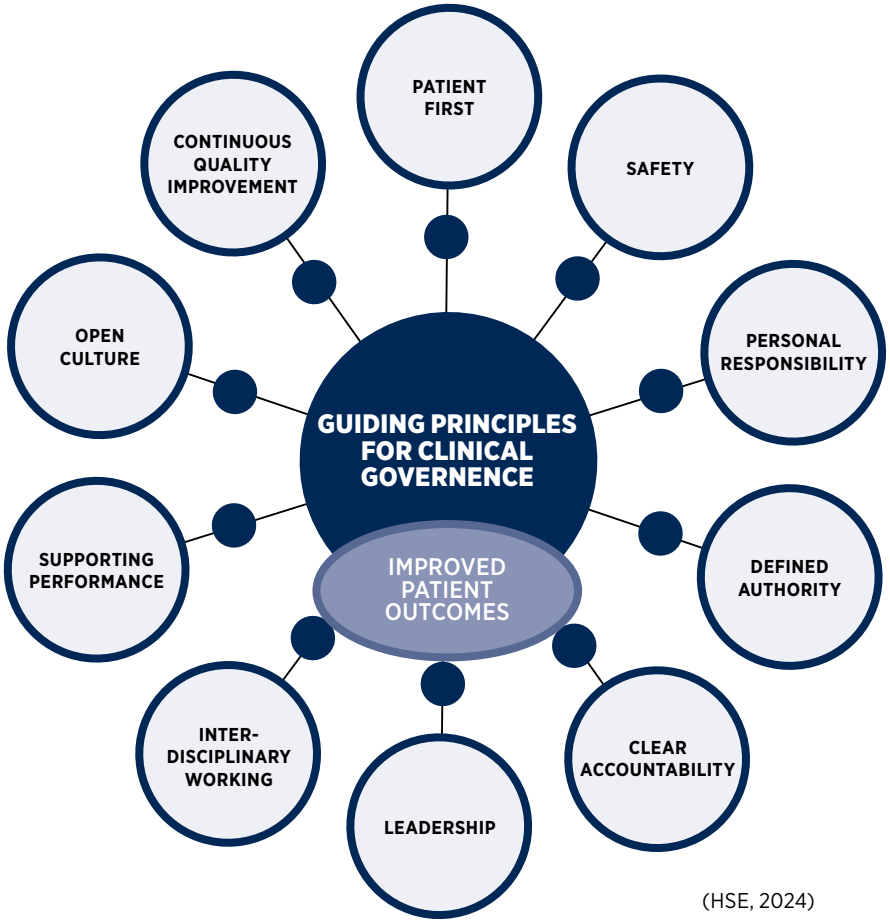
WHAT IS GOVERNANCE?

The system through which healthcare teams are accountable for the quality, safety and experience of patients in the care they have delivered (HSE, 2024). What this means to healthcare staff- Specifying the clinical standards you are going to deliver and showing everyone the measurements you have made to demonstrate that you have done what you set out to do (HSE, 2024).

The National INOR Report 2015-2024 recommends that: Every hospital participating in INOR should have an INOR hospital meeting group to ensure that the data from the audit/ register is being used to drive continuous quality improvement in the care of patients with hip or knee arthroplasty hip fracture care (NOCA, 2026)

MEETING ETIQUETTE

- Terms of reference developed for group
- Frequency of meetings: Quarterly minimum
- Agenda to be circulated one week in advance
- Minutes to be circulated one week later
- Key actions identified and allocated to specific members at each meeting.



(HSE, 2024)

MEMBERSHIP OF INOR COMMITTEE

- **Chair -** Surgeon
- **Vice-Chair** (from other professional group)
- INOR clinical lead and audit coordinator

Members representing:
Orthopaedics, Anaesthetics, Microbiology, Radiology, HSCP, Nursing, Quality & Safety, Risk management, Senior Hospital Management, Rehabilitation, Public/ Patient Representative, Bed Manager, Theatre Manager, Pre-op assessment

TOPICS FOR DISCUSSION

- Data quality
- Outcomes/ PROMS
- Surgeon performance
- Implants
- Quality improvement
- Patient safety
- Service needs
- Complaints
- Length of stay
- Mortality

FIGURE 7.1: INOR HOSPITAL MEETING GUIDANCE

LOCAL QI INITIATIVES

Joint School

A Joint School structured education programme for people who are about to undergo a joint arthroplasty is offered in several hospitals participating in INOR. It is delivered in the period leading up to the surgery. This aims to empower and prepare patients for their surgical journey, including their admission for surgery and postoperative rehabilitation (HSE, 2015).

The National Institute for Health and Care Excellence guidance (NICE, 2020) recommends this education or "schooling" of patients should occur "when listed for surgery, rather than whenever needed throughout their care". This supports other evidence that suggests patients undergoing joint arthroplasty have better outcomes when timely information and education are delivered pre-operatively, including decreased pre-operative anxiety, decreased postoperative pain, better postoperative coping and decreased length of stay.

Joint School is typically led by the arthroplasty nurse specialist and involves the wider multidisciplinary team who will be looking after the patient throughout their stay (i.e., anaesthetist, surgeon, nurse, physiotherapist, occupational therapist) delivering education sessions detailing the patient's journey from preassessment to discharge. The team approach improves patient compliance with the treatment plan, which in turn leads to improved functional independence and quality of life.

LOCAL QI INITIATIVES

Face-to-face Joint School and how it works, an example from Midlands Regional Hospital Tullamore.

Face-to-face Joint School is held in a group setting along with others waiting for joint replacement surgery. This allows patients to engage with other people who will be going through the same operation. It promotes a sense of social connectedness and fosters participants' independence. Active engagement allows patients to gain an understanding of what to expect with pre-/postoperative rehabilitation, preparing them for life with a joint replacement. It is complemented with verbal and visual education, using the written word as an aide-memoir to retain for future follow-up as required.

The format encourages open communication and dialogue where patients and their families interact and discuss their wishes and concerns regarding the surgery. This interaction between the patients allows them to share experiences and formulate better recovery plans.

Virtual on-line services are recommended to deliver patient education to patients who cannot attend Joint School in person.

NATIONAL QI INITIATIVES

Hip and Knee Pathway

It is estimated that more than 400,000 people in Ireland are affected by osteoarthritis (OA). This is a chronic condition associated with pain, joint stiffness and muscle weakness leading to reduced mobility and function. For some people it can result in periods of absence from work. There is a significant body of evidence (NICE, 2022), that demonstrates the efficacy of early non-surgical interventions such as physiotherapy and dietetics in primary care settings, (Law *et al.*, 2019; Lawford, 2021; Cunningham, 2023; Lawford *et al.*, 2024).

The National Osteoarthritis Hip and Knee Pathway aims to improve timely access to conservative management, including education, exercise and weight management for those who present to their GP with mild to moderate symptoms of hip and knee OA.

Since January 2023, the National Clinical Programme for Trauma and Orthopaedic Surgery (NCPTOS), with funding secured through the Sláintecare Integration Innovation Fund, has been piloting this pathway on two sites – Our Lady's Hospital, Navan and Carlow/Kilkenny/ University Hospital Waterford. A strategic priority of Sláintecare is to reduce waiting times for an initial outpatient appointment to 10 weeks. Results from the pilot can be seen is figure 8.2.

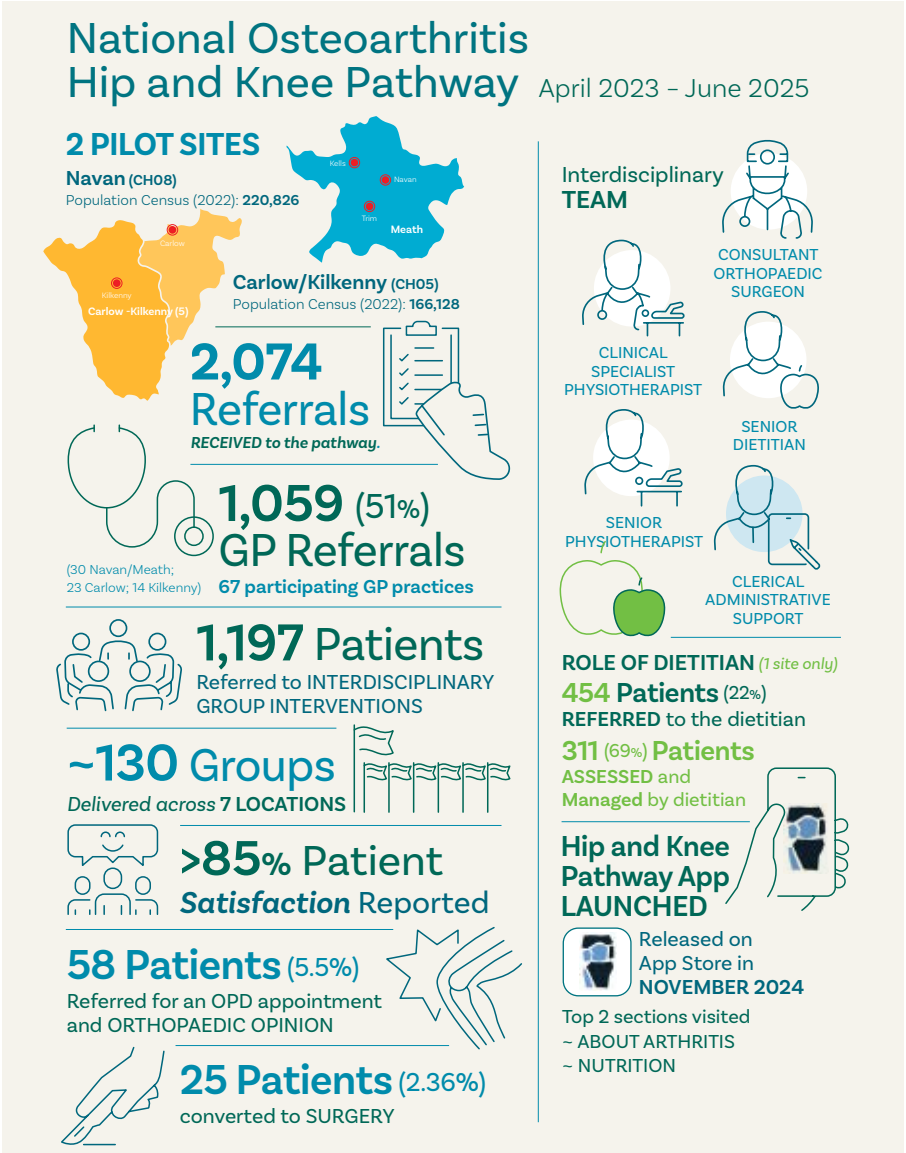


FIGURE 7.2: OSTEOARTHRITIS HIP AND KNEE PILOT PATHWAY RESULTS NCPTOS 2025

CHAPTER 8
NOCA RECOMMENDATIONS

CHAPTER 8: **NOCA RECOMMENDATIONS**

To progress the implementation of INOR to all sites providing surgery for hip and knee arthroplasty and expansion to include other joint arthroplasties in order to have a full national registry of hip, knee and other joint implants to support recall and ensure patient safety.

NOCA will continue to advocate for the implementation of INOR in all publicly funded hospitals that manage scheduled/elective orthopaedic care and will continue to engage with and implement INOR in private facilities who carry out elective hip, knee and other joint replacements.

NOCA will advocate for the National Treatment Purchase Fund (NTPF) to use INOR for public patients managed in private facilities for scheduled arthroplasty surgery.

Rationale

INOR is an important Irish patient safety initiative whose primary aim is to have the functionality to identify patients quickly in the event of an implant recall.

It also needs to be able to provide information on implant performance and trends in joint replacement surgery, and to benchmark against best practice standards for surgeons, hospitals, manufacturers and healthcare management to ensure optimal outcomes for patients.

INOR also presents tremendous opportunities for research into the factors that influence patients' progress and outcomes after surgery.

Therefore, to ensure that implants are traceable and are monitored for their lifespan, all patients undergoing elective Hip, knee and other primary/revision arthroplasty should have the opportunity to participate in INOR.

Evidence

Currently INOR is in eleven public HSE hospitals that perform elective arthroplasty and six private hospitals.

Internationally joint replacement registers have shown quality improvements in patient care through availability of audit data (National Joint Registry, 2008), especially with reductions in revision rates in patients who had hip replacement surgery. In Sweden, one of the longest established registers has seen the revision rate of primary hip arthroplasty decrease by approximately 50% over time, which was associated with a drastic reduction in the number of different components available for use (Labek *et al.,* 2011). For INOR, a high participation rate is essential in order to ensure good quality information.

What Action should be taken?

Complete the implementation of INOR in the remaining elective public hospitals. Advocate for all private hospitals to participate in INOR.

Require all public patients treated in private hospitals to be included in INOR.

Who will benefit from this action/recommendation?

All patients who have hip, knee or other arthroplasty will benefit from timely reporting in the case of a component recall.

All patients who have hip, knee or other arthroplasty will be monitored in order to ensure the quality and safety of arthroplasty surgery and ensure safe surgical practice.

Who is responsible for implementing this action/recommendation?

The NOCA INOR management team is responsible for completing the implementation of INOR in public hospitals and for encouraging the private hospitals to participate. Theya re supported by the National Clinical Programme for Trauma and Orthopaedic Surgery.

When will this be implemented?

Ongoing 2026-2028

NOCA will conduct an organisational survey of all participating sites in 2026, including the expanded range of joint arthroplasties.

Rationale
In order for INOR to stay relevant and collecting the most meaningful data it is important to understand that the current pathways and evolution of services caring for those patients is understood. It is also important to distinguish between the processes in the public and private hospitals.
Evidence
Organisational surveys as seen in audits such as the IHFD have been shown to add more granularity to the audit data. They explore local resources and give a better understanding to the local pathways of care for patients undergoing elective joint replacement surgery This data will be used to enhance the understanding and findings of the data.
What Action should be taken?
The hospitals participating in INOR should complete the organisational survey.
Who will benefit from this action/recommendation?
The hospitals will have a greater understanding about pathways and resources of the various arthroplasty services . The HSE and privates hospital providers will be able to forecast the requirements of future services and use data to evaluate the quality of services.
Who is responsible for implementing this action/recommendation?
The NOCA INOR management team is responsible for conducting the organisational survey.
When will this be implemented?
2026

CHAPTER 9
CONCLUSION

CHAPTER 9: **CONCLUSION**

This INOR report presents information on patient characteristics and clinical outcomes for patients who have undergone hip and knee replacement surgery in the Republic of Ireland during the period 2015–2024.

The report also indicates the types of components that are used nationally. The power of these data will be enhanced as the level of national coverage increases. It is vital that as well as achieving full coverage in our public hospitals, information from the private hospitals are included also.

We look forward to further increasing the participation of hospitals in 2026. Looking ahead, further work will examine the impact of waiting times for surgery and equity of access to joint replacement procedures nationally.

The inclusion of the patient perspective allows both patients and clinicians the opportunity to reflect on the impact of arthroplasty surgery on improving functional outcomes and individuals' quality of life.

We want to express our thanks to the leadership of the hospital clinical leads and all the system users who enter patient information directly into INOR. The INOR Governance Committee appreciates the dedication of the audit coordinators, who work to continually improve the quality of information in INOR.

This report represents a commitment to quality improvement and audit in hip and knee replacement surgery in the Republic of Ireland. Moreover, and most importantly, the report highlights the number of patients who can be found easily in the event of an implant recall, thus delivering on the primary aim of INOR and the patient safety aspects of the register. The INOR report data show how a register and audit complement each other and can drive change in our health service.

The inclusion of the patient perspective allows both patients and clinicians the opportunity to reflect on the impact of arthroplasty surgery on improving functional outcomes and individuals' quality of life.

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Irish National Orthopaedic Register National report 2015-2024 - Appendices.
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