



**Health
Information
and Quality
Authority**

An tÚdarás Um Fhaisnéis
agus Cáilíocht Sláinte

Health Technology Assessment of Scheduled Procedures

Surgery for end-stage arthritis of the hip in adults

July 2014

Safer Better Care

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1 Hip arthroplasty

1.1 Scope of this health technology assessment

This health technology assessment (HTA) evaluates the appropriateness and potential impact of introducing clinical referral and or treatment thresholds for selected scheduled hip arthroplasty procedures (including total hip replacement, hemiarthroplasty [partial hip replacement] and hip resurfacing) for adults with end-stage arthritis of the hip. These are routine scheduled surgical procedures provided within the publicly-funded healthcare system in Ireland. The effectiveness of hip arthroplasty may be limited unless undertaken within strict clinical criteria. This report is one of a series of HTAs of scheduled procedures. Details of the background to the request by the Director General of the Health Service Executive (HSE), Mr Tony O'Brien, and the general methodology, are included in the separate 'Background and Methods' document.⁽¹⁾

The scope of this HTA is to recommend clinical referral and treatment thresholds to be used in the assessment, referral and surgical management of patients for whom hip arthroplasty is being considered. Input from an expert advisory group as well as a review of international guidelines, international policy documents and thresholds, and economic evaluations were used to inform the referral criteria. In addition, the resource and budget impact were assessed where appropriate.

1.2 Surgical indications

According to Arthritis Ireland, there are some 915,000 people living with arthritis in Ireland, making it the single biggest cause of disability.⁽²⁾ Osteoarthritis is the most common form of arthritis. Also known as degenerative joint disease and osteoarthrosis, osteoarthritis is a chronic joint disease characterised by joint pain, and varying degrees of functional limitation and reduced quality of life.⁽³⁾ All tissues of the joint are involved, although loss of articular cartilage and changes in adjacent bone are the most striking features. To this extent, osteoarthritis represents failure of the joint as an organ, analogous to cardiac or renal failure.⁽⁴⁾ Osteoarthritis may occur in any joint, but is most common in the hip, knee, and the joints of the hand, foot, and spine.

Osteoarthritis may be classified as primary (idiopathic) or secondary. The former occurs in the absence of an identifiable prior condition or event, whilst secondary osteoarthritis occurs on a background of preceding trauma, pre-existing disease or deformity.⁽⁵⁾ Postulated risk factors have been divided into systemic (increasing age,

female gender, genetics, diet) and local (previous injury to a joint, occupation, involvement in sports, joint laxity or malalignment).⁽⁶⁾ Although obesity has been strongly linked with onset and progression of knee osteoarthritis, the data concerning its relationship with hip osteoarthritis is less conclusive.⁽⁷⁾

The Guideline Development Group for National Institute for Health and Care Excellence (NICE) Guideline 177 on osteoarthritis published in 2014 noted three factors which it felt represented a clinician's working criteria for a diagnosis of peripheral joint osteoarthritis:

- age 45 years old and over
- has activity-related joint pain
- has either no morning joint-related stiffness or morning stiffness that lasts no longer than 30 minutes.⁽⁸⁾

The European League Against Rheumatism (EULAR), meanwhile, published guidelines for the diagnosis of knee osteoarthritis in 2010. This suggested that a confident diagnosis of knee osteoarthritis can be made based on the presence of six clinical signs (crepitus, restricted movement, and bony enlargement) and symptoms (persistent knee pain, limited knee stiffness [less than (<) 30mins], and reduced function).⁽⁹⁾

Diagnosis depends on a combination of clinical and radiologic features, while nearly half of patients with radiological features of osteoarthritis have no symptoms and vice versa,⁽¹⁰⁾ although concordance appears stronger in more advanced disease.⁽¹¹⁾ The radiographic features conventionally used to define osteoarthritis include joint space narrowing, osteophyte formation, subchondral sclerosis, cyst formation, and abnormalities of bone contour.⁽⁴⁾ The scoring system most commonly used to assess for these changes is the Empire Rheumatism Council system, developed by Kellgren and Lawrence in 1957.⁽¹²⁾ This system assigns one of five grades (0–4) to osteoarthritis at various joint sites by comparison with a radiographic atlas. Scoring of joint space narrowing and osteophytosis are most closely correlated with hip and knee pain, respectively.⁽⁴⁾

Worldwide estimates are that 9.6% of men and 18% of women aged greater than or equal to (\geq) 60 years have symptomatic osteoarthritis.⁽¹³⁾ Incidence and prevalence data for osteoarthritis is difficult to establish because of its gradual progressive development, the fact that structural changes may not be accompanied by symptoms and because of problems associated with defining a new case. Figures may be skewed depending on whether clinical and radiographic criteria are used in combination or whether radiographic data alone are employed. In addition, data will

depend on whether only moderate and severe X-ray changes are counted, or whether mild changes are also included.⁽¹⁴⁾ It has been estimated that in Ireland approximately 140,000 adults have osteoarthritis, clinically diagnosed in the previous 12 months. This figure excludes undiagnosed osteoarthritis and is likely to be a significant underestimate of overall disease burden.⁽¹⁵⁾ Meanwhile, a 2013 report which examined the impact of osteoarthritis on general practice in the UK calculated that 8% of people aged ≥ 45 years in the UK have sought treatment for osteoarthritis of the hip; this rises to 16% of women and 11% of men aged ≥ 75 years. Based on extrapolations from the Consultations in Primary Care Archive (CiPCA) database, it is estimated that, some 2.12 million people in the UK have sought treatment for osteoarthritis of the hip. According to data from the National Joint Registry in the UK, osteoarthritis was the underlying diagnosis in 92% of patients who were scheduled for hip arthroplasty in 2012.⁽¹⁶⁾

Other surgical indications for hip arthroplasty include avascular necrosis (2%), fractured neck of femur (3%), congenital dysplasia/dislocation (2%), inflammatory arthropathy, failed hemiarthroplasty, chronic trauma, and previous surgery, arthrodesis or infection (combined less than 3% of all hip arthroplasties performed across England, Wales and Northern Ireland in 2012).⁽¹⁶⁾

1.3 Surgical procedures, potential complications and alternative treatments

For the purposes of this report, hip arthroplasty refers to any of those procedures whereby an artificial hip or hip part (prosthesis) is implanted. These include total hip arthroplasty, hemiarthroplasty and hip resurfacing arthroplasty. In the elective (planned surgery) setting, the decision to proceed to hip arthroplasty is dependent on a range of clinical parameters, including response to conservative management, range of motion and severity of a patient's symptoms.

Total hip arthroplasty/replacement (THR) is the most frequently performed scheduled hip arthroplasty procedure performed in the Irish context. The era of modern total hip arthroplasty began in the 1970s following widespread adoption of the Charnley prosthesis.⁽¹⁷⁾ The basic procedure involves reaming of the femoral canal with subsequent placement of the femoral stem. In addition, the acetabulum is hollowed out and replaced with an acetabular implant. Differences exist between surgeons in terms of incision, surgical approach, bearing material, size of the replacement femoral head and choice of fixation (see the following Table 1.1).

Hemiarthroplasty (partial hip replacement) involves replacement of the femoral head and neck, but not the acetabulum and can only be performed when the acetabular

bone structure is sound. This procedure is not generally employed in the elective setting.

Hip resurfacing arthroplasty involves placement of a metal cap on the femoral head to cover the damaged surface of the bone, with a metal cup placed in the acetabulum (MoM). Hip resurfacing theoretically allows for greater bone stock preservation, lower wear rates, retention of the femoral neck, and the use of a larger bearing surface. In addition, it has been argued that should revision surgery be required, converting to a total hip arthroplasty should be easier because of greater bone preservation at the time of the primary surgery.⁽¹⁸⁾ Concern has been raised regarding revision rates and possible metal hypersensitivity reactions with resurfacing prostheses in recent years, leading to market withdrawal in one instance. Of 70,188 hip arthroplasties performed across England, Wales and Northern Ireland in 2012 for osteoarthritis, just 1,036 (1.48%) were done using resurfacing.⁽¹⁶⁾ In Ireland in 2012, just 0.49% of elective hip arthroplasties performed in public hospitals were done using resurfacing.⁽¹⁹⁾

Table 1.1 Surgical options in performing total hip arthroplasty

Incision	Standard incision versus mini-incision (<10cm)	
	Single versus multiple incision	
Approach	Anterior	Lateral
	Antero-lateral	Transtrochanteric
	Lateral	Posterolateral
Material	Ceramic on ceramic (CoC)	Ceramic on polyethylene (CoP)
	Metal on polyethylene (MoP)	Metal on metal (MoM)
Head Size	Large	Small
Fixation	Fully cemented	
	Fully cementless	
	Hybrid – cemented stem, cementless cup	
	Reverse hybrid – cementless stem, cemented cup	

Other types of hip surgery include osteotomy (whereby some of the bone is removed, but no prosthesis is implanted), arthrodesis (whereby the two bones are

fused so that they are no longer mobile) and labral resection (whereby the cartilaginous edge or lip of the capsule is removed or repaired). Both osteotomy and arthrodesis are less commonly performed than hip replacement procedures and are often employed in younger patients to delay time to THR. Arthroscopic resection or debridement is another possible surgical intervention. These alternative surgical procedures are beyond the scope of this HTA.

Elective hip arthroplasty has been shown to be highly effective in reducing pain and improving mobility in those for whom it is an appropriate treatment, but it nevertheless carries risks. Analysis of a 4,281 patient cohort within the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database reported a minor complication rate of 2.7%, a major complication rate of 4.2%, and a mortality rate of 0.26% within 30 days of the procedure.⁽²⁰⁾ Pulmonary venous thromboembolism (VTE) (including both deep vein thrombosis and pulmonary embolism) is a particular concern following orthopaedic surgery. Meta-analysis has demonstrated in-hospital incidence rates of symptomatic postoperative VTE of approximately 0.5% after hip arthroplasty in patients who received recommended VTE prophylaxis during their hospitalisation.⁽²¹⁾

Post-operative mortality is reported to have declined substantially in recent years following widespread adoption of a number of clinical management strategies (posterior surgical approach, mechanical and chemical thromboprophylaxis, and spinal anaesthesia). Institutional review (Mayo Clinic Total Joint Registry) of 12,727 patients who had undergone elective total hip arthroplasty, between 1994 and 2008, reported all-cause mortality rates at 7-, 30-, and 90-days of 0.1%, 0.2%, and 0.5%, respectively.⁽²²⁾ More recently, ninety-day mortality has been estimated to have declined from 0.56% in 2003 to 0.29% in 2011 for patients undergoing primary hip arthroplasty for osteoarthritis.⁽²³⁾ Instability has been identified as the most common problem necessitating revision surgery, followed by mechanical loosening (20%), infection (15%), implant failure (10%), osteolysis (7%) and periprosthetic fracture (6%).⁽²⁴⁾ Studies have consistently demonstrated that complication rates following hip arthroplasty are significantly higher in those who are obese (body mass index (BMI) > 30 kg/m²), with one study demonstrating a crude incidence rate of infection 4.7 times higher in obese versus non-obese patients undergoing hip arthroplasty.⁽²⁵⁻²⁷⁾ An analysis of prosthesis long-term survivorship and functional outcomes following each of the different arthroplasty techniques is beyond the scope of this report.

Alternative treatments

Most clinical guidelines for arthritis recommend optimal multi-modal medical and non-pharmacological treatments for the initial management of pain and dysfunction

secondary to arthritis, with recommendations that such options should be exhausted prior to surgical intervention being considered. A detailed review of what constitutes optimal conservative management is beyond the scope of this HTA, but a summary table of the recommendations from some of the internationally recognised guidelines is attached as an appendix (see Appendix 1.1). These recommendations include making a holistic assessment of the patient, followed by the institution of non-pharmacological and medical treatment modalities.

Non-pharmacological measures can include patient education, the establishment of an exercise programme, and support for potentially beneficial lifestyle adjustments, including smoking cessation and weight loss programmes. Non-pharmacological treatment options include heat or cool packs as appropriate; shock absorbing footwear; the use of aids and appliances, such as walking sticks or grabbers; acupuncture or trans-electrical nerve stimulation (TENS) which may be helpful for some people.

Concurrent medical therapies include the adoption of a stepwise approach to pain management. Options may include topical and oral painkillers, with gastroprotection as required, and the addition of adjunctive medications (for example, intra-articular injections of corticosteroid) as indicated.

1.4 Current practice in Ireland

Potential candidates for hip arthroplasty are generally referred by their general practitioner (GP) or by another hospital specialist to an orthopaedic surgeon. Referral or treatment thresholds (similar to those discussed in Section 2 below) may be used by GPs and surgeons in Ireland to identify eligible candidates for referral or treatment. However, it is unclear if such thresholds are being used, or how consistently they are being applied.

Hip arthroplasty is a routine scheduled surgical procedure within the publicly-funded healthcare system in Ireland. The Hospital In-Patient Enquiry (HIPE) system was employed during this HTA to assess activity levels in relation to both procedures. Hip arthroplasty may be coded as the principal procedure or as a secondary procedure. For consistency and completeness, data are reported to include the principal and secondary procedures (that is 'all procedures') with all data presented on this basis. The International Classification of Diseases (ICD) intervention codes used to retrieve this data are listed in Appendix 1.2.

The HIPE system reports that there were approximately 4,850 patients who underwent hip arthroplasty in 2012. Of these, 3,274 (67.5%) patients were admitted

for their procedure on an elective (planned surgery) basis; 1,554 (32.0%) were admitted on an emergency basis; with the remaining 16 (0.3%) and six (0.1%) patients admitted as emergency and elective readmissions, respectively.

This data captures procedures provided as hospital day case and inpatient procedures, as in the other HTA reports in this series. All 3,274 procedures carried out in the pure elective setting were reported as being done on an inpatient basis, with an average length of stay (ALOS) of 6.9 days – the target set by the National Clinical Programme in Surgery states an ALOS target of seven days for patients undergoing elective hip arthroplasty.⁽²⁸⁾ It is noted that the average length of stay for patients undergoing elective hip arthroplasty in public hospitals decreased from 12.3 days in 2005 to 6.9 days in 2012 (Figure 1.1). The average age of patients undergoing elective hip arthroplasty in 2012 was 65.5 years.

In 2012, the most common procedure was unilateral total arthroplasty of the hip, which accounted for approximately 96.9% of cases. The 3,274 elective hip arthroplasties recorded within the HIPE system in 2012 were performed across 21 different hospital sites (range 2 – 605 procedures per hospital). Three institutions carried out 10 or less elective procedures in the year. These institutions are categorised according to their hospital groups in Table 1.2 on the following page. Any variation in practice may be explained by differing catchment sizes or the availability of an orthopaedic surgery service, hospital size or specialisation. It should also be noted that patient comorbidity may occasionally mandate that hip arthroplasty is performed in a tertiary-level institution in which this procedure is not normally undertaken.

Table 1.2 HIPE data for elective hip arthroplasty per proposed HSE hospital group* (2012)⁽²⁹⁾

Hospital group	Number	ALOS (days)	Inpatient bed days	Average age
	(%) (Range)			(years)
Dublin North East	46 (1.4%) (20-26)	15.0	688	65.4
Dublin Midlands	445 (13.6%) (16-219)	7.1	3,153	64.1
Dublin East	860 (26.3%) (2-605)	6.4	5,466	63.9
South/South West	808 (24.7%) (8-322)	6.8	5,493	66.5
West/North West	638 (19.5%) (91-188)	6.9	4,411	67.4
Midwest	475 (14.5%) (22-453)	7.2	3,440	66.0
Total	3,274 (100)	6.9	22,679	65.5

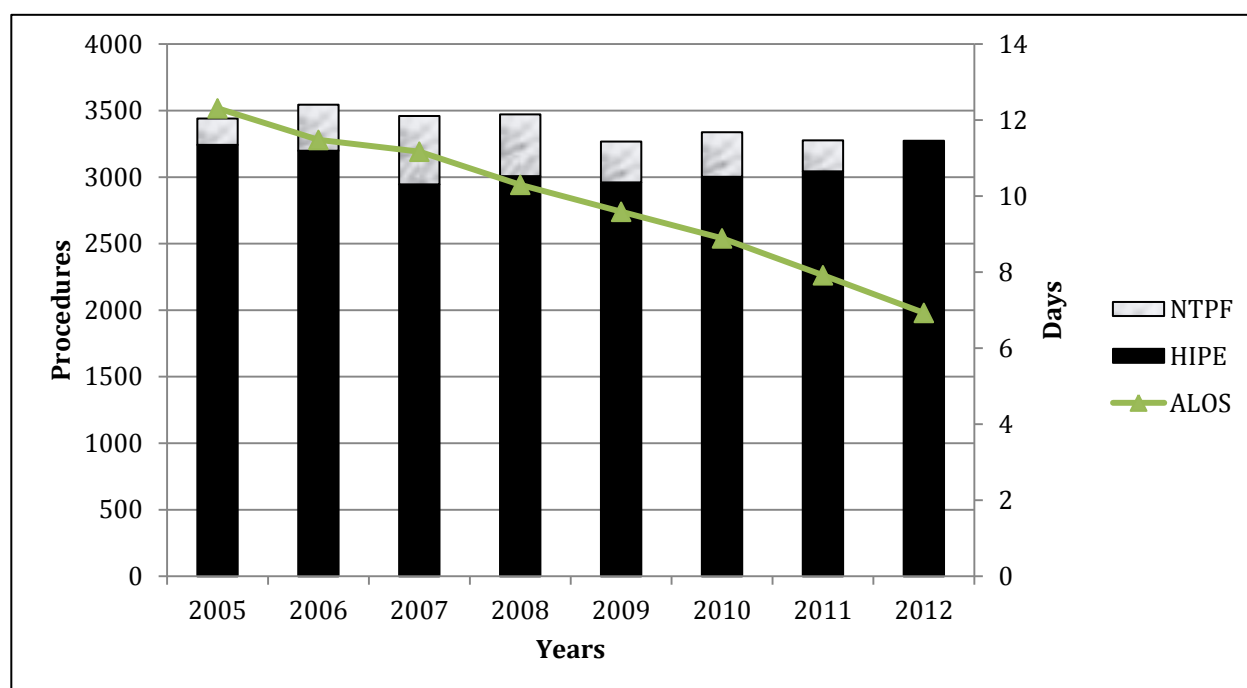
*Key: Range – the range in terms of number of procedures performed in individual institutions within the hospital group. ALOS – average length of stay; *See Appendix 1.2 for HIPE codes; HIPE data includes all activity in publicly-funded hospitals, including procedures in patients that used private health insurance.*

All patients who undergo a surgical procedure in Irish public hospitals have an operative diagnosis coded as part of the HIPE coding process. This is recorded as the principal diagnosis at the time of operation, and may not be synonymous with the preoperative diagnosis. In 2012, the principal diagnosis – at the time of the hip arthroplasty – was coded as 'coxarthrosis (arthrosis of hip)' (92.0%); the next most

frequently coded diagnoses were 'gonarthrosis (arthrosis of knee)' (1.3%), and 'other disorders of bone' (1.0%).

In addition to the activity levels in public hospitals, there were 2,397 procedures procured by the public healthcare system via the National Treatment Purchase Fund (NTPF), from private hospitals, between 2005 and 2012, although no procedures were funded in 2012. Data on the total number of procedures undertaken in the publicly-funded system, including the additional procedures funded by the NTPF are shown in Figure 1.1. The number of elective hip arthroplasties undertaken in the publicly-funded healthcare system has remained relatively stable between 2005 (3,441) and 2012 (3,274).

Figure 1.1 Number and average length of stay (days) for elective hip arthroplasties provided through the publicly-funded healthcare system in Ireland, 2005-2012⁽²⁹⁾



Key: HIPE (Hospital In-Patient Enquiry Scheme) data; NTPF (National Treatment Purchase Fund) funded procedures. HIPE data includes all activity in publicly funded hospitals, including procedures in patients that used private health insurance. ALOS (average length of stay).

The length of time a patient must wait to be reviewed varies according to the referral pathway and the individual hospital and consultant to which a patient is referred. At the end of April 2014, it was reported that there were 338,943 patients on the outpatient waiting list database collated by the NTPF, 34.2% of whom were waiting longer than six months, with 6.7% on the list for longer than 12 months.

Orthopaedic referrals constituted 12.4% (n=41,975) of the total waiting list; 42.0% of these patients had been waiting greater than six months for an outpatient appointment in secondary care.⁽³⁰⁾

Initiatives are underway by the HSE to standardise the management of outpatient services and to ensure that there are consistent management processes across all publicly-funded healthcare facilities that provide outpatient services. This includes the publication of a protocol for the management of these services by the NTPF in January 2013 which provides the core guidance of the Outpatient Services Performance Improvement Programme.⁽³¹⁾ The protocol specifies that patients should be treated based on clinical urgency, with urgent referrals seen and treated first. It is intended that the definition of clinical urgency and associated maximum wait times is to be developed at speciality or condition-level and agreed by the clinical programmes.

In January 2013, the NTPF published a national waiting list management policy that outlines the standardised approach to managing scheduled care treatment for inpatient, day case and planned procedures in all publicly-funded hospitals.^(31;32) It outlines a consistent structured approach that must be adopted in the management of the waiting list; monitoring of the implementation of the policy will be routinely undertaken by the NTPF in the form of annual quality assurance reviews.

In relation to orthopaedic procedures specifically, it should be noted that a joint initiative, aimed at reducing waiting lists for outpatient appointments, was launched by the National Orthopaedic and Rheumatology Clinical Programmes in 2010. Under this initiative, 24 clinical specialist musculoskeletal (MSK) physiotherapists were employed across Ireland (six per region) to work alongside orthopaedic and rheumatology consultants, with these consultants performing the initial triage based on the referral letter. The process aimed to identify patients for whom conservative management may be a more appropriate treatment.

An audit of practice, between January and July 2012, at St Vincent's University Hospital (SVUH) in Dublin has reported that of 763 patients allocated an appointment under this system, 49 (6%) did not attend or cancelled their appointment. At the time of the audit, 140 (20%) patients were awaiting review by the MSK team as return patients (for example, for follow-up after medical investigations). Of the remaining 574 patients, whose outcome was known, 76% were independently managed by the MSK physiotherapists without the need for orthopaedic consultation; 39% of whom were discharged to physiotherapy (63% within SVUH and 37% to a primary care service) and 37% back to their general practitioner. Twenty four percent of patients (n=137) were referred on to a surgical or medical specialty, 92%

(n=126) of those for an orthopaedic surgical opinion, 4% to the department of pain medicine, 1% to rheumatology and 2% to another specialty (for example, neurology, vascular surgery).⁽³³⁾

In the primary care setting, meanwhile, 175,926 referrals were made to physiotherapy services in 2013; this was 2.1% above expected activity for the year. Overall activity levels were also 1.9% higher than expected, with 733,613 physiotherapy treatment episodes provided in 2013. This included 145,213 patients who were referred for first-time assessments (an increase of 4.4% above expected activity).⁽³⁴⁾ Despite increased activity levels, demand continues to exceed available capacity. At the end of April 2014, there were 6,377 patients waiting over 12 weeks for a physiotherapy assessment in primary care.⁽³⁵⁾

2 Clinical referral/treatment threshold

2.1 Review of the literature

A comprehensive review of the literature was conducted during March 2014 to identify international clinical guidelines and health policy documents describing treatment thresholds that are in place in other healthcare systems. It also considered systematic reviews and economic evaluations examining the effect of the introduction of those thresholds. The approach and general search terms are described in Appendix 1 in the 'Background and Methods' document, and a summary of the results is included in Table 2.1. A summary of the clinical guidelines identified from the search and thresholds in use elsewhere are provided in Appendices 1.1 and 1.5, respectively.

Table 2.1. Summary of literature search results

Publication Type	Number	References
Clinical Guidelines	12	(36-47)
Reviews	1	(48)
Cost-Effectiveness Studies	6	(49-54)

2.2 Clinical evidence

International guidelines

As discussed in Section 1.4, HIPE data indicate that the majority of elective hip arthroplasties are undertaken in those with osteoarthritis of the hip.⁽¹⁹⁾ The most recent and comprehensive guideline retrieved regarding management of osteoarthritis is that entitled 'Osteoarthritis, Care and Management in Adults', published by the UK's National Institute for Health and Care Excellence (NICE) in February 2014.⁽³⁶⁾ This guideline addresses management of osteoarthritis as a single clinical entity and does not provide joint-specific recommendations. As noted in Chapter 1, this guideline suggests that a clinical diagnosis of osteoarthritis can be made without investigations if the person:

- is 45 or over and
- has activity-related joint pain and
- has either no morning joint-related stiffness or morning stiffness that lasts no longer than 30 minutes.

The guideline suggests that a holistic approach needs to be taken to assessment and management (Appendix 1.1). A full NICE review on the pharmacological management of osteoarthritis is to follow. The guideline made a number of specific recommendations in relation to consideration for referral for joint surgery:

- Prior to referral, the referring clinician should ensure that the person has been offered at least the aforementioned core (non-surgical) treatment options. This should apply to all with clinical osteoarthritis, regardless of whether or not they are symptomatic.
- Decisions regarding referral thresholds should be based on discussions between patient representatives, referring clinicians and surgeons, rather than using scoring tools for prioritisation.
- Referral for joint surgery should be considered for people with osteoarthritis who experience joint symptoms (pain, stiffness and reduced function) that have a substantial impact on their quality of life and are refractory to non-surgical treatment.
- Patients should be referred for consideration of joint surgery before there is prolonged and established functional limitation and severe pain.

- Patient-specific factors (including age, sex, smoking, obesity and comorbidities) should not be barriers to referral for joint surgery.

The guideline also recommended that when discussing the possibility of joint surgery, the clinician should check that the person has been offered at least the core treatments for osteoarthritis, and should give them information about:

- the benefits and risks of surgery and the potential consequences of not having surgery
- recovery and rehabilitation after surgery
- how having a prosthesis might affect them
- how care pathways are organised in their local area.

In 2009, Australia's National Health and Medical Research Council (NHMRC) published its Guideline for the Non-Surgical Management of Hip and Knee Osteoarthritis.⁽³⁷⁾ This guideline suggests that, for those with osteoarthritis of the hip, there is good evidence of benefit from land-based exercise and some evidence of benefit from aquatic therapy, up to three months of multimodal physical therapy, thermotherapy and self-management education programmes. The guideline stressed the importance of comprehensive assessment of the patient with hip or knee osteoarthritis, including their signs and symptoms, comorbidities, psychosocial and falls risk, medications and non-steroid anti-inflammatory drugs (NSAIDs) risk. Emphasis was also placed on the importance of individualisation of decisions regarding the need for multidisciplinary care, and it was suggested that referral to a rheumatologist should be considered for elderly patients, patients with significant comorbidity, those with extensive disease or when the diagnosis is uncertain. The guideline did not deal specifically with indications for referral for surgical intervention. Instead it referred users to a guideline developed by the Royal Australian College of General Practitioners in 2007 (see under 'prioritisation and referral criteria').⁽³⁸⁾

In 2008, the Osteoarthritis Research Society International (OARSI) published its guideline, for the management of both hip and knee OA, based on a systematic review of articles published between 1945 and 2005, inclusive.⁽³⁹⁾ This process resulted in 25 recommendations, a sample of which is included in Appendix 1.1. Specifically in relation to referral for arthroplasty, the guideline states that:

- Patients with hip or knee osteoarthritis who are not obtaining adequate pain relief and functional improvement from a combination of non-pharmacological and pharmacological treatment should be considered for joint replacement surgery.

- Osteotomy and joint preserving surgical procedures should be considered in young adults with symptomatic hip osteoarthritis, especially in the presence of dysplasia.

It should be noted that the evidence included in this review was updated in 2010 to include published studies up to the end of 2009. While effect sizes changed in relation to some of the individual treatment strategies under study, there was no suggestion that the recommendations above required alteration.⁽⁴⁰⁾

In 2010, March et al. reviewed the earlier version of the aforementioned NICE guideline (2008),⁽³⁾ together with the NHMRC and OARSI publications, and proposed a 'core set' of interventions that should be offered to all patients with osteoarthritis of the hip and/or knee.⁽⁴⁸⁾ The paper made eight recommendations (see Appendix 1.1), specifically saying that access to assessment for arthroplasty should be offered to patients with severe symptomatic osteoarthritis not responding to conservative therapy.

The Dutch Orthopaedic Association published its guidelines on total hip replacement in 2011.⁽⁴²⁾ This paper states that the indication for total hip replacement should be based on pain, loss of function, radiographic changes, and failure of non-operative treatment. Younger age and obesity were described as relative contraindications, the former because of an increased risk of revision, and the latter because of an increased risk of postoperative complications. In addition, the guideline states that "delay in surgery in high age is not advisable in view of reduced functional outcome and increased mortality. In addition, when progressive loss of function (with or without contractures) predominates over pain, surgery should not be delayed in view of reduced postoperative functional outcome".⁽⁴²⁾

The Ministry for Health in British Columbia, Canada, published its guideline for diagnosis and treatment of osteoarthritis in peripheral joints in 2008.⁽⁴¹⁾ It suggested that one needs to consider four treatment pillars, namely patient education, rehabilitation, medications and referrals (surgical and non-surgical). Its indications for non-surgical referral were as follows:

- Refer to Rheumatology or appropriate Internal Medicine specialist for: red flag conditions (alternative diagnosis), unexpected/unusual disease progression or complications.
- Refer to physiotherapy or occupational therapy for education on self-management or on the disease process; specific exercises for range of motion, strengthening, or joint protection; gait training; knee bracing; pain management education and

techniques; mobility aids; and education for dealing with functional difficulties (home, work or leisure).

- Refer to dietician for education on weight management.
- If the patient has significant disease progression, but is not a surgical candidate, for example, because of significant comorbidities, consider referral to occupational therapy for assistance with activities of daily living (ADLs).

Indications for surgical referral, meanwhile, were failure of a non-operative programme (inadequate pain control, increasing need for narcotic medications, significant pain on motion; resting pain; presence of night pain), increasing functional restriction (inability to walk without significant pain; significantly modified activities of daily living: that is, putting on shoes, climbing stairs, squatting and bending; increasing threat to patient's ability to work or live independently), significant abnormal findings on examination (decreasing range of motion of the hip and/or notable leg length discrepancy), and or progression of disease on X-ray (evidence of increasing acetabular protrusion or femoral head collapse).⁽⁴¹⁾

Finally, the European League Against Rheumatism (EULAR) published its guidance on management of osteoarthritis of the hip in 2004. It suggested that osteotomy and joint preserving surgical procedures should be considered in young adults with symptomatic hip activities of daily living, especially in the presence of dysplasia or varus/valgus deformity.⁽⁴³⁾ In addition, the guideline suggested that joint replacement be considered in patients with radiographic evidence of hip osteoarthritis who have refractory pain and disability. In 2013, the same organisation issued guidance on the non-pharmacological core treatment of hip and knee osteoarthritis – this made no recommendations on appropriateness for surgical referral.⁽⁴⁴⁾

There is thus clear consensus across international guidelines that patients with hip osteoarthritis should be managed conservatively in the first instance, with this management plan instituted following holistic assessment of individual patient need. Patients with severe symptomatic osteoarthritis, not responding to conservative measures, should be referred to secondary care for an opinion in relation to the need for arthroplasty. The following paragraphs outline international thresholds that have integrated this evidence into their prioritisation and referral criteria.

Prioritisation and referral criteria

Prioritisation criteria, based on scoring systems, have been developed for hip and knee arthroplasty, in New Zealand⁽⁵⁵⁾, Canada⁽⁵⁶⁾ and Australia. The New Zealand system was introduced in 1998 and calculates a score based on pain (maximum

score 40 points), physical disability (20 points), movement and deformity (20 points) and other features, including work and social issues (20 points).⁽⁵⁵⁾ Its correlation with validated measures of disability and function – the Western Ontario and McMasters Universities Arthritis Index (WOMAC) and the Musculoskeletal Function Assessment (MFA) – has been questioned, however,⁽⁵⁷⁾ and it has been used to a varying degree across New Zealand.⁽⁵⁸⁾ In addition, the good practice guidelines published by the New Zealand Orthopaedic Association do not mention prioritisation criteria, simply stating that “the indications for surgery are significant pain and disability usually with accompanying radiological changes at the hip, in patients where non-operative treatment has failed or is futile”.⁽⁴⁵⁾ The initial Canadian prioritisation criteria, meanwhile, used an algorithm based on rest pain, problems in work or care giving, and functional limitation, with different scores for prioritisation being assigned to different states.^(56;59) Meanwhile, the Western Canada Waiting List (WCWL) project was established in 1998 and established prioritisation criteria for both hip and knee arthroplasty, with individual criteria summing to a maximum score of 100 points for the most urgent cases (Appendix 1.3).⁽⁶⁰⁾ It, or a modified version, appears to have been rolled out in a number of Canadian provinces.⁽⁶¹⁾ Finally, the Orthopaedic Waiting List Project in Victoria, Australia, developed a Multi-Attribute Prioritisation Tool (MAPT) which contains 11 questions about pain, psychological and economic impact, limitations to activities, and deterioration.⁽⁶¹⁾ It has been built into the Victorian Osteoarthritis Hip and Knee Service, an improved service model for management of patients requiring joint replacement, piloted at several Victorian hospitals. In this service model, patients are initially assessed by a specialist physiotherapist and/or nurse; the MAPT score is to triage patients to the orthopaedic outpatient clinics for further assessment by a surgeon. Based on the clinical assessment of the patient, the surgeon then prioritises the appropriate patient for surgery and, hence, clinical assessment by the orthopaedic surgeon in the clinic, rather than a MAPT score is the basis of prioritisation for a surgery.⁽⁶²⁾ One small study has examined the MAPT against clinical and radiographic assessment of disease severity – its results suggested that no relationship exists between the two.⁽⁶²⁾

The use of referral thresholds by primary care trusts (PCTs) in the English NHS has been common practice for several years. As part of the changes to the NHS brought about by the Health and Social Care Act 2012, PCTs and strategic health authorities (SHAs) ceased to exist on 31 March 2013. Their responsibilities were taken over by clinical commissioning groups and the NHS Trust Development Authority. However, the thresholds that were previously developed by these trusts are likely to represent ongoing practice at a local level while new commissioning guides are being

established. A summary of specific thresholds from a sample of three NHS PCT areas is provided in Appendix 1.5.

Over the past 20 years, a large number of patient-reported outcome measures (PROMS) have been developed to evaluate the efficacy of both hip and knee arthroplasty, from the patient's perspective. These may be classified as (1) disease-specific (or osteoarthritis-specific) measures (Hip Dysfunction and Osteoarthritis Outcome Score [HOOS], HOOS physical function short form [HOOS-PS], Knee Injury and Osteoarthritis Outcome Score [KOOS], KOOS physical function short form [KOOS-PS], Western Ontario and McMaster Universities Osteoarthritis Index [WOMAC]); (2) arthroplasty-specific measures (Harris Hip Score, Oxford Hip Score, Oxford Knee Score); and (3) generic measures (EQ-5D, Short Form-12 [SF-12], Short Form-36 [SF-36]).⁽⁶³⁾ In the UK the PROMS of choice have been the Oxford Hip and Knee Scores (Appendix 1.4). In some cases, there have been attempts to use these scores as a method of prioritising patients for surgery (see Appendix 1.5). This was despite the fact that these measures were not designed to be used in this way, and that there are little data to suggest that they can predict the outcome of surgery.⁽⁶⁴⁾ Their use as a prioritisation tool by PCTs was inconsistent.

The most recent national commissioning guide, published in 2013, relating to hip arthroplasty is that from the Royal College of Surgeons of England.⁽⁴⁶⁾ Entitled 'Commissioning Guide – Pain arising from the hip in adults', this report is sponsored by the British Hip Society and the British Orthopaedic Association, and NICE has accredited the process used to produce it. It makes a number of recommendations for GPs who are considering the appropriateness of referral (Appendix 1.5), including that all patients must have engaged in shared decision making about alternatives, and the NHS Hip Arthroplasty Surgery Decision Making Tool can be used when arthroplasty is being considered. In addition, patients should be informed that the decision to have surgery can be a dynamic process and a decision to not undergo surgery does not exclude them from having surgery at a future point in time. Specifically in relation to total hip arthroplasty, it suggests that this should be considered when:

- pain is inadequately controlled by medication
- there is restriction of function
- the quality of life is significantly compromised
- there is narrowing of the joint space on radiograph.

Finally, it is stated that, having established the need for surgery, the procedure should be performed as soon as possible.⁽⁴⁶⁾

In 2007, the Royal Australian College of General Practitioners (RACGP) published its guidelines regarding referral for joint replacement.⁽³⁸⁾ This states that:

- Surgery should be considered when there is confirmation of advanced disease and a continuation of severe symptoms despite optimal conservative (non-surgical) treatment.
- When referral for orthopaedic assessment and possible joint replacement surgery is indicated there should be provision of information and support to enable the patient to make an informed decision in conjunction with family members and carers as appropriate.
- The surgeon has ultimate responsibility for determining a patient's fitness to proceed with surgery and to explain to the patient the potential risks and gains of the procedure. Thus, the existence of comorbidities should not preclude referral. The general practitioner does, however, have an important role in the detection and management of comorbidities that may affect fitness for surgery.
- When making a referral for orthopaedic assessment:
 - identify and develop a plan for appropriate stabilisation of comorbidities;
 - seek specialist advice as required; and,
 - consider referral for allied health assessment.

In 2013, the American Association of Hip and Knee Surgeons (AAHKS) issued guidance on joint arthroplasty for those who are obese.⁽⁴⁷⁾ Based on evaluation of the literature and consensus, the following statements were made in relation to hip arthroplasty:

- All obese patients (BMI >30kg/m²) undergoing total joint arthroplasty are at increased risk for perioperative complications and this needs to be discussed with every patient prior to considering total joint arthroplasty.
- The data for total hip arthroplasty (compared to that for knee arthroplasty) appear to be less clear. There are fewer studies that report on obesity and total hip arthroplasty, and there is much less consensus on a threshold above which complications increase. It would seem reasonable to extrapolate data from the total knee arthroplasty group, and recommend that patients with a BMI >40kg/m² be counselled regarding weight loss prior to surgery, but a strong recommendation cannot be made.⁽⁴⁷⁾

International referral thresholds thus uniformly suggest the need for conservative management in the first instance, prior to referral for consideration for arthroplasty. It is clear that while some organisations have adopted scoring tools or patient-

reported outcome measures to aid in the surgical prioritisation process, at present these are neither uniformly employed nor sufficiently evidence-based to warrant implementation in Ireland. There thus remains a subjective element to the referral process, but a number of factors which are common across thresholds, and which were enumerated in the international guidelines outlined earlier, have been identified, and these are reflected in the final developed threshold.

2.3 Cost-effectiveness evidence

A study by O' Shea et al. examined practices at Cappagh National Orthopaedic Hospital, Dublin, in 1999. Based on a mean hospital stay of 16.4 days they estimated that the cost of a total hip replacement (THR) at that time was £6,472.06 Irish punts (£IRL). For a male and female between the ages of 60 and 69 undergoing THR, the cost of a Quality Adjusted Life Year (QALY) was estimated at IRL£1,863.55 and IRL£1,467.27, respectively. Similarly, for a male and female between the ages of 70 and 79, the respective costs were IRL£3,152.00 and IRL£2,454.90 per QALY gained, respectively.⁽⁴⁹⁾ The authors concluded that total hip replacement was a worthwhile and efficient investment of health resources.

Fordham et al. retrospectively examined the difference in costs between a cohort of 938 patients undergoing an 'Exeter' THR between 1999 and 2002, with a hypothetical 'no surgery' group, over a period of five years.⁽⁵⁰⁾ Average length of stay was 10.8 days (SD 7.3) and the median estimated cost per patient was £5,084 (IQR: £4,588-£5,812) British pounds (£GBP). Due to a lack of a control group, the QALY gain could only be compared hypothetically with the Quality of Life (QoL) estimates that might have prevailed without surgery. For this the authors employed patients' pre-operative QoL as the counterfactual scenario. 90.7% of patients gained positive QALYs compared to no surgery. The mean QALY gain was 0.8 (95% CI 0.76-0.84), and the mean cost per QALY gained was GBP£7,182 (95% CI GBP£6,740-£7,678). Using the Oxford Hip Score (OHS) as a marker of preoperative disease severity, the authors reported significant differences in the QALY gain and the cost per QALY gained between those with mild (QALY gain =0.61, cost per QALY =GBP£9,188 [£7,893-£10,915]) and severe disease (QALY gain =0.98, cost per QALY =GBP£5,924 [£5,189-£6,826]) preoperatively. The authors also noted that their figures were probably conservative as they had assumed a zero cost for no surgery when in reality other treatment costs would be incurred in this cohort.⁽⁵⁰⁾ Therefore surgery was cost-effective in this study.

A number of other papers have demonstrated the relative value of total hip replacement (Table 2.2 on the following page).

Table 2.2. Summary of economic evidence from other papers

Author	Country (Currency)	Year costed (Discount rate)	Perspective	QALY gain	Cost per QALY*	Cost per DALY*	DALY averted
O' Shea ⁽⁴⁹⁾	Ireland (Punts)	1999 (-)	Payer	-	€2,633- €5,659	-	-
Fordam ⁽⁵⁰⁾	UK (GBP)	1999-2002 (-)	Payer	0.61- 0.98	€7,837- €12,146	-	-
Higashi ⁽⁵¹⁾	Australia (AUD)	2003 (3%)	Payer	-		€5,682- €13,507	1.7
Rasanen ⁽⁵²⁾	Finland (EURO)	2003 (5%)	Payer	0.77- 1.83	€5,682- €13,507	-	-
Tso ⁽⁵³⁾	Canada (CD)	2009 (3%)	Payer	2.78	€2,398- €12,535	-	-
Lawless ⁽⁵⁴⁾	U. States (USD)	2008-09 (3%)	Payer	-	€9,411- €12,156	-	-

Key: AUD – Australian dollars; CD – Canadian dollars; USD – United States dollars; QALY – quality adjusted life year; DALY – disability adjusted life year. *Costs have been inflated to 2013 values and converted to euro.

Given the reduction in morbidity and mortality associated with hip arthroplasty in recent years, together with the reduction in average length of stay, it might be argued that surgery has become more cost-effective than that reported in these historical studies. That said, these savings may have been offset by the introduction of new, more expensive prostheses and other surgical technologies. Historically, the threshold at which a given technology is considered to be cost-effective has varied between €20,000 and €45,000 per QALY gained. Whilst there are potential issues with the generalisability of cost data across healthcare systems, currencies, and time frames, all of the studies above have reported costs per QALY less than the lower threshold of €20,000, and hence it appears reasonable to concur with their conclusions that hip arthroplasty is a cost-effective procedure.

2.4 Budget impact and resource implications

The number of hip arthroplasty procedures provided through the publicly-funded healthcare system has remained relatively stable since 2005. As noted in Section 1.4, elective hip arthroplasty was associated with an average length of stay of 6.9 days in 2012. The current estimated annual national cost of elective hip arthroplasty procedures is €37.3 million, with an average weighted cost per case of €11,403, based on the latest Casemix costs (Table 2.3 on the following page).

Table 2.3. HSE inpatient and day case acute hospital activity and costs for elective hip arthroplasty procedures summarised by diagnosis-related group (based on 2011 costs and 2012 activity)⁽⁶⁵⁾

DRG code	Description	Number carried out	% of hip arthroplasty procedures	Cost/inpatient (€)
I03B	Hip replacement W/O catastrophic CC	3,118	95%	10,931
I03A	Hip replacement W catastrophic CC	99	3%	20,096
I08B	Other hip and femur procedures W/O catastrophic CC	16	0.5%	10,340
I01B	Bilateral or multiple major joint Pr of lower extremity W/O revision W/O catastrophic CC	12	0.4%	15,734
I01A	Bilateral or multiple major joint Proc of lower extremity W revision or W catastrophic CC	8	0.2%	37,771
	Other procedures*	21		

*Key: DRG – diagnostic-related group; W – with; W/O – without; CC – complication or comorbidity. Data summary from HSE National Casemix Programme Ready Reckoner, 2013 based on the 2011 inpatient and day case costs reported by 38 hospitals participating in the programme that year. Activity is based on the latest 2012 HIPE data. *Note the remaining diagnosis-related groups accounted for five or fewer of the procedures each.*

It is noted that average length of stay has declined from 12.3 days in 2005 to 6.9 days in 2012, with the system achieving the target of 7.0 days established by the National Clinical Programme for Surgery, albeit with some local and regional variation. In addition, the number of hip arthroplasty procedures provided by the publicly-funded system has remained constant for several years. However, demand for care is anticipated to increase due to changing demographics. The cost per episode of care is also anticipated to increase due to increasing levels of obesity. As noted in section 1.2, complication rates following hip arthroplasty are significantly higher in those who are obese (BMI >30kg/m²), potentially delaying hospital discharge or necessitating return to surgery. Cost of care may also be increased due to the need to acquire or adapt mobility aids and other equipment and the need for additional therapy staff to safely mobilise obese patients.⁽⁶⁶⁾

3 Advice on clinical referral/treatment threshold

Taking account of the available evidence that exists in relation to osteoarthritis of the hip in adults, and the role of arthroplasty in its management, the following threshold criteria are advised for referral and treatment within the publicly-funded healthcare system in Ireland.

These criteria are designed to distinguish between patients who would derive additional benefit from elective hip arthroplasty over conservative management in the primary care setting. Patients who present with 'red flag' signs or symptoms, suggestive of, for example, a fractured hip, septic arthritis or malignancy, should continue to be referred for emergency or urgent assessment in secondary care.

All patients should have timely access to routine radiological investigations via primary care services. For those suspected of having hip osteoarthritis, plain film X-ray should be performed within three months.

The majority of patients with hip osteoarthritis should be managed conservatively in the first instance. Where conservative management is indicated, this should be made available to patients at a time when they are most likely to derive benefit from this management.

The conservative management plan should be individualised following holistic assessment of individual patient need, and should include both pharmacologic and non-pharmacologic components.

Referral for opinion regarding the need for hip arthroplasty should be considered for patients:

- whose condition has not improved sufficiently following at least three months of optimal conservative management in the primary care setting
- AND who have severe symptoms
- AND OR moderate to severe functional limitation, significantly affecting their quality of life
- AND have radiographic evidence of hip osteoarthritis
- AND who have a BMI less than (<) 40kg/m²
- AND who are considered likely surgical candidates based on assessment of patient comorbidities
- AND who express a desire to proceed to surgery following discussion of the implications of undergoing hip arthroplasty.

Where patients have severe symptoms, but where comorbidity / BMI / lack of desire for surgery mean that surgical referral is not currently appropriate, consideration should be given to the need for referral to a rheumatologist, geriatrician, or pain management consultant as appropriate.

All patients with a BMI of equal to or greater than (\geq) 40kg/m² should be referred for participation in a formal weight reduction programme, with onward referral to a bariatric surgical service where this is deemed appropriate.

Patients who do not meet these criteria should remain under the care of the general practitioner who will manage conservative treatment of the patient.

While the exact nature of what constitutes optimal conservative management is beyond the scope of this assessment, options may include analgesia, weight reduction and activity programmes, physiotherapy, shoe wear modification, and or advice in relation to activities of daily living.

4 Discussion

Referral thresholds have been developed based on a comprehensive review of the literature and international referral guidelines. The aim of these thresholds is to ensure that the right patients receive referral and treatment at the right time, and to avoid unnecessary interventions, particularly in those who are unlikely to derive additional benefit from surgery over conservative management. While referral thresholds may currently be used on an informal basis within the Irish system, this has not been done consistently. Therefore, the thresholds developed here aim to provide primary care practitioners, surgeons and other clinicians involved in the care of these patients with a template upon which decision making can be standardised.

This requirement for standardisation is increasingly relevant as changing demographics and the increasing prevalence of chronic disease place additional strain on the publicly-funded healthcare system. In particular, it is noted that in Ireland at present 39% of adults are overweight and 18% are obese. Although the data regarding obesity as a risk factor for hip osteoarthritis is inconclusive, it is clear that the risk of serious complications following hip arthroplasty is significantly greater in those who are obese. These complications, together with the increased costs of surgical intervention and post-surgical rehabilitation in this patient cohort, place an onus on the healthcare system to develop thresholds which will aid in defining which patients are suitable candidates for surgery.

One caveat to the effective implementation of referral thresholds in Ireland is the limited access to conservative treatment in the primary care setting. The provision of specialist musculoskeletal (MSK) services through the Orthopaedic and Rheumatology Clinical Programmes has clearly impacted on waiting lists for outpatient appointments in secondary care. At present, however, access to these services remains via referral into the secondary care system, where patients are then triaged according to need. Implementation of an MSK programme to support general practitioners and community physiotherapists in the primary care setting may provide one solution to the need for increased access to timely and appropriate conservative management in this setting. In addition, implementation of this threshold will require additional resources to be directed towards physiotherapists working in the primary care setting, such that patients can be assured access to a holistic, multidisciplinary programme of conservative management where appropriate.

It is acknowledged that where a patient's BMI precludes them from being a candidate for arthroplasty, resources should be in place to ensure that those patients are offered formal weight reduction programmes and, where appropriate, access to a

bariatric surgical service. A key point noted in the international literature is the need for holistic assessment of the patient in the first instance. The literature also outlines the requirement that patients are not referred for an opinion in relation to surgery until there has been a discussion in relation to the pros and cons of surgical intervention and that they will be happy to proceed with surgery if considered suitable following assessment in secondary care. Both of these processes will require additional time over and above a routine appointment in primary care, and thus a further caveat to implementation of these guidelines is that that service is adequately resourced. In addition, the extent to which patients must wait for their arthroplasty once they have been listed for this procedure is currently unclear. While efficiencies have been achieved in terms of length of stay and total number of procedures carried out, it is likely that waiting lists for surgical intervention remain substantial.

It is noted that while development of this threshold should aid in defining who should be referred for arthroplasty, the mechanisms around its practical implementation remain to be fully clarified. It is clear that the National Healthlink Project, which permits the secure transmission of clinical patient information between GPs and hospitals, has facilitated improved communication of referrals between primary and secondary care. It is thus suggested that one mechanism through which this referral threshold might be implemented would be through its integration in the form of a standardised referral form into this project. Of note, initiatives are underway by the orthopaedic and rheumatology clinical care programmes in the Health Service Executive (HSE) to develop interface clinics and consultations between primary and secondary care services in Ireland and to implement agreed national referral guidelines for all patients with musculoskeletal disease.

In conclusion, the thresholds outlined above are consistent with well established clinical guidelines and published evidence. Hence, they are unlikely to represent a major change from current practice, but rather a standardisation of referral and treatment criteria across all areas of the publicly-funded healthcare system. Consistent application of the criteria throughout the healthcare system through the use of stated thresholds that are integrated into agreed national referral guidelines should assist patient triage, bring greater transparency, ensure equity of access based on clinical need and allow maximum benefit to be gained from existing resources. Consistent with best practice, guidelines and thresholds should be updated as necessary to reflect changes in the evidence base. As with all thresholds, it is imperative that there are opportunities for appeal mechanisms to ensure good governance. In addition, whilst these thresholds represent best practice, their implementation will depend on timely access to both the full range of conservative treatment options and to radiology services, at the primary care level.

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Appendices

Appendix 1.1 – Examples of guidelines for the conservative management of osteoarthritis

Guideline	Recommendations
NICE ^{(67)*}	<pre> graph LR Root([Holistic assessment of person with OA]) --- Social Root --- HealthBeliefs[Health beliefs including concerns, expectations and current knowledge of OA] Root --- Occupational Root --- Mood Root --- QualityOfSleep[Quality of sleep] Root --- SupportNetwork[Support network] Root --- OtherPain[Other Musculo-skeletal pain] Root --- AttitudesToExercise[Attitudes to exercise] Root --- InfluenceOfComorbidity[Influence of comorbidity] Root --- PainAssessment[Pain assessment] Social --- EffectOnLife[Effect on life] Social --- LifestyleExpectations[Lifestyle expectations] EffectOnLife --- ADL[Activities of daily living] EffectOnLife --- FamilyDuties[Family duties] EffectOnLife --- Hobbies[Hobbies] Occupational --- AbilityToPerformJob[Ability to perform job] Occupational --- AdjustmentsToHomeOrWorkplace[Adjustments to home or workplace] AbilityToPerformJob --- ShortTerm[Short term] AbilityToPerformJob --- LongTerm[Long term] Mood --- ScreenForDepression[Screen for depression] Mood --- OtherCurrentStresses[Other current stresses in life] SupportNetwork --- IdeasConcerns[Ideas, concerns and expectations of main carer] SupportNetwork --- HowCarerCoping[How carer is coping] SupportNetwork --- Isolation[Isolation] OtherPain --- EvidenceOfChronicPain[Evidence of a chronic pain syndrome] OtherPain --- OtherTreatableSource[Other treatable source of pain] AttitudesToExercise --- InteractionOfMorbidities[Interaction of two or more morbidities] AttitudesToExercise --- Falls[Falls] InfluenceOfComorbidity --- AssessmentOfDrugTherapy[Assessment of most appropriate drug therapy] InfluenceOfComorbidity --- UnderstandingOfSurgicalOptions[Understanding of surgical options] InfluenceOfComorbidity --- FitnessForSurgery[Fitness for surgery] PainAssessment --- SelfHelpStrategies[Self-help strategies] PainAssessment --- Analgesics Analgesics --- DrugsDoses[Drugs, doses, frequency, timing] Analgesics --- SideEffects[Side effects] </pre>

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Guideline	Recommendations
<p>OARSI, 2008⁽³⁹⁾ (Sample of Recommendations)</p>	<p>Optimal management of osteoarthritis requires a combination of non-pharmacological and pharmacological modalities.</p> <p>Patients with symptomatic hip and knee osteoarthritis may benefit from referral to a physical therapist for evaluation and instruction in appropriate exercises to reduce pain and improve functional capacity.</p> <p>Patients with hip and knee osteoarthritis should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises. For patients with symptomatic hip osteoarthritis, exercises in water can be effective.</p> <p>Patients with hip and knee osteoarthritis, who are overweight, should be encouraged to lose weight and maintain their weight at a lower level.</p>
Guideline	Recommendations
<p>March et al., 2010⁽⁴⁸⁾</p>	<p>Provide advice about, and offer access to appropriate information for osteoarthritis self-management and lifestyle change.</p> <p>Provide advice about weight loss if patient is overweight or obese and refer to services as required.</p> <p>Provide advice for land-based exercises incorporating aerobic and strengthening components and refer to services as required.</p> <p>Recommend adequate paracetamol for pain relief.</p> <p>Make patients aware that non-steroid anti-inflammatory drugs (NSAIDs) or coxibs can improve symptoms in majority but this comes with potential for harm and that risk potential varies – be aware of and minimise the individual’s risk potential.</p> <p>Offer intra-articular steroids for short-term relief of a flare or acute deterioration in symptoms.</p> <p>Offer stronger painkilling relief if prolonged severe symptoms.</p> <p>Offer access to assessment for arthroplasty for consumers with severe symptomatic osteoarthritis not responding to conservative therapy.</p>

Appendix 1.2 – HIPE ICD-10AM/ACHI list of intervention codes for hip arthroplasty procedures

Intervention code	Description
49318-00	Total arthroplasty of hip, unilateral
49319-00	Total arthroplasty of hip, bilateral
90607-00	Resurfacing of hip, unilateral
90607-01	Resurfacing of hip, bilateral
49312-00	Excision arthroplasty of hip
49315-00	Partial arthroplasty of hip
47522-00	Hemiarthroplasty of femur

Appendix 1.3 – Western Canada Waiting List Project – Hip and Knee Replacement Surgery, Priority Criteria Tool⁽⁶⁰⁾

Patients must be on appropriate non-surgical treatment prior to evaluation (e.g. medications, walking aids, shoe inserts)

Please check the box that most accurately describes the patient's current situation

1. Pain on motion (e.g. walking, bending): *

- None/mild (0)
- Moderate (6)
- Severe (13)

2. Pain at rest (e.g. while sitting, lying down, or causing sleep disturbance): *

- None (0)
- Mild (3)
- Moderate (8)
- Severe (11)

* Take into account usual duration, intensity, and frequency of pain, including need for narcotic vs. non-narcotic medication.

3. Ability to walk without significant pain :

- Over 5 blocks (0)
- 1-5 blocks (0)
- <1 block (4)
- Household ambulator (7)

4. Other functional limitations (e.g. putting on shoes, managing stairs, sitting to standing, sexual activity, bathing, cooking, recreation or hobbies):

- No limitations (0)
- Mild limitations - able to do most activities with minor modifications or difficulty (4)
- Moderate limitations - able to do most activities with modification or assistance (11)
- Severe limitations - unable to perform most activities (19)

5. Abnormal findings on physical exam related to affected joint (e.g. deformity, instability, leg length difference, restriction of range of motion on examination):

- None/mild (0)
- Moderate (5)
- Severe (10)

6. Potential for progression of disease documented by radiographic findings (e.g. recurrent dislocation, x-ray evidence of protrusion, significant bone loss, component wear, impending fracture):**

- None (0)

- Mild (4)
- Moderate (11)
- Severe (20)

** Predominantly applies to revisions, use in primary cases only in special circumstances (e.g. ligament instability, bone loss)

7. Threat to patient role and independence in society (i.e. ability to work, give care to dependants, live independently (difficulty must be related to affected joint)):

- Not threatened but more difficult (0)
- Threatened but not immediately (10)
- Immediately threatened or unable (20)

8. All things considered, how would you rate the urgency or relative priority of this patient?
(Draw a line across the scale.)

Not Urgent at all _____ Extremely Urgent
(just short of an emergency)

Appendix 1.4 – The Oxford Hip Score⁽⁶⁸⁾

On which side of your body is the affected joint, for which you are receiving treatment.

Left • Right • Both •

If you said 'both', please complete the first questionnaire thinking about the right side. A second questionnaire, for the left side, will follow.

PROBLEMS WITH YOUR KNEE

Tick (•) one box for every question.

1. During the past 4 weeks...

How would you describe the pain you usually have from your hip?

None Very mild Mild Moderate Severe

2. During the past 4 weeks...

Have you been troubled by pain from your hip in bed at night?

No nights Only 1 or 2 nights Some nights Most nights Every night

3. During the past 4 weeks...

Have you had sudden severe pain (shooting, stabbing or spasms) from your affected?

No days Only 1 or 2 days Some days Most days Every day

4. During the past 4 weeks...

Have you been limping when walking, because of your knee?

Rarely/never Sometimes, or just at first Often, not just at first Most of the time All of the time

5. During the past 4 weeks...

For how long have you been able to walk before pain from your hip becomes severe? (with or without a walking aid)

No pain/More than 30 minutes 16 to 30 minutes 5 to 15 minutes Around the house only
Not at all

6. During the past 4 weeks...

Have you been able to climb a flight of stairs?

Yes easily With little difficulty With moderate difficulty With extreme difficulty Impossible

7. During the past 4 weeks...

Have you been able to put on a pair of socks, stockings or tights?

Yes easily With little difficulty With moderate difficulty With extreme difficulty Impossible

8. During the past 4 weeks...

After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your hip? Not at all painful Slightly painful Moderately painful Very painful Unbearable

9. During the past 4 weeks...

Have you had any trouble getting in and out of a car or using public transport because of your knee? (whichever you would tend to use)

No trouble at all Very little trouble Moderate trouble Extreme difficulty Impossible to do

10. During the past 4 weeks...

Have you had any trouble with washing and drying yourself (all over) because of your hip?

No trouble at all Very little trouble Moderate trouble Extreme difficulty Impossible to do

11. During the past 4 weeks...
Could you do the household shopping on your own?
Yes, easily With little difficulty With moderate difficulty With extreme difficulty No, impossible

12. During the past 4 weeks...
How much has pain from your knee interfered with your usual work
(including housework)?
Not at all A little bit Moderately Greatly Totally

Each question is scored from 1 to 5, with 1 representing the best outcome/least symptoms. The scores from each question were added so that the overall figure lies between 12 and 60, with 12 being the best outcome. An alternative scoring system scores each question between 0 and 4, with 4 being the best outcome, producing overall scores running from 0 to 48, with 48 being the best outcome.⁽⁶⁹⁾

Appendix 1.5 – Primary Care Trust Thresholds and UK Commissioning Guide for Knee Arthroplasty

Primary Care Trust	Threshold
<p>NHS Black Country Cluster, 2012</p>	<p>As per NICE guidance, prosthesis should only be used if the evidence shows they require revision at a rate of less than 1 in 10 (10%) in 10 years.</p> <p>For patients with a BMI (body mass index) of 40 and above, documented participation in a comprehensive weight management programme of at least six months' duration is required prior to surgery.</p> <p>Minimum Eligibility Criteria:</p> <p>The patient has a BMI below 40 supported by a primary care referral.</p> <p>AND Conservative means (e.g. Analgesics [painkillers], NSAIDS [non-steroidal anti-inflammatory drugs], physiotherapy, advice on walking aids, home adaptations, curtailment of inappropriate activities and general counselling as regards to the potential benefits of joint replacement) have failed to alleviate the patients pain and disability</p> <p>AND Pain and disability should be sufficiently significant to interfere with the patients' daily life and or ability to sleep/patients whose pain is so severe</p> <p>AND Underlying medical conditions should have been investigated and the patient's condition optimised before referral</p> <p>AND Patient must accept and want surgery</p> <p>Or Mobility is so compromised that they are in immediate danger of losing their independence and that joint replacement would relieve this threat</p> <p>Or Patients in whom the destruction of their joint is of such severity that delaying surgical correction would increase technical difficulty of the procedure.</p> <p>Hip Resurfacing</p> <p>There is sufficient evidence to conclude that hip resurfacing is clinically and cost-effective but the studies have been undertaken in people aged 65 years. NICE guidance recommends their use in those likely to outlive the conventional THR (i.e. young and active) but advises surgeons to discuss the lack of long-term evidence on safety and reliability with patients.</p> <p>Except in the following patients MoM hip resurfacing techniques are not normally funded:</p> <p>Who qualify for primary total hip replacement AND</p> <p>Who are likely to outlive conventional primary hip replacements</p>

<p>Worcestershire, 2011</p>	<p>Patients should only be considered for joint replacement surgery if there is evidence to suggest:</p> <p>Their symptoms* have failed to respond to the conservative treatments undertaken within primary care i.e. analgesia, non-steroidal anti-inflammatory drugs and physiotherapy.</p> <p>* Should include pain and disability that is sufficiently significant to interfere with the patient's daily life and/or ability to sleep.</p> <p>The referral has been endorsed by ICATS/Orthopaedic Practitioner Service (OPS);</p> <p>The patient has an Oxford Hip or Knee Score of less than 30 (see note 1 below).</p> <p>A score of less than 30 is considered to be a guide only and if, following assessment by an orthopaedic surgeon, surgery is considered to be clinically necessary in a patient with a score of more than 30, THR/TKR will be supported.</p> <p>The patient has been assessed as fit, ready and willing to undergo surgery if required.</p> <table border="1" data-bbox="403 1032 1390 1588"> <thead> <tr> <th data-bbox="403 1032 507 1099">Score</th> <th data-bbox="507 1032 949 1099">Hip</th> <th data-bbox="949 1032 1390 1099">Knee</th> </tr> </thead> <tbody> <tr> <td data-bbox="403 1099 507 1395">0 to 19</td> <td data-bbox="507 1099 949 1395">May indicate severe hip arthritis. It is highly likely that you may well require some form of surgical intervention, contact your family physician for a consult with an orthopaedic surgeon.</td> <td data-bbox="949 1099 1390 1395">May indicate severe knee arthritis. It is highly likely that you may well require some form of surgical intervention, contact your family physician for a consult with an Orthopaedic Surgeon.</td> </tr> <tr> <td data-bbox="403 1395 507 1588">20 to 29</td> <td data-bbox="507 1395 949 1588">May indicate moderate to severe hip arthritis. See your family physician for an assessment and X-ray. Consider a consult with an orthopaedic surgeon.</td> <td data-bbox="949 1395 1390 1588">May indicate moderate to severe knee arthritis. See your family physician for an assessment and X-ray. Consider a consult with an orthopaedic surgeon.</td> </tr> </tbody> </table> <p>Note: Only ONE routine follow-up to be offered following the six-week review. Note 1: TKR is cost-effective for all ASA grade 1-2 patients with baseline OKS <40 and for ASA grade 3 patients with OKS <35 and patients should be considered for surgery on this basis. (Dakin H, Gray A, Fitzpatrick R, et al. BMJ Open 2012;2:e000332. doi:10.1136/bmjopen-2011-000332)</p>	Score	Hip	Knee	0 to 19	May indicate severe hip arthritis. It is highly likely that you may well require some form of surgical intervention, contact your family physician for a consult with an orthopaedic surgeon.	May indicate severe knee arthritis. It is highly likely that you may well require some form of surgical intervention, contact your family physician for a consult with an Orthopaedic Surgeon.	20 to 29	May indicate moderate to severe hip arthritis. See your family physician for an assessment and X-ray. Consider a consult with an orthopaedic surgeon.	May indicate moderate to severe knee arthritis. See your family physician for an assessment and X-ray. Consider a consult with an orthopaedic surgeon.
Score	Hip	Knee								
0 to 19	May indicate severe hip arthritis. It is highly likely that you may well require some form of surgical intervention, contact your family physician for a consult with an orthopaedic surgeon.	May indicate severe knee arthritis. It is highly likely that you may well require some form of surgical intervention, contact your family physician for a consult with an Orthopaedic Surgeon.								
20 to 29	May indicate moderate to severe hip arthritis. See your family physician for an assessment and X-ray. Consider a consult with an orthopaedic surgeon.	May indicate moderate to severe knee arthritis. See your family physician for an assessment and X-ray. Consider a consult with an orthopaedic surgeon.								

Swindon, 2012	<p>Criteria for routine referral to orthopaedic services: (Based on RAND appropriateness methodology developed by Jose Quintana and Colleagues Candidates for elective THR).</p> <p>Moderate to severe persistent pain not adequately relieved by an extended course of non-surgical management. AND clinically significant functional limitation resulting in diminished quality of life. AND radiographic evidence of joint damage.</p> <p>Guidance for secondary care on thresholds for hip replacement surgery:</p> <ol style="list-style-type: none">1. When the patient complains of:<ol style="list-style-type: none">a. Severe joint pain.b. AND has severe functional limitation irrespective of whether conservative management has been trialled.c. OR has minor to moderate functional limitation, despite the use of non-surgical treatments such as adequate doses of NSAID analgesia, weight control treatments and physical therapies.2. Where the patient complains of:<ol style="list-style-type: none">a. Mild to moderate joint pain. AND has severe functional limitation, despite the use of non-surgical treatments such as adequate doses of NSAID analgesia, weight control treatments and physical therapies AND is assessed to be at low surgical risk. <p>OR Oxford score is ≤ 26 on the 0 to 48 system, or ≥ 34 on the 60 to 12 system. Note that all reasonable weight management attempts should have been tried if BMI is > 30.</p>
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<p>Commissioning Guide (RCSEng, BHS, BOA), 2014.⁽⁴⁶⁾</p>	<p>Management – offer to all people</p> <p>Mild symptoms offer verbal and written information about condition offer information to achieve weight loss if people are overweight or obese as a core treatment advise to carry out local muscle strengthening and general aerobic exercise as a core treatment use of shared decision making tools suggest oral simple analgesia and anti-inflammatory medication assess need for aids and devices (refer to occupational therapy or physiotherapy) including instruction in using a walking aid. prescribe supervised and evidence-based physical therapies after assessment by an appropriate HCPC registered practitioner.</p> <p>Moderate symptoms: add NSAIDs or stronger analgesics in very elderly patients and those assessed to be unsuitable for surgery consider referral for image guided intra-articular steroids - beneficial for between three weeks and three months.</p> <p>Emergency referral to secondary care Hip pain associated with systemic symptoms, signs of infection, known primary malignancy, severe muscle spasm, sudden inability to bear any weight, history of a fall.</p> <p>Immediate referral to secondary care Severe pain unresponsive to analgesia and persistent loss of function affecting employment.</p> <p>Refer to intermediate or secondary care</p> <ul style="list-style-type: none"> ■ Young adults (<40) with persistent hip pain which affects activities of daily living, work or leisure. ■ All adults with painful irritable and stiff hip interfering with sleep, activities of daily living, work or leisure not controlled with measures above. ■ Referral should be independent of the radiographic grade of arthritis. ■ Refer patients before there is prolonged and established functional limitation and severe pain. ■ Age, gender, smoking, obesity and comorbidity should not be barriers to referral. ■ Ensure that patients with significant comorbidities (systemic or local) have appropriate investigations and treatment to optimise their condition before referral. ■ Patients who are considered not suitable for surgery by one of the surgical team should be referred for a complex care package.
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The Guideline adopts a definition of 'Intermediate Care' as those services that do not require the resources of a general hospital, but are beyond the scope of the traditional primary care team. It suggests that intermediate care should form part of an integrated care programme with close links to primary and secondary care using protocols agreed with secondary care. The suggested aims of intermediate care are to offer those non-operative interventions not already offered, to use shared decision making and define treatment goals, taking into account personal circumstances (e.g. occupation, level of activity/ sports), and to provide appropriate aids if not already used. In particular, it suggests that an evidence-based six-week physiotherapy programme, which is both specific and goals based, should be offered if this has not already been done in primary care. Referral to secondary care is suggested.

- If persistent pain and disability has not responded to up to 12 weeks of evidence-based non-surgical treatments, this time to include any manual therapy (including physiotherapy) received in primary care.

The Guideline suggests that the decision to offer patients surgery is based on their symptom pattern, with the type of surgery determined by age, diagnosed pathology and the patient's preference. All patients must have engaged in shared decision making about alternatives, and the NHS Hip Arthroplasty Surgery Decision Making Tool can be used when arthroplasty is being considered. In addition, patients should be informed that the decision to have surgery can be a dynamic process and a decision to not undergo surgery does not exclude them from having surgery at a future time point.

The Guide then breaks down surgical indications into two categories, as follows: **Hip preserving operations** include surgery for impingement and osteotomy for malalignment where there is the potential for developing early osteoarthritis. This surgery is best performed in centres undertaking high volumes of surgery on young adults' hips.

Total hip replacement - after appropriate diagnosis, consider total hip replacement when:

- pain is inadequately controlled by medication
- there is restriction of function
- the quality of life is significantly compromised
- there is narrowing of the joint space on radiograph

Finally, it is stated that, having established the need for surgery, the procedure should be performed as soon as possible.⁽⁴⁶⁾

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