

British Orthopaedic Association

PATRON: H.R.H. THE PRINCE OF WALES



PRIMARY TOTAL HIP REPLACEMENT: A GUIDE TO GOOD PRACTICE

First published by the British Orthopaedic Association, 1999; revised August 2006

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PREFACE

Total hip replacement has been one of the most spectacularly successful innovations in modern medicine and in the United Kingdom over 50,000 such operations were carried out in 2003 and the number continues to rise^{1,2,3}.

This is the revised version of the original document produced under the leadership of Hugh Phillips in October 1999⁴. He was President of both the British Orthopaedic Association, the British Hip Society and The Royal College of Surgeons of England.

I was given the task of coordinating the revision process. At the outset acknowledgement must be given to the late Hugh Phillips for producing what was a ground-breaking document. Helped by his Steering Group and other contributors, a consensus statement was produced that was acceptable to the membership of both the British Orthopaedic Association and the British Hip Society. We know that the first edition of this document has been of help to Clinicians in setting standards of patient care⁵ and, as the first such document, it led the way in development of other good practice guidelines in orthopaedics.

The first version acknowledged that it was an interim statement, and five years later we are addressing the changes in practice and environment that have occurred. The object of this guide is to ensure the best possible care for patients undergoing primary total hip replacement in the United Kingdom.

As with the first edition it is hoped that this guide will inform surgeons, primary and secondary healthcare providers and commissioners. It is not designed to inform patients but it may form the basis for patient-focussed information. This edition of the guide will also require revision in time.

Primary total hip replacement as described in this document includes any procedure on the hip joint that entails the insertion of artificial bearing surfaces. No previous major operations have been performed on that joint.

The first document dealt solely with 'classical' **total hip replacement** and excluded **hip resurfacing**. The latter procedure has become widely used in the United Kingdom and is included in the scope of this document.

The standards laid down in this document apply to the practice of primary hip replacement in any setting, be it National Health Service (NHS), Private Practice or elsewhere.

The creation of such a consensus document involves help from many experts. I acknowledge and thank those who have made this task possible. Their names are recorded in the appendices.

James Nixon

DISCLAIMER

This good practice guidance is of a general nature and is not intended to be a substitute for professional medical advice, diagnosis, treatment or care. This guidance is intended for suitably qualified medical practitioners. The British Orthopaedic Association and the British Hip Society disclaim any and all liability from any injury, loss, or damage or any kind resulting from actions taken or omissions made by any person relying on this guidance.

PROBITY

Surgeons and the service within which they work may receive external financial support for education or research. In many cases this support takes the form of training visits or courses on new or developing techniques. In other situations support may be given for research or audit within a department which would not be possible within existing NHS resources. An innovative surgeon may develop a technique, implant or instrument that is unique; while it is appropriate that they should be able to receive some recompense for this, it is important that all such dealings are transparent.

It is recommended that, where such support, either financial or in kind (travelling expenses, lecture fees, accommodation, research or audit support, either directly or indirectly through separate trusts or charities) exceeds a total of £500, this be declared in writing. It is not necessary to declare the exact amount, but the sources and amount of each sum received should be noted as part of the appraisal process to ensure that the surgeon's employers are aware of and have recorded the declaration. Where there appears to be doubt about the relevance of declaration it is good practice to declare.

All monies received personally by the surgeon should be declared.

Surgeons should also be aware of their responsibilities regarding financial interest when conducting clinical research which has received proper ethical approval.

1. INTRODUCTION

- 1.1 This document is a statement of current best practice in primary total hip replacement (THR) and metal-on-metal hip resurfacing (MOMR) in the United Kingdom (UK) in all settings. It has been approved by the Council of the British Orthopaedic Association (BOA) and by the Executive and Members of the British Hip Society (BHS).
- 1.2 The development and use of metal-on-metal hip resurfacing has expanded rapidly⁶. We have included this group of procedures in the scope of this document.
- 1.3 Many studies of THR identify the cost-effectiveness and high levels of patient satisfaction rates in the short term. Most patients are relieved of pain and disability, which has often compromised their quality of life and independence^{3,7,9}.
- 1.4 Data regarding outcomes of MOMR are of shorter duration but so far it appears to be an equally effective procedure^{6,9}.
- 1.5 There is variation in the types of implants used for THR and MOMR (the Operation). Surgical techniques employed and post-operative follow-up techniques vary. There remains considerable variation in length of stay and nursing practice, although the development of Integrated Care Pathways (ICPs) has been helpful^{7,10}.
- 1.6 This document attempts to identify best practice in general terms, using available evidence. It does not claim to apply to all patients and in all circumstances. Each consultant, or those within a surgical team, must continue to take into account the individual requirements of a patient. There remains a lack of standards for the operation and associated care, but the development of ICPs and the creation of the National Joint Register (NJR)⁶ and the Scottish Arthroplasty Project (SAP)² is helping to address this.
- 1.7 This document should be read in conjunction with the Advisory Book on Consultant Trauma and Orthopaedic Services, BOA, 2006¹¹.
- 1.8 The patient's treatment should be in a setting wherein satisfactory standards of Clinical Governance are applied¹². _

2. THE INDICATIONS FOR REFERRAL FOR THE OPERATION

- 2.1 Pain and disability arising from degenerative (osteoarthritis) or inflammatory arthritis in the hip joint are the indications for the operation. In many cases other non-operative treatment has failed or has proved to be futile.
- 2.2 The incidence of the condition varies throughout the regions of the UK^{13,14}. Factors predisposing to the development of joint failure due to osteoarthritis are many and include genetic factors, inflammatory arthritis, occupation, injury and lifestyle.
- 2.3 The capacity of the local orthopaedic service to perform these procedures may influence referral patterns to that service. It is recommended that local referral pathways are developed, possibly as part of Integrated Care Pathways (ICPs)¹⁰. Some centres use scoring systems such as those developed in New Zealand¹⁴ or in Salisbury¹⁶ to help general practitioners in assessing if a patient has reached a stage that would justify referral for surgical intervention.
- 2.4 Some patients deteriorate very rapidly and referral guidelines should be developed to help identify these patients and arrange for more rapid referral to the orthopaedic service.
- 2.5 The General Practitioner (GP) should be aware of the general health of any patient before referring to the local orthopaedic service, and any significant health problems should be corrected as far as possible before that referral is made.
- Occasionally fracture of the proximal femur (particularly of the intra-capsular part of the neck) is an indication for the operation^{17,18}. These standards apply equally to the care of such patients.

3. **THE OUTPATIENT CONSULTATION**

- 3.1 Usually the patient will have attended their GP who will seek the opinion of a Consultant Orthopaedic Surgeon. Waiting time for an outpatient consultation is variable throughout the UK and is a reflection of many factors including the number of orthopaedic surgeons serving the local population^{19,20}.
- 3.2 The consultation with the orthopaedic surgeon should include history taking, examination, and provision of good quality X-rays films or images. A routine anterior-posterior view may also require a lateral view. The BOA regards 20-30 minutes as the minimum time allowable for a first consultation¹¹. The patient must feel that adequate time has been allowed for this consultation.
- 3.3 A suitable environment for discussion with the patient and relatives should be present, and all relevant notes and investigations including imaging should be available.
- 3.4 Discussion regarding the possibility of operative management of the hip disease should involve a consultant who has a Certificate of Completion of Specialist Training (CCST in Trauma and Orthopaedics) and is on the General Medical Council (GMC) Specialist Register²¹. Such discussion should take place before the patient is offered the operation, and with their agreement the name is placed on the waiting list for the operation.
- 3.5 Patients should have the risks and benefits of the operation explained in understandable language. An individual patient may have added risk factors present (such as cardio-vascular disease, obesity, predisposition to venous thrombo-embolism, neurological disease or diabetes) and that patient should be made aware of the added risks when these factors are present. The surgeon should try to verify that the patient has understood the information.
- 3.6 Patients should be aware that they make the decision whether or not to undergo surgery. Failure of the hip joint as a result of arthritis is not a life- or limb-threatening disease, but patients should appreciate that the operation carries a 30 day mortality rate of about 0.5%^{22,23}.
- 3.7 The patient should be made aware that there is the option of not having an operation, and some other procedures may be possible in appropriate cases. [See section 5.3]
- 3.8 Some centres have a process whereby other practitioners may place a patient's name on the waiting list for operation. Such an arrangement should involve a team approach and it is essential that a consultant orthopaedic surgeon meeting the standards in 3.4 is involved in the process. This process should be reviewed regularly.

4. WAITING FOR THE OPERATION

- 4.1 Consultants and their managers are expected to manage their waiting lists ethically^{24,25}, and patients should be admitted for operation according to clinical priority and length of time on the waiting list. Social circumstances may occasionally be a factor to be borne in mind in assessing priority.
- 4.2 Procedures have been developed to identify patients deserving priority for earlier admission^{15,16}. These have achieved mixed results and are not agreed nor applied generally.

5. PRE-ADMISSION ASSESSMENT

- 5.1 A managed system of pre-admission assessment is best practice²⁶. This assessment should take place within six weeks of the operation.
- 5.2 Pre-admission clinics should be staffed by doctors and other clinicians (usually nurses) working to agreed protocols. The presence of anaesthetists and Allied Health Professionals (AHPs), such as physiotherapists, occupational therapists and social workers, helps to prevent cancellations, identify co-morbidities and risk factors [see 3.5] and permit discharge planning. There is also an opportunity for patient education, particularly with regard to the risks and benefits of the operation. At this stage identification of goals for that patient can be discussed.
- 5.3 Fully-informed consent for the procedure and for collection of patient details for local or national registries is best obtained at this stage by the surgeon or a senior member of the team trained to do so^{27,28}.
- 5.4 Routine investigations of blood, urine (including mid-stream specimen), blood pressure and relevant microbiological assessment (including detection of organisms such as MRSA when appropriate) are best carried out at this assessment. The patient should be made aware of local policy regarding blood transfusion following the operation.
- 5.5 General health screening by the general practitioner will help to detect significant clinical problems before the pre-admission assessment and will help to identify those patients that may require additional investigation at that time.
- 5.6 Provisional discharge planning should take place. This takes into consideration age, co-morbidities, home circumstances and availability of carers after discharge from hospital.
- 5.7 With the inexorable move towards same-day admission and early discharge, all these arrangements become vital for the safe passage of the patient through the service.
- 5.8 Information about the operation may be given to the patient or relatives in leaflet or pamphlet form. It should be constructed in language that is understandable to the patient^{29,30}.
- 5.9 A process should be in place to ensure that all patient-related information is available at the time of admission. This applies especially to any investigations that may have been deemed necessary at the pre-admission assessment.
- 5.10 Patients considered unfit to undergo the operation and requiring further treatment or investigation should be suspended from the active surgical waiting list according to agreed national guidelines³¹.

6. HOSPITAL ADMISSION

- 6.1 Patients should be admitted to hospital with adequate time before operation to allow routine pre-operative and pre-anaesthetic procedures to be completed.
- 6.2 It is better that patients scheduled to be first on a morning operating list are admitted the previous day.
- 6.3 The limb on the operation side should be indelibly marked by the surgeon, or a member of the surgical team, in an area which should be visible during preparation in the operating theatre.
- 6.4 Pre-operative visiting by a member of the anaesthetic team is necessary to explain details of this part of the process to the patient.
- 6.5 The patient must give written consent to the operating surgeon or senior medical member of the team and this consent is best given at the pre-admission assessment. The Senate of Surgery of Great Britain and Ireland gives guidance for surgeons in this process³². [See 5.3]

7. HOSPITAL STAFF and IN-PATIENT FACILITIES

- 7.1 The operation is most safely carried out in hospitals where consultant support from other medical and surgical disciplines is readily available.
- 7.2 Access to a high dependency unit (HDU) or intensive care unit (ICU) is desirable. Such units should have nursing staff trained in the management of orthopaedic patients.
- 7.3 Adequate numbers of trained orthopaedic nurses and members of AHPs, especially physiotherapists, must be available. There must be adequate social services support.
- 7.4 Patients should be nursed in dedicated elective orthopaedic wards, staffed by a team experienced in the management of patients with musculoskeletal disease.
- 7.5 Nursing staff will explain the process to the patient as part of an ICP¹⁰.
- 7.6 The risk of cross-infection in hospital should be reduced to a minimum. Facilities must be available for isolating patients known to be infected with, or carrying, pathogenic organisms³³. [See 5.4]
- 7.7 Pre- and post-operative group therapy 'classes' permit efficient use of physiotherapy and other AHP staff. The patient may benefit from the contact with others who have had a similar experience.

8. OPERATING THEATRE RESOURCES

- 8.1 Infection following operation can be catastrophic for the patient.
- 8.2 The use of ultra-clean air theatres is advised³⁴.
- 8.3 The operating theatre should be dedicated to elective orthopaedic surgery as far as possible. Sharing these facilities with other elective clean surgical disciplines is acceptable, particularly when an ultra-clean air theatre exists. Some surgeons operate in body-exhaust suits in addition. This may reduce the post-operative infection risk further³⁵.
- 8.4 There should be a clear and agreed sterile technique protocol in the orthopaedic theatre. Adherence to this should be mandatory. Where the surgeon is identified as a responsible clinician for audit of infection, that surgeon should decide the theatre protocol.
- 8.5 The surgeon must have trained 'scrubbed' assistants during the operation and a trained scrub nurse fully familiar with the instrumentation. In the absence of junior medical staff, additional assistance must be available. Sometimes more than one assistant is required. Specific training should be received by any assistant.
- 8.6 A full range of implants and instruments must be readily available. Non-orthopaedic emergencies such as vascular injury may occasionally occur and specialised instrumentation should be available to help manage such situations.
- 8.7 Appropriate impenetrable clothing and sheets/drapes are essential³⁶.
- 8.8 A Hospital Sterile Supply Department (HSSD) should be near the operating theatre. It must be able to process used instruments and provide packs in an efficient and timely manner. Tracking mechanisms should be in place to ensure efficient and accountable sterilisation procedures³⁷.
- 8.9 Any instrument that is not duplicated in the theatre suite should be capable of re-sterilisation rapidly (ideally within one hour) if it is found to be non-sterile during the procedure.

9. THE SURGEON AND THE SURGICAL TEAM

- 9.1 Any consultant surgeon within the team should possess the CCST and be enrolled on the Specialist Register of the GMC, or hold other acceptable international qualification²¹. [See 3.4]
- 9.2 The operative credentials of any member of the team should relate to regular performance of the operation. It is impossible to be dogmatic on the number of such procedures performed, but occasional performance is not acceptable.
- 9.3 The knowledge and practical skills of a consultant orthopaedic surgeon and the team performing the operation must be maintained by continuing medical education (CME), and a continuing appraisal process³⁸.
- 9.4 The operation performed by surgeons in training must be supervised by consultants meeting the criteria in 9.1. Operating theatre time must be made available when required for surgical training as part of a Higher Surgical Training (HST) programme. The level of supervision should be in accordance with the experience of the trainee. In the absence of consultant supervision in theatre, arrangements should be made for on-site consultant cover³⁹.
- 9.5 During the later years of HST some trainees receive advanced training in hip surgery. This may include the surgical management of more complex cases and secondary (revision) operations. Such trainees may be appointed as consultants into NHS posts in which hip surgery is a major component of their elective work. Such surgeons will be required increasingly to meet the anticipated increase in the volume of complex hip reconstruction and revision procedures arising from the increasing numbers of primary procedures.
- 9.6 The surgical team should be able to inform the patient about outcomes of these operations in that Hospital. Data collection systems should be provided in any hospital undertaking these operations.

10. THE ANAESTHETIST and the ANAESTHETIC TECHNIQUE

- 10.1 The anaesthetist and anaesthetic team are essential, highly-trained and skilled members of the operating team.
- 10.2 The Royal College of Anaesthetists and associated groups have developed standards of training and practice in this Specialty. These should be followed in relation to THR and MOMR.
- 10.3 Such standards will change in time and all staff should update their skills and knowledge regularly through CME and CPD.
- 10.4 The activity of the Consultant Anaesthetist may include supervision of Extended Role Practitioners such as Nurse Anaesthetists. This should follow nationally agreed standards
- 10.5 The involvement of the anaesthetic team is essential in the Pre-Admission Assessment. The team should as far as possible help to identify and assess increased medical risk factors and advise on reduction of risk where possible. This may require postponement of the scheduled operation.
- 10.6 The anaesthetic team should be involved in the development of local prophylactic and therapeutic protocols. These include antibiotic policy and venous thrombo-embolism prevention. [See sections 14 and 15]
- 10.7 The team must be involved in the process of informed consent²⁷ [see 5.3] and immediate pre-operative visiting [see 6.4].
- 10.8 The **Anaesthetic Record** should be part of the Clinical Record and meet nationally agreed standards. [See 11.1]
- 10.9 The activity of the anaesthetic service must be within the setting of Clinical Governance.
- 10.10 A multi-disciplinary clinical audit process should be in place⁴⁰.

11. CLINICAL RECORD

- 11.1 Good records are a basic tool of clinical practice and should be typewritten or produced on computer⁴¹.
- 11.2 The record must include the name, date of birth and the address of the patient, and the referring practitioner should be identified. The hospital number should be clear, and the hospital and surgeon with responsibility for care of the patient should be named. Increasingly the patient will be admitted under the care of a team and, if so, this should be specified.
- 11.3 Within the record the general medical condition of the patient as well as fitness for operation should be recorded. It should contain the clinical history, the full clinical examination findings, pre-existing medical history and all current disabilities and complaints. The diagnosis of the condition and the purpose of the operation should be stated and all medication should be listed. There should be a multi-disciplinary clinical record which may be part of a local ICP.
- 11.4 The process of fully-informed consent should be recorded correctly [See 5.2, 5.3, 6.3 and 7.5] and the patient's signature witnessed as appropriate^{27,28}. The process should ensure that the patient is aware of the risks and benefits of the procedure being offered, as well as the option of not performing any procedure. The operating surgeon or another appropriately trained member of the surgical team should complete the consent form with the patient and all of the above should be in compliance with guidelines.
- 11.5 Some patients may express a wish not to learn of the significant risks of the proposed procedure. The surgeon obtaining consent should ensure that the patient is aware of their right to know, and that the operation is a major procedure with such associated risks. [See 3.5, 5.3, 9.6]
- 11.6 The Anaesthetic Record is part of this record. [See 10.8, 12.8]
- 11.7 Records and images should be retained indefinitely to permit long-term follow-up. [See 12.7 and 17.5]

12 THE OPERATIVE AND POST-OPERATIVE RECORDS

- 12.1 The operative note should be made in writing or dictated by the operating surgeon or other member of the surgical team for immediate typing or word-processing. A proforma may be available and the surgeon should complete this. Increasingly, computer-generated proformas may be developed⁴¹.
- 12.2 The record of the operation should be made as soon as possible following surgery and should include:
- Patient identification
 - The name of the operating surgeon, assistants and the name of the consultant or team responsible The diagnosis
 - The procedure performed The position of the patient on the operating table
 - The name of the anaesthetist
 - The type of anaesthesia employed
 - The surgical incision or approach used, and the reason for doing so, if necessary
 - Description of any other procedures performed such as catheterisation or the use of calf stimulators or foot pumps
 - Description of the findings including major structures seen, such as the sciatic nerve when the posterior approach is employed
 - Details of tissues removed, altered or added
 - Details of serial numbers of prostheses inserted. The use of bar-code reading devices can help this and other recording
 - Details of bone cement or any other implanted materials
 - Description of bone cement insertion technique
 - Details of bone grafting if used. It will be unusual for non-autologous or allograft bone to be inserted in primary procedures. If so, details of its origin should be recorded
 - Details of sutures or wound repair materials used
 - An accurate description of any difficulties or complications encountered and how these were overcome
 - Details of antibiotic prophylaxis [See section 15]
 - Details of venous thrombo-embolism prophylaxis [See section 14]
 - Details of the stability of the joint at completion of the procedure.
 - Immediate post-operative instructions and, in particular, any variance from any agreed care pathway or rehabilitation programme
 - Details of HSSD tracking procedures³⁶
 - The surgeon's signature or computer equivalent
 - Date of the operation
- 12.3 Post-operative progress should be documented, particularly noting any complications. The date of discharge and arrangements for further care should be recorded. The existence of an ICP should be specified, if present in an institution, and any variance from that pathway should be recorded.

- 12.4 All notes should be contemporaneous and should not be altered; errors should be identified. Orthopaedic records within the hospital records should be readily identifiable within the case note. All computer-assisted recording should conform to the Data Protection Act⁴².
- 12.5 Follow-up notes should allow another clinician to assume the care of the patient at any time. The following standards should apply:
- All clinicians mentioned in the record must be identified by name and designation.
 - Details of written and verbal information given to the GP, patients, relatives and carers must be recorded.
 - Details of all investigations considered and requested should be noted.
 - There should be a daily entry of the patient's progress in the record. Any change in the patient's management or any further procedures should be recorded.
 - An entry should be made whenever a doctor is called to see the patient.
 - Deletion should be made with a single line and signed and dated.
- 12.6 All patients should have good quality antero-posterior and lateral radiographs of the hip before discharge from hospital.
- 12.7 There should be agreed protocol for the retention of all documents and images.
- 12.8 The **Anaesthetic Record** should comply with standards laid down by that specialty. [See 10.8]
- 12.9 The clinical record in all settings (NHS, Private Practice or Independent Sector Treatment Centres) should follow the same high standard as laid down in this document.
- 12.10 Patient details should be entered into national registers^{2,6}. [See 1.6] Such information should also be available for local audit.

13. THE IMPLANT

- 13.1 Orthopaedic Surgeons have many devices from which to choose. Many of these have not been subject to studies of outcome for as long as ten years and guidance exists from the National Institute of Health and Clinical Excellence (NICE)^{43,44}, and the Orthopaedic Device Evaluation Panel (ODEP)⁴⁴.
- 13.2 Many factors determine the surgeon's preference for an individual implant. These include their training, consultant colleagues' preference, and a desire to improve their own results. The manufacturers of such devices can have a significant effect on choice through the service they provide¹⁰.
- 13.3 An individual theatre policy may be in place to limit the number of implants being used. Storage of a large range of implants may be impossible due to limitation of space.
- 13.4 The choice of prosthesis should be governed by evidence of the effective performance of that implant^{7,43,44,45} and, if possible, of the operating team using it.
- 13.5 The choice of implant may be influenced by cost. Surgeons and their teams should ensure that the cost of the implant does not result in the use of an unproven or sub-standard implant. Experience has shown that apparently minor variation in design and manufacture may result in an unsatisfactory outcome for patients when such implants are used^{46,47}. Managers should ensure that when changes in implant, cement or equipment are introduced, all staff are involved, informed and suitably trained. Any degree of change can lead to significant difficulties in the operating theatre. Resources should be available to provide appropriate training for all staff involved in the use of such new equipment or devices. [See 16.12]
- 13.6 Surgeons should be aware of information published by manufacturers in relation to each implant. This Information for Use (IFU) enclosed with each implant should be read by the surgeon.
- 13.7 Surgeons should ensure that the implants being inserted are compatible. This applies particularly to bearing surface dimensions, but also to Morse tapers and the variety of femoral head components available.
- 13.8 Manufacturers advise against the use of so-called 'cross-breeds' wherein the acetabular component is manufactured by a different maker from that of the femoral component. Many surgeons use such techniques and there is no clinical evidence that it is harmful, but surgeons should nevertheless be aware of the manufacturers' IFU.
- 13.9 Surgeons should be aware that there have been, and will be, mergers of manufacturing companies. The definition of a 'cross-breed' may therefore become difficult.
- 13.10 Occasionally a custom-made implant is necessary to perform primary hip replacement. Such an implant should be manufactured on a named-patient basis, and the reason for the choice and any special aspects should be recorded in the consent and orthopaedic records⁴⁸.

- 13.11 The published results of many implants offer little help to the surgeon wishing to make an informed choice. Most outcome research is short-term, non-comparative and does not take into account the case-mix and variations in the operative technique of the surgeon. There is great variation in the measurement of outcomes following the procedure. Surgeons should be aware of the high quality outcome studies that are published and of the advice from NICE^{7, 43,49,50, 51, 52}.
- 13.12 The selection of prosthesis for general use should normally be based on evidence published in peer-review journals or other acceptable method. This includes any National Joint Register such as in Sweden⁷, Norway⁸ and Scotland², or the recently established NJR in England and Wales⁶. A clinical follow-up of more than ten years with published life-table and survivorship curve is necessary. The presentation of results should follow best statistical practice and should be available to support the use of a particular prosthesis^{7,53}.
- 13.13 A confounding factor for the surgeon is that implants with apparently good published results have been modified subsequently by the manufacturers and the clinically tested design is no longer available. Company mergers may provoke such changes. There has been a failure to realise that even minor modifications to design, material, surface finish or fixation technique can dramatically alter the performance of the implant⁶. [See 13.5 and 13.9]
- 13.14 In the absence of peer-reviewed evidence of outcome to ten years, a device must be subject to ongoing surveillance and preferably part of a properly conducted controlled prospective trial. NICE guidelines should be followed where appropriate⁴³
- 13.15 The patient and hospital management must be made aware if any of the surgical or anaesthetic team may gain financially from the use of any device or medicine²¹. [See page 4, Probity]

14. PROPHYLAXIS AGAINST VENOUS THROMBO-EMBOLISM

- 14.1 Deep vein thrombosis (DVT) is the most commonly occurring post-operative complication. It has been demonstrated by venography in between 50 and 60% of cases at any level, and above the knee joint in 10 to 20% of cases. Few of these develop a clinical event causing death or morbidity^{54,55}. Evidence suggests that the prevalence of fatal pulmonary embolism (PE), even in the absence of chemical thromboprophylaxis, is about 0.4%^{22,70}, and much lower than quoted in historical papers^{56,57,58,59,60}.
- 14.2 There are well-accepted patient-related factors that increase the risk of DVT or PE. These include:
- a history of PE or DVT;
 - malignant disease;
 - a positive family history;
 - likelihood of prolonged immobility or poor mobilisation.
- The surgeon, anaesthetist and clinical team at pre-admission assessment should identify such risk factors in an individual patient. The most effective thromboprophylaxis should be applied, and may mean a combination of mechanical and chemical methods prolonged for several weeks after surgery. [See 5.2]
- 14.3 Debate continues regarding the use of chemical prophylaxis. Low molecular weight Heparin (LMWH) or pentasaccharide can reduce the incidence of symptomatic DVT and PE^{60,61,62,63,64}. There is no evidence that fatal PE is reduced by such a protocol^{54,72}. It is known that pulmonary embolism can occur more than six weeks after surgery^{55,65}. Prophylaxis in the very high-risk case may require to be extended to that time or beyond^{62,63,64,66}.
- 14.4 There is evidence that the use of spinal anaesthetic technique significantly reduces the incidence of DVT^{67,68}. Anaesthetists should be aware of the potential risk of spinal haematoma with concurrent LMWH and neuraxial anaesthesia^{69,70}. An in-dwelling epidural catheter, if used, should be removed before such chemical prophylaxis is commenced^{68,70} and guidelines should be regularly updated⁷¹.
- 14.5 There is strong evidence for the effectiveness of low dose Heparin, low molecular weight Heparin or Warfarin in reducing radiological DVT by 40 to 60%, but there is also concern regarding possible bleeding complications which may put the surgical wound, implant or patient at risk^{54,61,62}.
- 14.6 To be effective, prophylaxis should be given as close as possible to the time of surgery, but avoiding bleeding risk. When pentasaccharide is used, prophylaxis should start 6-8 hours after surgery. Mechanical devices (foot pumps, pneumatic compression, calf stimulators) may be used in the peri-operative period and there is fairly good evidence that these reduce the risk of DVT. These are, by and large, free of significant side effects⁵⁴.

- 14.7 Some surgeons remain uncomfortable with routine chemical prophylaxis, but each unit should publish guidelines, which combine common sense with available evidence⁷¹. The surgeon and anaesthetist should weigh up the current evidence, assess individual risk factors and share with the patient their approach to the problem.
- 14.8 Under normal circumstances, early mobilisation (24 to 48 hours following surgery) should take place.

15. PROPHYLAXIS AGAINST INFECTION

- 15.1 Patients should be clinically screened for infection prior to the operation. [See 5.4 & 8.1]
- 15.2 All patients should receive, intravenously, an antibiotic at induction of anaesthesia and for the first 24 hours after the operation⁷³. Each unit performing the operation should have a locally-agreed policy which should include advice from microbiologists.
- 15.3 The operation should be performed in ultra clean air theatres^{34,35,36}. (see 8.2)
- 15.4 When bone cement is used, antibiotic-impregnated cement further reduces the risk of infection⁷. However when infection does occur, the resistance profile of the infecting organism(s) may be affected^{74,75}.
- 15.5 A combination of systemic antibiotics, antibiotic-impregnated cement, ultra-clean air theatre ventilation and body exhaust suits provides the most effective infection prophylaxis^{7,34,35,36}.
- 15.6 There does not appear to be an increased risk of urinary tract infection if an indwelling catheter is used for only a short time in the immediate post-operative period⁷⁶.

16. SURGICAL TECHNIQUE

- 16.1 Any surgical approach to the hip joint must allow a view of all of the face of the acetabulum and adequate delivery of the proximal femur into the wound.
- 16.2 The recognised complications of the approach to be used must be explained to the patient^{27,28,29,30}. [See sections 3, 5 & 6]
- 16.3 When bone cement is used, the interface should be cleaned, irrigated and dried before the introduction of bone cement. Thorough lavage is helpful in this process and during the operation. Bone cement is introduced when viscous and pressurised before introducing the component⁷.
- 16.4 At THR the intramedullary canal of the femur should be occluded and the cement injected retrogradely by some means. Techniques to centralise the stem in the cement mantle are probably helpful⁷⁷.
- 16.5 For cementless procedures, adequate preparation of the bone and stable fixation of the implants must be achieved at operation.
- 16.6 During wound closure surgeons should ensure the integrity of the hip abductor mechanism and the fascia lata. Repair of the lateral rotator muscles reduces the risk of dislocation after the posterior approach^{78,79}.
- 16.7 Efforts should be made to ensure limb-length equality and restoration of femoral off-set. Pre-operative planning from images and trial reduction intra-operatively is helpful. The introduction of digital X-ray films may require special templates or computer programmes. It is acknowledged that limb-length equality cannot be achieved in every case, but it is becoming an increasing cause of patient dissatisfaction^{80,81}.
- 16.8 Every attempt should be made to ensure stability of the hip joint by correct implant selection, appropriate bone resection, accurate placement of the implants and assessment and correction of soft tissue tension. Repair of soft tissues reduces the risk of post-operative dislocation^{78,79}.
- 16.9 Patient-related factors such as neurological disease or lack of compliance can increase the risk of post-operative dislocation⁸². Pre-operatively the surgeon should warn the patient of such increased risk.
- 16.10 Sophisticated navigation systems are being developed which may permit very accurate placement of implants. There is no evidence available to demonstrate improvement in outcome.
- 16.11 The development of minimally invasive surgery (MIS) has received publicity. Methods employing one or two small incisions have been presented. There is no evidence that these techniques have a better outcome for the patient than conventional approaches⁸³, but the surgeon should be aware of any additional risks to the patient.
- 16.12 Surgeons should ensure that, when using new techniques or techniques new to them, they are capable and competent to perform these. Any specific risk associated with these new techniques, together with the surgeon's own experience in them, should be shared with the patient as part of the informed consent process. Surgeons are reminded to be aware of and to follow any

local guidelines on the introduction of new or novel techniques⁸⁴.

- 16.13 There is variation in the use of wound drains and suture materials. There is no strong evidence to support or condemn such techniques⁸⁵ but the patient should be made aware if skin sutures, clips or suction drains are to be employed.

17. POST-OPERATIVE MANAGEMENT AND DISCHARGE FROM HOSPITAL

- 17.1 All patients should be made aware of the expected interventions following surgery^{29,30}. This should be part of any locally developed ICP.
- 17.2 Mobilisation following the operation should include significant input from the physiotherapy team, and patients should only be discharged from hospital when considered capable of coping in the environment at their destination.
- 17.3 Discharge planning should be in place following pre-admission assessment [see 5.6]
- 17.4 Patients should be given information about telephone numbers or other methods of contacting the hospital or the orthopaedic service, should problems occur.
- 17.5 Patients should be informed of the likely early review date following surgery; this will usually be within 8 weeks of the operation^{29,30}.

18. LONG-TERM FOLLOW-UP OF PATIENTS

- 18.1 Some implants fail before ten years, and more thereafter⁷. For best practice patients should be followed up clinically and radiologically in the longer term. The minimum requirements include taking a history of any complaints, clinical examination and antero-posterior (AP) and lateral X-rays at one, five and each subsequent five years after operation.
- 18.2 Failure from aseptic loosening of the prosthesis is often silent; the patient may not complain. Regular follow-up with X-ray examination identifies the patient at risk of failure^{86,87}. Revision procedures should be planned and performed before massive bone destruction occurs. Such operations are usually less successful than primary procedures²³.
- 18.3 Outcomes vary between units^{2,7,86}. To inform the consent process for this common procedure, long-term review is essential. Follow-up using questionnaires with X-ray examination by non-medically qualified clinicians is used in some centres. This may permit more efficient use of consultant time.
- 18.4 It is recommended that part of the contractual agreement with purchasers/commissioners is to require follow-up to identify premature failure [see 18.1]. Data from each Centre performing these procedures should be available and obtainable in a common format for regional and national audit, and forwarded to the National Joint Registry⁶, Scottish Arthroplasty Project², or other register. Such registers record only the procedure performed and at the moment outcome data are not obtainable unless the patient requires further surgery.
- 18.5 Patients should be given written information after discharge from hospital^{29,30}. [See 5.7]
- 18.6 Patient support and advice organisations can be helpful pre- and post-operatively for the patient^{88,89}.

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