Purchasing for Quality: the Providers' View

Total hip replacement

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Over 40 000 total hip replacements will be performed in the United Kingdom this year,¹ making the procedure one of the commonest major operations carried out in patients over the age of 60 years. The rate of the procedure has steadily increased over the past 30 years since its development in the early 1960s. A successful joint replacement predictably transforms the recipient from a state of high dependence, poor function, and constant pain to a virtually pain-free independence with good locomotor function.

Complications, however, do occur. They may be early and easily treatable, although prolonging hospital stay – for example, superficial wound infection and early dislocation – others, such as thromboembolic complications are life threatening, pulmonary embolism being the major cause of death after this procedure.² Deep infection is likely to seriously compromise the result of the hip replacement and may herald itself at any time after the operation, and aseptic loosening in the longer term remains the most important reason for revision operation because of pain and destruction of bone as the prosthesis loosens.

The focus of a purchaser when negotiating the quality clauses of contracts for total hip replacements should be on those aspects of the process of care that have been shown to reduce and limit unsatisfactory outcome; providers, of course, should also measure those outcomes when possible. However, the number of untoward outcomes will be low and for several untoward outcomes the time lapse from operation is long, and as process is often easier to measure than outcome, measures of process are necessary for quality improvement. In order to assure the quality of care purchasers will require providers to measure important aspects of process. This review will follow a patient through a total hip replacement, identifying those areas where the provider care may vary at the expense of quality patient management (box).

Assessment for operation

REFERRAL

The main indication for hip replacement is severe pain which is usually accompanied by functional disability. The pain is not controllable by simple analgesics or non-steroidal anti-inflammatory tablets and causes regular loss of sleep, and the functional impairment is characterised by inability to walk for more than about 400–800 m, use of walking aids,

Process of total hip replacement

- Assessment for operation – referral
 - outpatient attendance
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- Preoperative care – preadmission clinics
 - admission
- Perioperative period – prosthesis
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inability to use public transport and to tie or untie shoelaces, difficulty in getting in and out of chairs or bed, or up and down stairs, fixed flexion deformity, and poor range of movement.⁴ Such a functional impairment severely restricts patients' quality of life. By these criteria, most orthopaedic surgeons would consider offering an operation, provided the patient is fit enough to withstand it and is able to accept the risks involved, and referral to an orthopaedic consultant is appropriate at this stage. Earlier referral may be indicated in those patients who wish an opinion from a specialist but for whom operation is not yet indicated. It is advisable to have locally agreed policies for referral using simple scales of severity of symptoms in terms of distance that can be walked and loss of sleep at night.

OUTPATIENT ATTENDANCE

It is desirable to minimise the waiting time from referral to outpatient attendance and this can be helped if information contained in the referral letter from the general practitioner accords with local protocols so that clinical priority can be ascertained. If long waiting times prevail it may be beneficial for patients to be told that their referral has been received and approximately when they may expect their appointment. The outpatient department structure and process should incorporate an efficient and timely appointment system. Adequate notice of the appointment (at least two to three weeks) should be given with

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information on how to change the appointment if required.

The patient's charter sets standards of less than 30 minutes' waiting time in the clinic. The British Orthopaedic Association recommends that each new patient is allocated a 20 minute appointment so that each three and a half hour clinic may comprise seven new and seven follow up patients per surgeon.³ A patient satisfaction survey in our hospital, where new patients are allocated 10 minute appointments and follow up patients five minutes, showed that the consultation seemed hurried and allowed insufficient time for discussion and questions.

Patients should be seen by a doctor of appropriate seniority to advise whether their symptoms are sufficiently severe to warrant joint replacement. Fitness to undergo the surgery should be assessed at this stage and any potential problems identified. The patient should be interviewed, while still dressed, in an interview room before being examined in an appropriate room. The risks and benefits of the procedure should be explained and discussed in the interview room again and should be reinforced with a printed information sheet.* At all times the doctor must be courteous and sympathetic. If patients are to be placed on a waiting list they should receive printed information on how the list works and how long they may expect to wait.

WAITING LISTS

In many areas the waiting list for total joint replacement runs to many months. The length of time that patients wait for hip surgery depends on the constantly changing flux between the number of patients being entered on to the waiting list as a result of outpatient consultations and the number being removed after receiving the operation. The number of patients entered should be regulated by protocols for referral and for determining the urgency of the operation, by using a modified hip score.⁴ Assuming that resources are limited, the volume of the contract must be tailored to keep these times to reasonable levels.

Although there is substantial political pressure to reduce the time for patients who have to wait a long time, some patients should be given priority on an urgent waiting list – for example, those with very severe symptoms (severe night pain or inability to get out of the house) or those with extenuating social circumstances, such as having a dependent relative to look after. Late referral of patients may be due to the stoical nature of the British patient and the “gatekeeper” function of general practitioners, who recognise the length of orthopaedic waiting lists. The more patients placed in the urgent category, however, the longer the maximum waiting time becomes, assuming that a finite number of joint replacements is purchased.

Preoperative care

PRE-ADMISSION CLINICS

Late cancellation of surgery should be avoided

if possible. Most cancellations occur because of medical or logistical reasons, and those for medical reasons are largely avoidable with adequate pre-admission assessment supported by anaesthetic assessment when necessary.⁵ All patients who have hip surgery should be seen at the pre-admission clinic, where general fitness is assessed, appropriate investigations are ordered, and explanations are given. Thus conditions such as uncontrolled hypertension, which may have resulted in cancellation, can be treated before the planned date of the operation. A mechanism for anaesthetic and medical advice before admission for surgery should exist so that patients considered at high risk of general complications can be reviewed and their condition optimised for surgery. Every effort must be made to minimise the risk of deep sepsis. To do this an infection screen can be carried out, the results of which should be available before surgery. Preoperative bacteriuria is found in 15–28% of women and 0–8% of men before surgery, but definite evidence that this increases the risk of an infected replacement joint does not exist. It is considered good practice, however, to treat such patients with antibiotics beforehand.*

Patients should have a reasonable understanding of the likely course of the admission and should have their fears about that admission discussed and, if possible, allayed in the pre-admission clinic supplemented by written information, videos, visits to the ward area, and preoperative instruction by a physiotherapist.* Ideally, all patients should be counselled and assessed in the pre-admission clinic by the physiotherapist and a nurse who will be caring for them during their admission. Home visits by occupational therapist should be done routinely. Medical, social, and mobility problems can be identified in advance and adequate preparations made to deal with them.

Assessment in the clinic will result in some patients having their planned operation cancelled because their symptoms have improved or their general fitness to undergo the operation has changed since they joined the waiting list. Cancellations also occur for logistical reasons, owing to lack of beds, inappropriate operative scheduling, or cancellations due to emergencies. Cancellations must be reduced to avoid underuse of provider resource and inconvenience to patients, and therefore a mechanism must exist for replacement at short notice. The control process is the internal organisation of the hospital, which in itself is not measurable, although the specific outcome measure of the number of cancellations and reasons for cancellation should be available and should be monitored.

ADMISSION

Although patients will have had their investigations performed in the pre-admission clinic, they should be admitted the day before surgery; purchasers may wish to know why

* Accepted good practice unsupported by published data.

units admit patients earlier. Admission should be to an elective orthopaedic ward where the nursing staff have the relevant skill, and a preoperative visit by the surgeon and anaesthetist should occur on the day before surgery,* affording patients an unhurried atmosphere in which to voice their uncertainties and have the operation and anaesthetic technique explained.

Trained nursing staff should have time to explain the nursing process to the patients and to familiarise them with the layout of the ward. Primary nursing care with a named nurse for each patient may reduce the length of stay by improving quality of care, and self care modes of nursing may promote greater motivation for return to health.⁶ A Nightingale ward requires about 12 whole time equivalent staff and a ward with cubicles 20 whole time equivalent staff for 20 beds for full nursing cover per 24 hour period.³ Review by the physiotherapist and occupational therapist in the ward before surgery will reassure the patient of continuity of care, and any remaining questions can be answered. This period of acclimatisation is important because a well prepared patient is likely to rehabilitate quicker.

Perioperative period

The processes undertaken in the perioperative period are valuable measures of the likely quality of the care being provided.

PROSTHESIS

A good quality result for a hip replacement is one in which there is improvement in pain and function in the patient, with longevity of the prosthesis because of low rates of failure. The major reason for failure of hip replacements is loosening of the components from the bone, which is associated with further pain, deterioration in function, and destruction of bone. Many alternative designs of prosthesis are available. The traditional design is fixed into the bone with a cement grout. Loosening of cemented hips was thought to be related to cement debris and therefore a natural development was to avoid the use of cement altogether by cutting and reaming the bone to fit the prosthesis exactly. Not only was this thought to decrease loosening but also that if loosening did occur in this uncemented design the amount of associated bone destruction would be reduced. Such cemented and uncemented designs of prosthesis have different costs and their manufacturer's claims of quality differ, but these are largely unsupported by long term scientific evidence.

GOOD QUALITY OUTCOME

There is reasonable evidence that the long established designs of cemented hip replacements such as the Charnley and Exeter designs are satisfactory in terms of quality of hip replacement (see above).^{7,8} The evidence for quality in uncemented hip replacement is more doubtful.⁹ Follow up studies on uncemented prostheses have inadequate numbers of patients and length of follow up to be scientifically valid. The case for the greater

longevity of an uncemented prosthesis is certainly not proved and the same processes of aseptic loosening are seen in uncemented hips.¹⁰ Loosening seems likely to be related more to polyethylene debris from the cup, arising from wear, and hence is not excluded by an uncemented technique. Uncemented femoral components have been associated with a high incidence of thigh pain.¹¹ However, design may be important, and short term studies seem to suggest that hydroxyapatite coating may have a role in reducing the incidence of this complication,¹² but the follow up period is short. A loose uncemented hip replacement should be easier to revise than when cement has to be removed, but modern techniques for removal of cement greatly ease the revision operation of cemented total hip replacement (W Muirhead-Allwood, third British course on revision surgery, Stratford, 1993).

Cementing still seems to be the optimal method of fixation for the stem of the prosthesis. Studies are needed to evaluate the increasingly common practice of using uncemented stems in young adults. Cementing may not be the best way of fixing the cup of the prosthesis; recently, there has been a move to using uncemented cups and cemented femoral stems (the "hybrid") but again the long term data do not as yet support their unrestricted use.^{13,14} In conclusion, the use of uncemented hip prostheses should be restricted and used only in the context of clinical trials or systematic assessments.

COST

The type of prosthesis used is also particularly relevant because its cost may vary substantially. The list price of the commonly used Charnley prosthesis is £700 whereas alternative similar prostheses on the market may cost as little as £300. This may be an attractive option for a provider attempting to save costs but it must be remembered that the manufacturing process of the similar prosthesis may not be of the same standard as that of the original. In addition, long term follow up data are not available on the newer prostheses. However, the so called "Charnley prosthesis" that is marketed today is different in both design and material from the original prostheses used by Charnley himself, on which most of the long term follow up data are available. Uncemented designs are invariably more expensive than their cemented counterparts. Larger centres may be conducting prospective trials of hip replacements to help answer some of the quality issues, and inevitably this will be associated with more expensive prostheses being used and more frequent follow up. The purchaser should question the rationale behind the use and the cost of the prostheses used and consider separating the contract into the cost of care with the cost of the prosthesis added on top.

* Accepted good practice unsupported by published data.

SURGICAL TECHNIQUE

The usual surgical approaches to the hip are posterior, lateral, and anterior, each of which has its advocates; no firm evidence is available to support any one of these approaches. Modern pressurisation techniques improve cement fixation which, although increasing the cost, may improve the longevity of the prosthesis. In clinical studies these techniques seem to reduce femoral loosening.^{7 14} The additional cost is £50 per operation but would seem to be best practice.

The competence of a surgeon performing an operation undoubtedly affects the outcome and this is true for hip replacement.¹⁵ There should be positive evidence of appropriate competence of junior staff allowed to perform the operation unsupervised. This may be a requirement that juniors allowed to perform the operation unsupervised have performed a certain number of supervised operations and been positively confirmed to be competent by a senior surgeon.* Training junior surgeons by requiring them to perform beyond their competence without adequate supervision is not acceptable. However, training increases unit cost; a consultant who spends time training other surgeons will perform fewer operations himself or herself.

PROPHYLAXIS AGAINST INFECTION

Deep infection occurs in 1.5% of hip replacement operations⁷ and its avoidance is of great importance since treatment entails at least one, and usually two, revision operations with prolonged hospital stays and an uncertain outcome. Two processes are important – firstly, the surgery should be carried out in a laminar airflow theatre¹⁶ and, secondly, appropriate, and timely antibiotics should be administered. The choice of antibiotic is probably not important,¹⁷ but evidence that the unit is actually prescribing and delivering the antibiotics appropriately should be sought. The minimum appropriate regimen is three doses of intravenous antibiotics, the first being given with the induction of anaesthetic.

THROMBOPROPHYLAXIS

Without prophylaxis against thromboembolic complications the incidence of deep venous thrombosis is 40–80%, pulmonary embolism 1–10%,¹⁸ and fatal pulmonary embolism 0.7%,⁷ pulmonary embolism being the most common cause of death after total hip replacement.² Various techniques, including anticoagulants and perioperative mechanical pumps, reduce the incidence of this potentially fatal complication; equivocal scientific evidence supports each one. This area remains contentious because of the lack of well conducted clinical trials of the use of prophylaxis in hip replacement and the need to balance the advantages of prophylaxis with associated complications of increased bleeding. Nevertheless, review of current published research suggests that the most effective methods of prophylaxis are low molecular weight heparin injections and low dosage warfarin.¹⁸ Purchasing total hip replacement should include

effective prophylaxis against thromboembolism.

ASEPTIC LOOSENING OF PROSTHESIS

The revision rate after primary hip replacement is of great importance but because of the long delay between the first operation and subsequent aseptic loosening (10 to 20 years) this normally cannot be directly measured. However, a steady state should be reached where the number of primary operations performed can be related to the number of revision operations performed each year, although it is important to know what percentage of the revisions had their primary operation in that unit. A specialist revision surgeon may increase the number of revisions by taking on work from outside areas. These figures for a number of years should therefore be analysed and monitored by the purchaser. One study of the prevalence in six general practices in south west England has shown that 13% of hip replacements performed are revision operations.¹⁹

ANAESTHESIA

The anaesthetic technique is relevant to the survival of the patient and certainly epidural or spinal anaesthesia reduces both blood loss and thromboembolic events.^{20 21} In some units orthopaedic lists are serviced by junior anaesthetists, but the elderly orthopaedic patients often have concomitant medical problems and are undergoing major surgical procedures. The same principles regarding grade and experience of the anaesthetist apply as for the surgeon. A preoperative visit by the anaesthetist is essential and should be at least the day before surgery* and not half an hour before. Patients may have concerns about the anaesthetic technique and postoperative pain control which need to be discussed before surgery.

Postoperative period

The postoperative care of the patient should be appropriately planned by the ward staff, including the multidisciplinary team comprising physiotherapists, occupational therapists, and nurses. Adequate pain control post-operatively is vitally important and there should be a positive attitude to management of pain, including its regular measurement. Ideally, some form of advanced pain control, such as patient controlled analgesia, should be provided. Pain scores incorporated into the observation charts enable fine adjustment of analgesia. A high dependency area is desirable for the first 24 hours of care after the operation.*

REHABILITATION

Patients undergoing hip replacement require intensive rehabilitation by a physiotherapist, and there should be at least one physiotherapist per 20 to 25 beds of a mixed

* Accepted good practice unsupported by published data.

orthopaedic ward.³ Patients may be able to start gait training with walking aids before surgery. After surgery the patient is mobilised from the first or second day after the operation. Prolonged bed rest is now redundant. Patients require on average eight treatments in the postoperative period so that they can get on and off the bed independently, walk 20 metres with two sticks and can climb 12 stairs.* Advice on good care of the hip and on particular movements to be avoided to prevent dislocation are given. Discharge from hospital should happen when the patient is ready; there is no need to await removal of sutures,† which can be organised through good communication with the primary health care team.

Many patients who undergo total hip arthroplasty can be effectively rehabilitated at home from the fifth postoperative day,²² depending on them having reached self care status for dressing, toileting, and getting in and out of bed or with minimum help from their spouse or home helper. Daily visits by either the district nurse or community physiotherapist would ensure safety and continued rehabilitation during the first week after discharge. The purchaser should explore this option with the provider if local circumstances are favourable.

Rehabilitation by the occupational therapist starts preoperatively with assessment of patients and their social situation. Some changes may be necessary to the home environment, including chair and bed raises, monkey pole attachments for the bed, and handrails on the stairs. These are identified as needs before operation in the preadmission clinic or by a home visit preoperatively to avoid unnecessary delay in discharge after surgery. Toilet seat raises, mechanical reacher, long-handled shoe horns, and stocking aids are dispensed by the hospital occupational therapy department routinely.

FOLLOW UP

Follow up must focus on ensuring return of function and detection of development of complications. Traditionally, a first review occurring at about six weeks after surgery is a reasonable strategy;* it should include assessment of return of adequate mobility, function, and gait.

A return to 65–75% of normal functional performance occurs within one year of arthroplasty.²³ The role of physiotherapy in those who recover more slowly is uncertain. A non-specific programme of exercises started two months after hip replacement did not have any appreciable effect on hip motion, muscle strength, and walking ability.²⁴ However, selected patients, such as those with poor independent mobility, poor confidence, and stiffness, may benefit from carefully programmed physiotherapy or hydrotherapy.* Patients who are unable to walk or get in and out of a chair or bed confidently should be assessed by a community physiotherapist. Good communication with the primary health care team is essential so that such services can

be provided for patients with poor mobility and confidence, many of whom can be identified in preadmission clinics. Assessment and advice from a physiotherapist present in the six week outpatient clinic may be an effective method in dealing with these problems.*

Wound infections, healing problems, and deep vein thromboses should be diagnosed before discharge or, for those discharged early, by the primary health care team. Discrepancy in leg length should also be noted before discharge and, if necessary, a shoe raise provided. Adjustments to the raise may be needed at the six week review. Further evaluation with an x ray examination at six months to one year is recommended to ensure that early loosening is not occurring as a consequence of a low grade infection.*

Patients therefore require one early follow up with clinical assessment at six weeks and one later follow up at six months to one year with radiological and clinical assessment.* Beyond that, the requirement for regular yearly check ups is debatable.† Patients with uncemented hip replacements may require more frequent follow up as part of their review protocol. Patients under the age of 60 who undergo total hip replacement are more likely to require revision surgery since failure is primarily related to the length of time the prosthesis has been in place. Younger patients should have radiographic review, possibly without clinical review, to identify loosening at an early stage before there is too much bone loss which would make revision surgery more difficult.*

AUDIT

As indicated, most hip replacements will be uncomplicated and provide excellent results; a few patients have undesirable outcomes. The provider unit should have audit data on their perioperative complication rates to enable the purchaser to ensure that the unit can meet accepted standards, particularly with regard to infection, thromboembolism, revision operations, and the proportion of the work carried out by unsupervised trainees.

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* Accepted good practice unsupported by published data.

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