

SHORT REPORT

A Survey of the Current State of Hip Arthroplasty Surveillance in the United Kingdom

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Introduction

The orthopaedic community recommends that patients with total hip arthroplasty should be followed up for the long term owing to unknown outcomes of materials and designs, and the problems of peri-prosthetic osteolysis induced by wear particles (Charnley, 1972; Harris, 2004; Wroblewski et al., 2009). Failure of the implanted hip prosthesis over time can occur for a number of reasons – the implant materials, design, size, positioning, infection, dislocation, trauma, unexplained pain or aseptic loosening with or without osteolysis (National Joint Registry, 2013). In view of this, the British Orthopaedic Association recommends surveillance of hip arthroplasty and publishes guidelines, which were revised in 2012 (British Orthopaedic Association, 2006, 2012). These recommend that, for established prostheses (those that satisfy the ten-year benchmark of the Orthopaedic Data Evaluation Panel), review should take place at one and seven years after surgery, and three yearly thereafter (British Orthopaedic Association, 2012; Orthopaedic Data Evaluation Panel, 2014). The Australian Orthopaedic Association recommends follow-up intervals of one to two years, five years and biennially thereafter (<http://www.aoa.org.au/subspecialties/arthroplasty>). In the USA, there are currently no similar guidelines, although the need for such has been acknowledged (Lieberman et al., 2011).

Despite the improvement to materials used in total hip arthroplasty, osteolysis continues to be a threat to the survival of the joint, and follow-up is advocated (Beck et al., 2012). Some authors suggest that age should determine follow-up – that is, that younger,

active patients should receive more frequent follow-up and that patients in their mid-70s at primary surgery do not require any routine surveillance (Wainwright et al., 2011; Keeney et al., 2012). The time intervals necessary for effective arthroplasty surveillance are unclear but many authors now suggest that review before seven years is unnecessary, other than routine early checks (Bolz et al., 2010; Keeney et al., 2012; Malchau et al., 2005). The recent UK guidelines emphasize the importance of X-ray images and their interpretation as part of the follow-up, in conjunction with patient-reported outcome measures (British Orthopaedic Association, 2012).

Recent concerns about metal-on-metal articulations led to the issue of specific guidance for follow-up of this type of prosthesis in the UK. Annual follow-up is advocated for all metal-on-metal prostheses other than asymptomatic resurfacing or asymptomatic total hip arthroplasty with a femoral head diameter of less than 36 mm (Medicines and Healthcare Products Regulatory Agency, 2012). For these latter groups, follow-up should be according to local protocol.

Hip arthroplasty surveillance benefits patients and surgeons through monitoring changes that indicate deterioration in order to optimize further intervention. Currently, revision surgery constitutes 12% of all hip arthroplasty procedures in the National Joint Registry, the largest group constituting those undertaken for aseptic loosening or osteolysis (National Joint Registry, 2013). These conditions are often silent at onset and, if undetected, may lead to substantial loss of bone with subsequent peri-prosthetic fracture and a significantly higher cost of revision than for aseptic loosening alone

(Haddad et al., 2007; Ghos and Macdonald, 2008; Huddleston et al., 2010). This situation is more challenging for the orthopaedic surgeon and is associated with a higher risk for the patient (Paprosky et al., 2001; Barrack, 2004; Howard, 2009; Vanhegan et al., 2012).

In the current economic environment with associated health reforms, many services are being forced to reduce all types of follow-up and to ensure that all services are efficient and effective, as highlighted in a recent national orthopaedic report (Briggs, 2012). Consequently, any surveillance service must be targeted towards those patients who will benefit from subsequent treatment, avoiding needless recall of those who will not benefit. The present survey was undertaken to provide an indication of the status of current hip arthroplasty surveillance in the UK, to inform the future provision of arthroplasty surveillance services.

Materials and methods

In the 2012 report from the National Joint Registry for England and Wales, a total of 411 orthopaedic units were recorded (National Joint Registry for England and Wales, 2012). A sample of units from these data was purposively selected for the survey to ensure that all sizes and types of hospital were represented. In addition, one unit in Ireland and two in Scotland were included, to gain a broader perspective. Following advice from the local research and development department, the present study was registered as an evaluation of current service provision with the clinical audit department of the host NHS Trust. It was conducted during the introduction of the newest UK guidelines.

Initial contact was made with each unit by telephone or email, followed by an invitation letter

and a request for the contact details of an appropriate health professional. They were asked to complete a short survey and, if responses were unclear, a follow-up email or telephone call was used to clarify the information provided. When there was no response to the initial invitation, further attempts were made to contact the clinical director of the orthopaedic unit via letters or telephone.

Survey

The survey was designed as a verbal questionnaire (seven questions only) to reduce the response burden but allow the capture of relevant data (see Appendix 1). The objectives were to identify types and sizes of units with an existing service, to describe where the service was delivered, the frequency of review, patient selection, use of patient-reported outcome measures, which health professionals undertook the review and how it was funded. The response from each unit was recorded on a Microsoft® Word document copy of the questionnaire, which was forwarded to any respondent who preferred to complete it at another time.

Information recorded for each unit included the total number of primary hip and knee replacements, the number of primary hips (available on request to the National Joint Registry) and the average American Society of Anaesthesiologists (ASA) grade. This provides an indication of the general health of the patient group treated in that unit, with grades from 1 (healthy individual with no systemic disease) to 5 (moribund and not expected to survive 24 hours). These data were entered into a Microsoft® Excel spreadsheet, to which the responses from the survey were added, each categorized into groups and summarized with descriptive statistics.

Table 1. Size and type of orthopaedic units selected to be included in survey

No. of hips and knees completed	Regional R	Regional NR	Elective R	Elective NR	District Hospital R	General Hospital NR	Private R	Private NR	Trauma R	Trauma NR
<100			1						3	
100–199					1			1		2
200–299	1				2	1				
300–399	1				2		2	0		
400–599	2	1			4	2				
600–799	2				3					
800–999	1	1	2		3					
>1,000	8	1	2	1	2					
Total	15	3	5	1	17	3	2	1	3	2

NR, non-responder; R, responder.

Results

Between December 2012 and April 2013, 52 orthopaedic units were contacted to participate in the survey, representing a range of all types and sizes of hospital, as shown (see Table 1). The National Joint Registry reported an average of 204 hip arthroplasties per unit in the 12-month period of data collection and an average ASA grade at primary surgery of 2.0 (National Joint Registry for England and Wales, 2012).

Of the 52 units surveyed, 42 responded (81%), with an average number of primary hip arthroplasties of 332 (range 23–1,124) and mean ASA grade of 2.1 (range 1.9–2.7). The ten non-responding units included a range of 56–1,225 primary hip arthroplasties. Of the 42 responding units, five reported that they had no arthroplasty surveillance in place: three were trauma units, one was a private hospital (follow-up was dependent on a patient's health care insurance policy)

Table 2. Length of follow-up offered to patients with hip arthroplasty

Provision of hip arthroplasty surveillance after primary surgery	Number of units	%
None	5	12
Variable by consultant	1	2.25
Up to 6 weeks	3	7
Up to 1 year	10	24
Up to 5 years	3	7
At 1, 5 and 10 years; then discharge	1	2.25
At 1 and 10 years; then discharge	1	2.25
At 1, 5 and 10 years and beyond	15	28
At 1 and 7 years and beyond	1	2.25
Metal on metal arthroplasty only	2	5
Total	42	100

and one was a district general hospital in which no routine follow-up had ever existed. The survey was completed by the lead orthopaedic surgeon, or by another health professional with the lead surgeon's knowledge, in every case.

All hip arthroplasty surveillance took place in orthopaedic outpatient departments, although the Scottish units also delivered satellite clinics in community hospitals or via a video link to offshore islands. The length of follow-up varied between units with 18 (43%) providing a service beyond five years postoperatively (see Table 2).

In six units (14%), the selection of patients for surveillance was limited to those who were 75 years or less at the time of surgery. The service was provided from the orthopaedic budget in 34 units (81%) and from primary care in three (7%), and seven (17%) units obtained additional funding through research. Thirteen (31%) specifically reported a reduction in service due to financial constraints.

The service was delivered by a variety of health professionals (see Figure 1), all of whom were part of the orthopaedic team, and the rate of non-attendance at clinics was less than 5% in 16 of the units. The use of patient-reported outcome scores varied (see Figure 2). The routine interpretation of X-ray images was conducted by the medical team or by suitably trained arthroplasty practitioners with rapid access to expert opinion (see Figure 3).

Discussion

In the present small survey of orthopaedic units, hip arthroplasty surveillance was provided in 88% of the

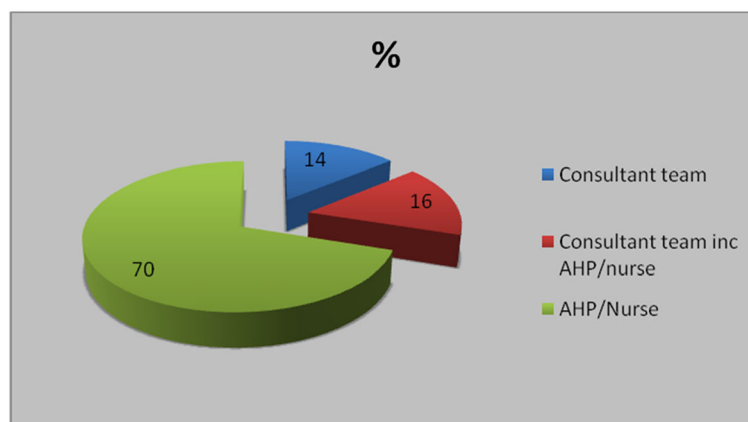


Figure 1 Health professionals delivering arthroplasty surveillance. AHP, allied health professional

units, although long-term follow-up beyond ten years was offered in only 43% of units. The concept of long-term follow-up in non-metal-on-metal articulations is of a comprehensive programme to identify asymptomatic patients at risk of significant bone loss with implications for subsequent treatment. Failure from aseptic loosening accelerates in the period beyond seven years, and an absence of long-term follow-up potentially increases the risk for complicated revision hip surgery, which is associated with significant bone loss (Paprosky et al., 2001; Barrack, 2004; Howard, 2009; Vanhegan et al., 2012).

The selection of patients by age was implemented in 14% of the units, as advised in recent guidelines, which state that surveillance should be targeted at those aged 65 years or less at primary surgery (British Orthopaedic Association, 2012). Although age is not a predictive variable for radiographic changes around a hip arthroplasty at mid-term, the reduction of mechanical demand on a joint and the increased risk of comorbidities lessen the likelihood of revision (Wainwright et al., 2011; Keeney et al., 2012; Smith et al., 2013). Low rates of non-attendance for arthroplasty surveillance have been reported elsewhere and imply that these services are well received by patients, although further research is needed to explore the patient perspective (Teo and Smith, 2014).

All units conducting surveillance included radiographic review, and image interpretation was by the orthopaedic team. The importance of the interpretation of these images is recognized and it is recommended that an orthopaedic surgeon or musculoskeletal radiologist or an arthroplasty practitioner with suitable training complete this (Haddad et al., 2007; British Orthopaedic Association, 2012). Although both cost and risk are associated with taking X-ray images, they continue to form the basis of total hip arthroplasty assessment to identify degenerative changes, which cannot be predicted from symptoms alone (Aghayev et al., 2013; Smith et al., 2013). Patient-reported outcome measures are a useful indicator of factors such as pain, function, general health or satisfaction, particularly if a change in score is measured (Murray et al., 2007). When used in conjunction with radiographic review, they provide a comprehensive understanding of the progress of an individual patient. In the present study, 67% of the units that offered surveillance services were routinely using patient-reported outcome measures, the Oxford Hip Score being the most frequently used (Dawson et al., 1996). The introduction of mandatory

patient-reported outcome measures in England in 2009 highlighted the use of this hip-specific score and the use of a change in score as a method of outcome analysis (Health and Social Care Information Centre, 2013).

Allied health professionals and orthopaedic nurses, working at an advanced level as part of the orthopaedic team, frequently deliver hip arthroplasty surveillance. The use of non-medical health professionals to work in orthopaedic teams is well established and provides continuity in long-term surveillance that is beneficial to the patient (Daker-White et al., 1999; Kersten et al., 2007; Walton et al., 2008). The close working relationship with orthopaedic surgeons facilitates rapid transfer of knowledge and consistency of care, which is further supported by the Arthroplasty Care Practitioner's Association (<http://www.acpa-uk.net>).

The present survey provides evidence that existing surveillance services had been reduced in many orthopaedic units. Hip arthroplasty surveillance can be instrumental in identifying patients for revision surgery at the optimal time, consequently reducing associated surgical costs and improving outcomes for the patient (Haddad et al., 2007; Vanhegan et al., 2012). It has the potential to provide one of the required efficient and cost-effective services (NHS England, 2013) but must be streamlined to capture the patients who may benefit rather than needlessly recalling patients for whom surveillance is not necessary. The solution lies in identifying who should be seen for maximum effectiveness, how and where this service should be delivered for maximum cost benefit, and, importantly, incorporating the views of the patients and the health professionals involved.

Strengths and limitations

The sample of orthopaedic units included in the present survey provides an indication of current hip arthroplasty surveillance, which was previously unknown, but was too small to allow meaningful conclusions to be drawn, with the average number of hip replacements per unit (332) being higher than the national average (204). The moderate response rate of 81% could be improved, an in-depth analysis of the service changes and the existence of any services within primary care carried out, and further information on the reasons for absence of follow-up obtained.

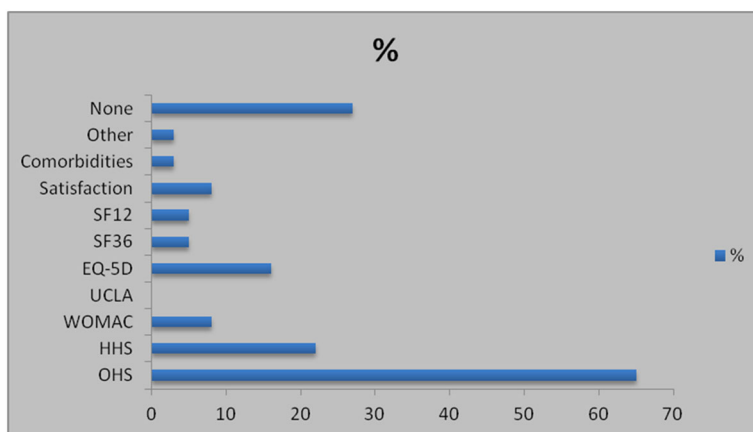


Figure 2 Frequency (%) of use of patient-reported outcome measures in hip arthroplasty surveillance. EQ-5D, EuroQol questionnaire; HHS, Harris Hip Score; OHS, Oxford Hip Score; SF12, Medical Outcomes Study short form 12; SF36, Medical Outcomes Study short form 36; UCLA, University of California in Los Angeles activity scale; WOMAC, Western Ontario and McMaster University Osteoarthritis index

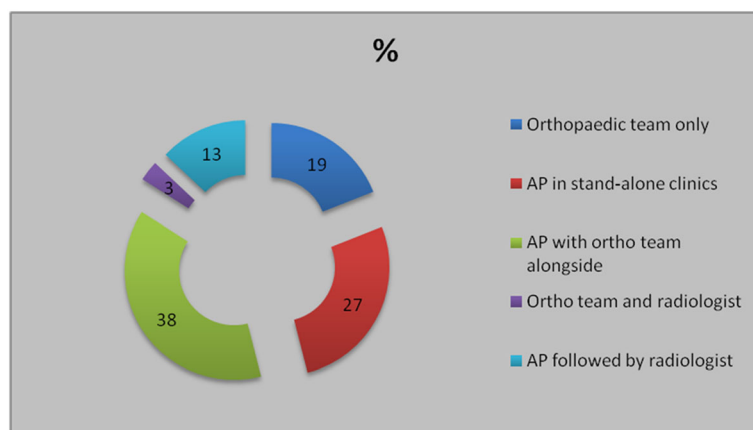


Figure 3 Interpretation of X-ray images in arthroplasty surveillance. AP, arthroplasty practitioner; ortho, orthopaedic

Conclusion

Hip arthroplasty surveillance has traditionally been provided in orthopaedic units across the UK but its future is uncertain. The present small survey gives some indication of the actual status but a larger data collection is required to represent the national situation. Where hip arthroplasty surveillance exists, a variety of service models are employed, with radiographic review as a core element. Future research should investigate the clinical and cost effectiveness of such services so that, together with the information emerging from implant registry studies, an evidence-based and patient-centred approach can be taken to any further disinvestment.

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REFERENCES

Aghayev E, Teuscher R, Neukamp M, Lee EJ, Melloh M, Eggli S, Roder C (2013). The course of radiographic loosening, pain and functional outcome around the first revision of a total hip arthroplasty. *BMC Musculoskeletal Disorders* 14: 167.

Barrack RL (2004). Preoperative planning for revision total hip arthroplasty. *Clinical Orthopaedics and Related Research* 420: 32–8.

Beck RT, Illingworth KD, Saleh KJ (2012). Review of periprosthetic osteolysis in total joint arthroplasty: An emphasis on host factors and future directions. *Journal of Orthopaedic Research* 30: 541–6.

- Bolz KMD, Crawford RW, Donnelly B, Whitehouse SL, Graves N (2010). The cost-effectiveness of routine follow-up after primary total hip arthroplasty. *Journal of Arthroplasty* 25: 191–6.
- Briggs TWR (2012). Getting it right first time. Improving the quality of orthopaedic care within the National Health Service in England. Available at <http://www.timbriggs-gettingitrightfirsttime.com/> [Accessed 6 April 2014].
- British Orthopaedic Association (2006). Primary total hip replacement: A guide to good practice. London: British Orthopaedic Association.
- British Orthopaedic Association (2012). Primary total hip replacement: A guide to good practice. Available at <http://britishhipociety.com/patientinfo> [Accessed 6 April 2014].
- Charnley J (1972). The long-term results of low-friction arthroplasty of the hip performed as a primary intervention. *Journal of Bone and Joint Surgery [Br]* 54: 61–76.
- Daker-White G, Carr A, Harvey I, Woolhead G, Bannister G, Nelson I, Kammerling MA (1999). A randomised controlled trial. Shifting boundaries of doctors and physiotherapists in orthopaedic outpatient departments. *Journal of Epidemiology and Community Health* 53: 643–50.
- Dawson J, Fitzpatrick R, Carr A, Murray D (1996). Questionnaire on the perceptions of patients about total hip replacement. *Journal of Bone and Joint Surgery [Br]* 78: 185–90.
- Ghoz A, Macdonald D (2008). New trends in total hip replacement: Follow-up is it required and who pays? *Current Orthopaedics* 22: 173–6.
- Haddad FS, Ashby E, Konongampambath S (2007). Should follow-up of patients with arthroplasties be carried out by general practitioners? *Journal of Bone and Joint Surgery [Br]* 89: 1133–4.
- Harris WH (2004). Conquest of a worldwide human disease: Particle-induced periprosthetic osteolysis. *Clinical Orthopaedics and Related Research* 429: 39–42.
- Health and Social Care Information Centre (2013). Patient reported outcome measures. Available at <http://www.hscic.gov.uk/proms> [Accessed 30 October 2013].
- Howard PW (2009). Reconstruction/revision of acetabular failure in revision hip replacement. *Orthopaedics and Trauma* 23: 322–6.
- Huddleston JI, Harris AHS, Atienza CA, Woolson ST (2010). Hylamer vs conventional polyethylene in primary total hip arthroplasty: A long-term case-control study of wear rates and osteolysis. *Journal of Arthroplasty* 25: 203–7.
- Keeney JA, Ellison BS, Maloney WJ, Clohisy JC (2012). Is routine mid-term total hip arthroplasty surveillance beneficial? *Clinical Orthopaedics and Related Research* 470: 3220–6.
- Kersten P, McPherson K, Lattimer V, George S, Breton A, Ellis B (2007). Physiotherapy extended scope of practice – Who is doing what and why? *Physiotherapy* 93: 235–42.
- Lieberman JR, Leger RR, Tao JC, Clohisy JC, Meneghini RM (2011). Total hip arthroplasty surveillance: When do we see our patients postoperatively? *Journal of Arthroplasty* 26: 1161–4.
- Malchau H, Garellick G, Eisler T, Karrholm J, Herberts P (2005). The Swedish Hip Registry: Increasing the sensitivity by patient outcome data. *Clinical Orthopaedics and Related Research* 441: 19–29.
- Medicines and Healthcare Products Regulatory Agency (2012). Medical Device Alert: All metal-on-metal (MoM) hip replacements (MDA/2012/036). Available at <http://www.mhra.gov.uk/Safetyinformation/Healthcareproviders/Orthopaedics/MedicalDeviceAlerts> [Accessed 7 July 2013].
- Murray DW, Fitzpatrick R, Rogers K, Pandit H, Beard DJ, Carr AJ, Dawson J (2007). The use of the Oxford hip and knee scores. *Journal of Bone and Joint Surgery [Br]* 89: 1010–4.
- National Joint Registry for England and Wales (2012). 9th Annual Report. Available at <http://www.njrcentre.org.uk/njrcentre> [Accessed 7 July 2013].
- National Joint Registry (2013). 10th Annual Report. Available at http://www.njrcentre.org.uk/njrcentre/Portals/0/Documents/England/Reports/10th_annual_report/NJR%2010th%20Annual%20Report%202013%20B.pdf [Accessed 30 October 2013].
- NHS England (2013). Putting patients first: The NHS England business plan for 2013/4 – 2015/6. Available at <http://www.england.nhs.uk/wp-content/uploads/2014/04/ppf-1415-1617-wa.pdf> [Accessed 18 June 2013].
- Orthopaedic Data Evaluation Panel (2014). Available at <http://www.odep.org.uk/> [Accessed 28 April 2014].
- Paprosky WG, Burnett RSJ, Martin EL (2001). Current topics in revision total hip replacement: Acetabular deficiency and its management. *Techniques in Orthopaedics* 16: 227–36.
- Smith LK, Cramp F, Palmer S, Coghill N, Spencer RF (2013). Empirical support for radiographic review: A follow up study of total hip arthroplasty. *Hip International* 23: 80–6.
- Teo AQA, Smith LK (2014). Arthroplasty surveillance: What does non-attendance indicate? Available at <http://onlinelibrary.wiley.com/enhanced/doi/10.1002/msc.1064> [Accessed 23 March 2014].
- Vanhegan IS, Malik AK, Jayakumar P, Ul Islam S, Haddad FS (2012). A financial analysis of revision hip arthroplasty. *Journal of Bone and Joint Surgery [Br]* 94: 619–23.
- Wainwright C, Theis JC, Garneti N, Melloh, M (2011). Age at hip or knee joint replacement surgery predicts

likelihood of revision surgery. *Journal of Bone and Joint Surgery [Br]* 93: 1411–5.

Walton MJ, Walton JC, Bell M, Scammell BE (2008). The effectiveness of physiotherapist-led arthroplasty follow-up clinics. *Annals of the Royal College of Surgeons of England* 90: 117–9.

Wroblewski BM, Siney PD, Fleming PA (2009). Charnley low-frictional torque arthroplasty: Follow-up for 30 to 40 years. *Journal of Bone and Joint Surgery [Br]* 91: 447–50.

Appendix 1

What is the current state of hip arthroplasty surveillance in the UK?

Questionnaire

1. What type of orthopaedic unit are you (regional/tertiary, DGH, elective only, etc)?
2. Is it a facility that takes referrals from other hospitals (how many)?
3. What is the population size or catchment area for your unit (number of PCTS, towns, etc)?
4. Is hip revision surgery undertaken in your unit?
5. Is there any hip arthroplasty surveillance in place within your unit? If so:
 - a. Where does it take place?
 - b. How is it funded? (Separate service, included within orthopaedics, primary care funded, included in cost of components?)
 - c. Which health professionals deliver the service?
 - d. Which patients are eligible for the service?
 - e. Approximately how many appointments are offered per annum/how many patients are seen?
 - f. What is the DNA rate?
 - g. Which patient reported outcome measures do you use?
 - h. At what postoperative intervals are X-rays taken?
 - i. Which health professional(s) routinely review the arthroplasty images?
6. Do you have a protocol for the arthroplasty surveillance service? If yes, please can we have a copy?
7. If there is no hip arthroplasty surveillance in place within your unit, has there been a service in the past? What were the circumstances in which it was discontinued?