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**Title:** Is a questionnaire and radiograph-based follow-up model for patients with primary hip and knee replacements a viable alternative to traditional regular outpatient follow-up clinic?

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**Abstract**

Increasing demand for total hip and knee replacement (THR/TKR) and associated follow-up has placed huge demands on orthopaedic services. Feasible follow-up mechanisms are therefore essential. We conducted an audit of clinical follow-up decision-making for THR/TKR based on questionnaire/radiograph review compared to local practice of

Arthroplasty Care Practitioner (ACP)-led outpatient follow-up. 600 patients attending an ACP-led THR/TKR follow-up clinic had a pelvic/knee radiograph, completed a pain/function questionnaire and were reviewed by an ACP. An experienced orthopaedic surgeon reviewed the same radiographs and questionnaires, without patient contact or knowledge of the ACP's decision. Each pathway classified patients into: urgent review, annual monitoring, routine follow-up or discharge. 401 hip and 198 knee patients were included. There was substantial agreement between the ACP and surgeon for both hip ( $\kappa=0.69$ , 95%CI(0.62-0.76)) and knee ( $\kappa=0.81$ , 95%CI(0.74-0.88)). Positive agreement was very high for discharge and routine follow-up; however the ACP was more likely to select annual monitoring and the surgeon urgent review. Review of the questionnaire/radiograph together identified all patients in need of increased surveillance, with good agreement for on-going patient management. However, review of the radiograph or questionnaire alone missed some patients with potential problems. Radiograph with questionnaire review may represent a cost-effective THR/TKR follow-up mechanism.

**Keywords:** Hip, knee, arthroplasty, follow-up, care pathways

## **Introduction**

Total joint replacement (TJR) has revolutionised the management of degenerative joint disease.<sup>1</sup> However, with a rapidly ageing population<sup>2</sup> and medical advances that have led to less stringent criteria for surgery eligibility,<sup>3</sup> demand is beginning to outstrip capacity. Orthopaedic surgery currently sits as the worst performer across the NHS in terms of waiting-list breaches, with an estimated 8,000 breaches each month.<sup>2</sup> As such, there is a compelling need to alleviate demand on orthopaedic centres; reducing the amount of follow-up after TJR provides one possible solution.

Current guidelines for primary total hip and knee replacement (THR/TKR) follow-up in the NHS are based on British Hip Society and British Orthopaedic Society recommendations for

outpatient follow-up at 1 and 7 years, and every 3 years thereafter for Orthopaedic Data Evaluation Panel 10A (ODEP-10A) implants, with more frequent follow-up for novel implants.<sup>4,5</sup> The rationale for follow-up is to ensure timely detection of complications or arthroplasty failure that will require revision surgery. Early complications (less than five years) are often symptomatic and include infection and technical errors.<sup>6</sup> Arthroplasty failure in the longer term (after five years), constituting 50% of revision surgery, is usually due to aseptic loosening, often associated with lytic lesions in cemented hip replacements;<sup>6</sup> it carries the risk of sudden unexpected peri-prosthetic fracture. These lytic lesions may be asymptomatic until sudden clinical and radiographic failures have occurred.<sup>6,7</sup> Complex revision surgery is more costly in terms of surgical and subsequent rehabilitation costs, more traumatic to the patient, and carries higher complication risk, therefore screening for early identification of a failed joint is a key component of the follow-up process. However, with modern techniques of allografting and impaction grafting there is often less urgency to proceed to revision surgery for asymptomatic x-ray changes compared to 10 years ago.<sup>8</sup>

In other specialties, 'paper' or 'virtual' clinics<sup>9</sup> have been demonstrated as viable alternatives to routine out-patient follow-up clinics; increasing patient convenience and satisfaction whilst reducing costs to the NHS.<sup>10</sup> Anecdotal reports suggest that some orthopaedic units have already adopted such strategies to reduce their TJR follow-up load<sup>11</sup>; however, there is no evidence-base for this disinvestment in outpatient appointments. It is unknown whether such a follow-up strategy can detect, in a timely fashion, problem cases which are in need of revision. To explore the benefits and safety of a paper-based follow-up clinic, we conducted an audit of all patients who attended for THR/TKR follow-up at a busy UK orthopaedic centre during a two year period. The aim of the audit was to examine the reliability and sensitivity of clinical decision-making based on 'remote' orthopaedic surgeon questionnaire/radiograph review compared to arthroplasty care practitioner (ACP)-led outpatient follow-up, in terms of ability to identify cases requiring revision or increased surveillance.

## **Patients and Methods**

### *Patient population and routine follow-up*

Patients attending a standard-care ACP-led THR/TKR follow-up outpatient clinic from October 2011 to September 2013 were included in the audit. Patients attending for follow-up of a revision surgery or a procedure other than primary THR/TKR (e.g. patella resurfacing) were excluded. As part of their routine care, patients had a standard pelvic or knee x-ray and completed a questionnaire on pain, function and problems with the hip/knee replacement. The questionnaire is routinely used in our unit as an aid for specialist ACPs and junior doctors conducting outpatient follow-up clinics. Patients then attended an appointment with the orthopaedic outcomes ACP who reviewed the questionnaire and radiograph, discussed any problems and agreed a follow-up plan. ACP clinics are routine in our unit; after each clinic the decisions made for each patient are reviewed by a senior orthopaedic surgeon together with the ACP. Follow-up options during routine care are classified as follows: immediate review by surgeon; annual monitoring (next appointment in 1 year); long-term follow-up in 2-5 years; discharge.

### *Orthopaedic 'remote' review*

For the purpose of this audit, a blinded senior orthopaedic surgeon (referred to as 'remote' surgeon) reviewed all radiographs and questionnaires, with no patient contact and no prior knowledge of the follow-up plan determined by the ACP. In the first instance all questionnaires were reviewed and scored for whether they suggested 1) a potential problem requiring investigation or 2) that the hip/knee was problem-free. Secondly, the radiographs were reviewed, using the same scoring system above. Finally the two were reviewed together and a decision with respect to follow-up recorded as per the four classifications used in routine care. Reviews were performed on separate occasions to ensure no recollection of previous decisions.

For all patients identified by either the ACP or the remote surgeon as requiring urgent review, a clinical notes review was conducted to determine outcome of further follow-up. A

review of the Patient Administration System (PAS) was conducted in September 2014 to identify all subsequent orthopaedic appointments for patients included in the audit.

### *Statistical analysis*

Statistical analysis was conducted using Stata 13.1 software (StataCorp LP, College Station, TX, USA)<sup>12</sup> and WINPEPI version 11.<sup>13</sup>

The overall proportions of exact agreement between the two raters (ACP and remote surgeon) were evaluated to determine the exact agreement between the raters, scoring for knee and hip surgery separately. Cohen's kappa and weighted kappa statistics were calculated to evaluate the measure of agreement between the raters, using the benchmarks of Landis and Koch:  $\leq 0.2$  (poor agreement); 0.21-0.40 (fair agreement); 0.41-0.60 (moderate agreement); 0.61-0.8 (substantial agreement); 0.81 (perfect agreement).<sup>14</sup>

Weighted kappa values were used for the evaluation of categorical variables on the basis that partial credit could be given to pairs of ratings that differed by just one category, but larger differences should contribute substantially less to the calculated level of agreement. Urgent referral was designated as the 'worst' category, followed by annual review and long-term follow-up, with discharge as the 'best' category. Quadratic weights were used for calculating weighted kappa statistics: the weights for differences of 0, 1, 2 and 3 categories were 1, 0.9, 0.6, and 0. We also explored the use of custom weights of 1, 0.9, 0.2 and 0 respectively.

Given that kappa may be affected by bias and the imbalance between prevalence of responses, bias-adjusted kappa (BAK) and prevalence-adjusted-bias-adjusted-kappa (PABAK) were also calculated. Agreement was evaluated between the radiograph and the questionnaire (dichotomous 'yes/no' outcomes) using the same measures. Category-specific measures of agreement were evaluated; the proportion of positive agreement

estimates the conditional probability that, given one rater assigned a patient to a given category, the other rater would assign them to that same category.

A random sample of 45 hip patients were selected 12 months later and the radiographs and questionnaire were re-rated by the remote surgeon to assess intra-rater reliability compared to previous assessment.

### *Ethics*

This was an audit of local service provision and ethical approval was therefore not required.

### **Results**

Questionnaires and radiographs were collected for 401 hip (mean age 70.5, SD 11.0 years) and 198 knee patients (mean age 73.3, SD 7.3 years). Of the 45 questionnaires and radiographs (just over 10%) that were rescored by the surgeon, there was agreement on follow-up classification for all but one case. In this case, the remote surgeon had scored as “discharge” on the first occasion, but as “long-term routine follow up” on the second occasion.

#### *Agreement between remote surgeon review and ACP-led out-patient review*

Follow-up decisions for hip and knee patients are summarised in Figure 1. Agreement statistics are presented in Tables 1 and 2. For the hip, five patients with missing data for the ACP/remote surgeon were not included in the agreement analysis, leaving a sample size of 396; whilst for the knee 15 were excluded leaving a sample size of 183. The percentage exact agreement between the ACP and surgeon (based on reading the questionnaire and radiograph together) for both the hip and the knee was high. There was substantial agreement between the ACP and the remote surgeon for the hip and perfect agreement for the knee. For both joints there was high positive agreement for the discharge and long-term follow-up decisions, while lower positive agreement was seen for annual monitoring and

urgent review. The ACP was more likely to list patients for annual follow-up and the remote surgeon more likely to recall patients for immediate review if there was suspicion of a problem.

The outcomes of patients identified by the remote surgeon and/or the ACP for urgent review are outlined in Table 3. All patients identified by the ACP for review subsequently attended for an outpatient appointment with an orthopaedic surgeon where a further follow-up decision was made (as per Table 3). In our subsequent clinical notes review, we identified one hip patient and one knee patient that had not been identified by the ACP. Both patients subsequently presented to CHOC with problems with their contralateral joint. Notably, both patients had been highlighted by the radiograph/questionnaire review as needing urgent review. No other patients were found to have re-presented with problems within the three year audit period and there were no cases of revision surgery.

#### *Agreement between radiographs and questionnaire for detecting a potential problem joint*

To determine whether both the questionnaire and radiograph were required for a surgeon to make an accurate decision on follow-up, we compared the agreement between the questionnaire and radiograph for detecting a 'problem' hip/knee. Table 4 shows whether the remote surgeon detected a problem on the questionnaire and/or radiograph during the review process. For both hip and knee, most patients were recalled for urgent review due to a problem detected on their questionnaire. Notably, a proportion of hip and knee patients were only identified as a potential problem when the questionnaire and radiograph were reviewed together. In some cases, a problem was detected on either the radiograph or questionnaire, but when the two were reviewed together the patients were not recalled for urgent review. For example, of the hip patients that were identified as having a potential problem with their radiograph, a quarter (7/25, 28%) were not recalled for urgent review when the surgeon reviewed the radiograph in conjunction with the questionnaire. All were listed for annual monitoring. Of the hip patients that were identified as having a potential



problem by their questionnaire responses, 15% (6/39) were not recalled for urgent review when the surgeon reviewed the questionnaire in conjunction with the radiograph. In contrast, all five hip patients who were identified as having a problem on their radiograph were recalled for urgent review when the radiograph was viewed in conjunction with the questionnaire. A total of 4/23 (17%) knee patients who were identified as having a problem by their questionnaire responses were not recalled for urgent review when the remote surgeon reviewed the questionnaire in conjunction with the radiograph.

For both hip and knee, the percentage exact agreement between the radiograph and questionnaire was high (Tables 1 and 2). However agreement according to Kappa and BAK were low, whilst agreement by PABAK was high. The disparities in agreement statistics may be attributed to the high prevalence indexes of 83.5% and 85.7% for hip and knee respectively. These are a result of most patients having 'no problem' identified on their radiograph or questionnaire, leading to a high probability of agreement between raters by chance.

#### *Questionnaire responses and surgeon's decision*

Whilst no individual question was more discerning than any other for highlighting a potential problem with the joint, the majority of participants who were listed for urgent review by the remote surgeon reported pain from the hip operation, problems with their hip since the last clinical visit and/or were taking pain killers for the joint (Table 5). Notably, only 15% (7/46) of those listed for urgent review reported that the operation had not been worthwhile, and most reported that it had help with their daily and personal activities. All patients listed as discharge and long-term follow-up reported that their operation had been worthwhile and that they were satisfied with the outcome.

A similar pattern was observed for knee patients (Table 6). Patients listed for urgent review were more likely to report problems and pain associated with their knee operation, compared

to those listed for long-term review or discharge and more likely to be taking painkillers for their joint or using a walking aid. In contrast to hip, over a third of patients listed for urgent review reported that their operation had not been worthwhile or that they were dissatisfied with their operation.

## **Discussion**

In this audit, we have shown that a questionnaire and radiograph, reviewed remotely by an orthopaedic surgeon, shows good agreement with ACP-led outpatient follow-up in terms of clinical decision making. Differences in decision-making may reflect a better understanding of the natural history of a joint replacement by the surgeon; importantly no cases in need of increased surveillance or intervention were missed by the surgeon when the radiograph and questionnaire were reviewed together. However, review of the radiograph or questionnaire alone did miss some patients with potential problems. Remote decision making by the surgeon also showed good intra-rater reliability, with identical decisions made in 98% of cases when reviewed on two occasions one year apart. An arthroplasty care practitioner could be trained to undertake this review. However this requires dedicated training and long term funding of these posts; neither of which can be guaranteed in the current climate.

Randomised trials in other specialties have demonstrated paper,<sup>9</sup> nurse-led,<sup>15</sup> telephone<sup>16</sup> and general practitioner follow-ups<sup>10</sup> as viable alternatives to doctor-led follow-up clinics, increasing patient convenience and satisfaction whilst reducing costs to the NHS.<sup>10,17</sup> This audit suggests a focussed questionnaire together with a radiograph provides sufficient information to allow specialists to accurately assess patients' post-TJR status. Notably, previous studies reported that patients completing questionnaires in their own time are less likely to omit information than during a perceived rushed consultation, and are more honest in their answers.<sup>18</sup> However, a radiograph or questionnaire used alone would not be sufficient to detect all patients with potential problems. For example, three hip patients

currently under six-monthly surveillance had progressive cement-bone interface loosening or lysis detected by radiograph, but indicated no problems on the questionnaire. To reduce the need for travel and inconvenience of attending for an x-ray, it is possible that x-rays could be offered at multiple local hospitals, connected via Picture Archiving and Communication Systems (PACS) systems, and reviewed centrally thereby. In turn this may reduce the numbers of patients lost to follow-up and improve patient satisfaction. The general consensus from our local patient advisory group on this issue was that remote surveillance by a specialist unit was potentially acceptable, provided clinical review was available for complex cases, and was preferable to a non-specialist service provided solely by GPs. This is supported by a recent study which found that 77% of patients, 95% of GPs and 100% of orthopaedic trainees did not support follow-up care being provided by GPs and specialist nurses in the community, indicating that such a move could cause potential harm to patients and would remove an important training opportunity for orthopaedic trainees to ensure that they acquire the appropriate skills to treat their patients safely.<sup>19</sup> Further work is required to fully understand the patient acceptability of such a follow-up system.

Whilst our study suggests that remote review of an x-ray and questionnaire is able to pick up patients with potential problems, further work is also necessary to ensure that potential problems would not be missed by such a system resulting in reduction in the quality of care provided to patients. However, it is hard to envisage a patient who would not be picked up with x-ray changes or symptoms who required more frequent review or surgical intervention. Furthermore the implications of how to integrate a remote system into a busy clinical system, where for example such review may be delayed due to requirement for urgent patient contact, must be considered. Our estimation is that with training an experienced orthopaedic surgeon could review a questionnaire and x-ray in a couple of minutes, whereas an outpatient appointment takes 10-20 minutes. Hence upwards of 5-10 patients could be reviewed in the time taken to review one patient under the current system.

Current guidelines have a limited evidence-base to support their recommendations, and are disparate with respect to the timing of follow-up.<sup>15,16</sup> Moreover, they are based on replacement technologies that have changed, and, for the hip, do not reflect the shift in UK practice from cemented to uncemented femoral stems, with a two-fold increase in cementless procedures since 2005.<sup>1</sup> With the exception of metal-on-metal procedures which are covered by a mandatory MHRA-specified follow-up pathway, there is no recognition within current recommendations that specific technologies and implants may require different follow-up pathways. Current recommendations also do not account for increasing fitness of the ageing population or improvements in bone stock restoration at modern revision surgery. There is often less urgency to proceed to revision surgery for asymptomatic radiographic changes compared to 10 years ago, with cases commonly kept under observation until development of symptoms triggers progression to surgery.<sup>7</sup> This raises the question that, without any routine follow-up, if patients were allowed urgent access to their surgeon if they developed pain in their replaced joint, would the pick-up rate of patients requiring intervention be better and cheaper than our current guidelines? Further studies to answer this question are urgently required.

There are limitations to this study. Revision rates in our unit are lower than the UK national average; therefore results must be interpreted with some caution and should not be extrapolated to a national level based on this evidence alone. In the 600 patients included in our audit, none required surgical intervention and we therefore cannot conclude that a paper/radiograph-clinic would identify all urgent review cases. However, apart from two patients currently under annual review, the paper/radiograph-clinic identified all patients in need of increased surveillance. Even with routine follow-up some patients will still present acutely with major loosening or fracture problems. Possibly if more time could be spent planning for the patients identified as 'at risk' from the radiograph/questionnaire combination, without the burden of the entire follow-up, potential failures of surveillance may be reduced. A cheaper and more effective follow-up programme could therefore be developed.

With modern hip and knee replacement having in excess of 90% clinical success between 10 and 20 years after implantation, it is not unexpected that follow-up of these patients takes second place to the demands of an increasingly elderly population requiring ever greater numbers of primary joint replacements. The traditional model of follow-up of the surgeon regularly seeing all their patients is no longer tenable and an evidence-based, cost-effective follow-up plan for these patients is required. The current costs to the NHS are probably in excess of £75 million annually for routine follow-up, placing huge pressure on units to curtail follow-up, with some stopping their follow-up joint replacement clinics entirely.<sup>4</sup> Whilst there is an obvious need to reduce the burden on orthopaedic services, a blanket disinvestment in follow-up cannot be supported without a strong evidence base. This audit suggests that a paper/radiograph-clinic may be a viable alternative to traditional outpatient TJR follow-up, reducing the follow-up burden by approximately 90% whilst still ensuring that cases requiring intervention are identified appropriately.

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## **Figure legends**

**Figure 1: a)** Follow-up decisions for hip replacement made by an orthopaedic outcomes ACP following an outpatient clinic and by an orthopaedic surgeon following independent review of a patient reported questionnaire and pelvic radiograph. **b)** Follow-up decisions for knee replacement made by an orthopaedic outcomes ACP following an outpatient clinic and by an orthopaedic surgeon following independent review of a patient reported questionnaire and knee radiograph.





**Table 1: Agreement summaries for hip participants, n=396**

Measure of agreement	Ordered categories ACP vs remote surgeon	Dichotomous Radiograph vs questionnaire
Percentage exact agreement	79%	89%
Kappa (95%CI)	0.69 (0.62-0.76)	0.25 (0.11-0.40)
Weighted kappa (with quadratic weights)	0.62 (0.60-0.69)	0.25 (0.09-0.40)
Weighted kappa (with custom weights)	0.56 (0.52-0.59)	-
PABAK	0.84	0.78
BAK	0.69	0.25
<b>Proportions of category specific agreement</b>		
Discharge	85.7%	
2+ years	88.5%	
1 year follow up	47.9%	
Urgent follow up	53.5%	
'Problem'		30.8%
No 'problem'		93.9%

ACP – arthroplasty care practitioner; BAK - Bias-adjusted kappa; CI – confidence interval; PABAK - Prevalence-adjusted bias-adjusted kappa.

**Table 2: Agreement summaries for knee participants, n=183**

<b>Measure of agreement</b>	<b>Ordered categories ACP vs remote surgeon</b>	<b>Dichotomous Radiograph vs questionnaire</b>
Percentage exact agreement	88%	89%
Kappa (95%CI)	0.81 (0.74-0.88)	0.18 (0.11-0.40)
Weighted kappa (with quadratic weights)	0.76 (0.73-0.82)	0.18 (0.01-0.39)
Weighted kappa (with custom weights)	0.74 (0.65-0.77)	-
PABAK	0.90	0.78
BAK	0.81	0.15
<b>Proportions of category specific agreement</b>		
Discharge	94.3%	
2+ years	90.2%	
1 year follow up	37.5%	
Urgent follow up	73.2%	
'Problem'		21.4%
No 'problem'		94.0%

ACP – arthroplasty care practitioner; BAK - Bias-adjusted kappa; CI – confidence interval; PABAK - Prevalence-adjusted bias-adjusted kappa.

Table 3: Outcomes of patients listed by ACP or surgeon for urgent review

	Listed by the ACP and remote surgeon for urgent review	Listed by the remote surgeon but not ACP for urgent review	Listed by the ACP but not remote surgeon for urgent review
<b>Hip</b>	n=22	n=30	n=12
Under close surveillance	2	1 (presented with problems with other hip)	0
Annual monitoring	4	5	2
Long-term routine follow-up	2	10	5
Discharge	12	13	4
Lost to follow-up	0	1	1
Intervention	0	0	0
	n=14	n=22	n=2
<b>Knee</b>			
Under close surveillance	0	1 (presented with problems with other knee)	0
Annual monitoring	2	0	0
Long-term routine follow-up	4	4	0
Discharge	5	2	2
Lost to follow-up	4	2	0
Intervention	0	0	0

ACP – arthroplasty care practitioner

**Table 4: Method of identifying a patient requiring 'urgent review'**

	Hip n=53 n (%)	Knee n=24 n (%)
Problem detected on questionnaire only	25 (47)	16 (66)
Problem detected on radiograph only	10 (19)	2 (8)
Problem detected on both questionnaire and radiograph	8 (15)	3 (13)
No problem detected when radiograph and questionnaire reviewed independently but patient recalled after both reviewed together	10 (19)	3 (13)

**Table 5: Descriptive summaries of participant questionnaire responses and remote surgeon follow-up decision for hip**

Question	Decision			
	Urgent review N=53	1 year N=34	2+years N=158	Discharge N=154
Any problems with the joint since last visit	28/51 (55)	7/33 (21)	28/154(18)	17/150 (11)
No problems	23 (45)	26(79)	126(82)	133(89)
Any pain from the hip operation	38/50 (76)	10/33(30)	37/153(24)	28/148 (19)
No problems	12 (24)	23(70)	116(76)	120(81)
Whether taking any painkillers for the joint	29/47 (62)	7/34 (21)	25/154 (16)	40/146 (27)
No problems	18 (38)	27 (79)	129 (84)	106 (73)
Whether using a stick or crutches as walking aids	27/49 (55)	7/33 (21)	23/154 (15)	49/147 (33)
Not using aids	22 (45)	26 (79)	131 (85)	98 (67)
Operation not helped improve daily activities	13/49 (27)	3/33 (9)	5/154 (3)	11/149 (7)
Has helped	36 (73)	30 (91)	149 (97)	138 (93)
Operation not helped improve personal activities	10/45 (22)	3/33(9)	12/155 (8)	12/145 (8)
Has improved personal activities	35 (78)	30 (91)	143 (92)	133 (92)
Operation has not been worthwhile	7/46 (15)	1/33(3)	-	-
Worthwhile	39 (85)	32 (97)	154 (100)	149 (100)
Satisfied	42/50 (84)	34/34 (100)	157/157 (100)	151 (100)
Dissatisfied	8 (16)	-	-	-

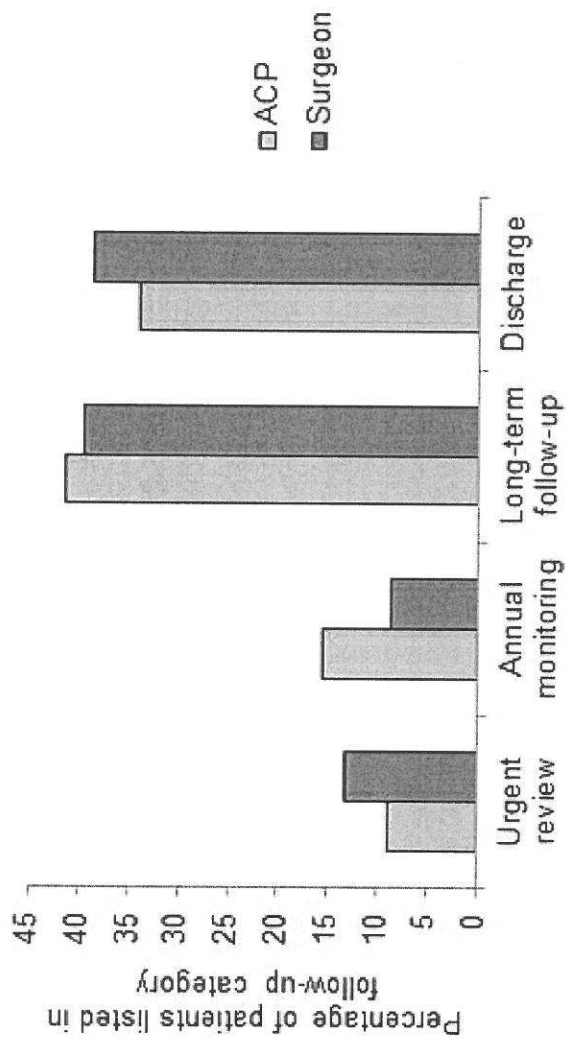
Results are N (%) for those participants answering "Yes" to the question. Missing data not shown.

**Table 6: Descriptive summaries on participant questionnaire responses and remote surgeon follow-up decision for knee**

Question	Decision			
	Urgent review N=24	1 year N=4	2+years N=66	Discharge N=91
Any problems with the joint since last visit	19/22 (86)	1 (25)	15/64 (23)	22/84 (26)
No problems	3 (14)	3(75)	49(77)	62 (74)
Any pain from the knee operation	18/20 (90)	3 (75)	20/63 (32)	34/88 (39)
No problems	2 (10)	1(25)	43(68)	54 (61)
Whether taking any painkillers for the joint	17/21 (81)	2 (50)	27/65 (42)	22/83 (27)
No problems	4 (19)	2 (50)	38 (58)	61 (73)
Whether using a stick or crutches as walking aids	20/22 (91)	2 (50)	13 (20)	29/83 (35)
Not using aids	2 (9)	2 (50)	53 (80)	54 (65)
Operation not helped improve daily activities	12/20 (60)	-	7/65 (11)	11/85 (13)
Has helped	8 (40)	4/4 (100)	58 (89)	74 (87)
Operation not helped improve personal activities	13/21 (62)	-	10/63 (16)	11/83 (13)
Has improved personal activities	8 (38)	4/4 (100)	53 (84)	72 (87)
Operation has not been worthwhile	7/21 (33)	-	-	1/86 (1)
Worthwhile	14 (67)	4/4 (100)	65/65 (100)	85 (99)
Satisfied	13/21 (62)	4/4 (100)	66 (100)	86/87 (99)
Dissatisfied	8 (38)	-	-	1 (1)

Results are N (%) for those participants answering "Yes" to the question. Missing data not shown

### Hip Replacement Follow-up Decisions





### Knee Replacement Follow-up Decisions

