

ORIGINAL REPORT



A PREOPERATIVE EDUCATION CLASS REDUCES LENGTH OF STAY FOR TOTAL KNEE REPLACEMENT PATIENTS IDENTIFIED AT RISK OF AN EXTENDED LENGTH OF STAY

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Objective: To establish whether attendance at an education class prior to total hip or knee replacement surgery as part of an enhanced recovery after surgery pathway could decrease length of hospital stay.

Methods: A single-site, retrospective cohort study comparing length of stay in hospital for patients who attended and did not attend an education class prior to hip or knee replacement surgery. Patients were stratified into 3 groups according to the predicted likelihood of an extended inpatient hospital stay using the Risk Assessment and Predictor Tool.

Results: Mean length of stay reduced by 0.37 days for patients who received hip replacement ($n = 590$) (95% confidence interval (95% CI) $-0.74, -0.01, p = 0.05$) and by 0.77 days for patients who underwent knee replacement ($n = 643$) (95% CI $-1.23, -0.31, p = 0.001$) following attendance at a preoperative education class. Patients undergoing knee replacement who were considered at high risk of an extended hospital stay stayed a mean of 2.59 days less in hospital after attending the class (mean length of stay: 4.52 (standard deviation (SD) 1.26) vs 7.11 (SD 4.18) days (95% CI $-4.62, -0.54, p < 0.02$).

Conclusion: This study supports the inclusion of a preoperative education session in this context for both hip and knee replacement procedures, and indicates that this may be most beneficial for patients undergoing knee replacement who are at risk of an extended length of stay.

Key words: arthroplasty, replacement, hip; arthroplasty, replacement, knee; preoperative care; education; enhanced recovery after surgery.

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The volume of total hip and knee replacement surgeries occurring annually in the United Kingdom (UK) for the treatment of end-stage degenerative joint disease continues to grow linearly with the ageing population (1). The application of enhanced recovery after surgery (ERAS) (also termed fast-track) program-

LAY ABSTRACT

The aim of this study was to compare length of stay in hospital between patients who attended an education class prior to elective total hip or knee replacement surgery, and those who did not attend. A further aim was to establish which patients would benefit most from a preoperative education class, using the Risk Assessment and Predictor Tool. The study showed that patients who attended the class spent 0.38 days less in hospital following hip replacement, and 0.77 days less following knee replacement surgery. Patients undergoing knee replacement who were considered at high risk of an extended hospital stay spent a mean of 2.58 days less in hospital after attending the class. These results support the inclusion of a preoperative education class in this context for both hip and knee replacement procedures, and indicate that this may be most beneficial for patients undergoing knee replacement.

mes, a multidisciplinary approach to patient care (2), combined with the improvement of surgical techniques and better pain management, has improved postoperative outcomes (3, 4). In addition, the influence that psychological factors may have on recovery from joint replacement surgery has become increasingly recognized (5, 6). Patients affected by osteoarthritis may experience worse symptoms in terms of mental health, including anxiety and depression (7, 8). Optimizing the psychological status of patients pre-surgery through education is recommended by the ERAS Society (9); however, current literature is contradictory regarding the effect of preoperative education on length of stay. Although some studies have shown improvement in length of stay with the use of a preoperative education class (10, 11), the majority of the current evidence base does not support the inclusion of routine (non-selective) psychological or educational intervention in total hip or knee replacement pathways (12–15).

Orthopaedic surgeons have a pivotal role in transitioning the care of their patients from a biomedical to a biopsychosocial model; however, they may not always formally screen patients, and therefore refer for psychological treatment (16). Therefore, it may be that attendance at a preoperative education session could improve outcomes for some patients by inducing feelings of control and empowering patients to undertake positive

health behaviours prior to admission to hospital. Although reported to have no effect on postoperative pain (17), there is evidence that preoperative education can attenuate anxiety (18, 19), encourage compliance with physiotherapy (20) and increase self-esteem (19), and may be most beneficial to high-risk patients, presenting with co-morbidities or impaired mental health as part of a targeted prehabilitation programme. The primary aim of the current study was to compare length of stay between patients who attended an education class prior to elective total hip or knee replacement surgery, and those who did not attend. The secondary aim was to establish which patients would benefit the most from a preoperative education class, using the Risk Assessment and Predictor Tool (RAPT) (21).

METHODS

This is a single-site, retrospective cohort study, reported in accordance with the Reporting of Studies using Observational Routinely-collected Data (RECORD) statement (22). Patients were retrospectively, consecutively recruited between 27 July 2010 and 4 November 2011 from the Royal Bournemouth Hospital, Bournemouth, UK. Patients were considered eligible for inclusion if they had undergone elective total hip replacement or total knee replacement surgery. All patients were enrolled onto a standardised and previously published ERAS pathway (23), which included: a comprehensive preoperative assessment process, patient education, discharge planning, admission to hospital on the day of surgery, a default anaesthetic technique, effective pain management, and twice-daily physiotherapy until discharge (23). All hip replacements were performed using the posterior approach, whilst all knee replacements were carried out using the medial parapatellar approach. Revision cases and re-admitted patients were excluded from the study.

Outcome measures and data collection

The primary outcome measures were: (i) length of hospital stay; and (ii) attendance at the preoperative education class, collected retrospectively. Attendance at the preoperative education class was recorded routinely on an attendance register prior to admission. Length of hospital stay was recorded routinely on the day of discharge as the number of days between hospital admission and discharge home. The 2 outcome measures were compared in order to establish if there was a relationship between attending a preoperative education class and the time spent in hospital following surgery. The discharge criteria following total hip replacement at the Royal Bournemouth Hospital includes: (i) being able to safely walk independently around the ward either with crutches or with walking sticks; (ii) being able to stair climb; being able to get on and off a bed, chair and toilet independently; (iii) dry wound (with no significant discharge), showing signs of healing; (iv) satisfactory blood results and X-ray; (v) controlled pain; and (vi) being medically fit.

The RAPT questionnaire was originally designed to identify a patient's risk of needing extended inpatient rehabilitation following total hip or knee replacement (21) and was included within the current study to compare outcomes between different groups of patients. At the education session, all patients were asked to complete a RAPT questionnaire (Appendix I) to aid the therapists'

discharge planning (21). If patients did not attend their education session, the RAPT was completed on the day of surgery. Scores were categorized into *red* (high-risk of needing extended inpatient rehabilitation services, score <6), *amber* (medium-risk of needing extended inpatient rehabilitation, score 6–9) and *green* (low-risk of needing extended inpatient rehabilitation, score >9) (21), and then compared with length of stay and class attendance data.

Data access

Data were accessed through the hospital's online administrative system. The researchers were granted access as they all held professional positions at the Royal Bournemouth Hospital at the time of data collection.

Preoperative education

Following a phone call to arrange their operation date, all patients received a letter with specific instructions to attend a preoperative education class. The session was delivered within 2 weeks of the date of surgery, by a physiotherapist, occupational therapist and nurse, who all worked on the ward where the ERAS programme was delivered. The personnel delivering the class were regularly rotated and all new staff were trained to deliver the content. The aims of the 1-h session were: (i) to reduce anxiety; and (ii) to provide a detailed explanation of the pathway. Patients were encouraged to ask questions and bring carers so that their expectations could also be managed. Education topics included: what to bring and how to prepare preoperatively, exercises to start before the operation, post-operative pain control and anaesthetic protocols. The patients were also given the opportunity to practice walking with crutches, and to discuss any equipment they required for their return home (23). All patients were given a series of knee range of movement and quadriceps-strengthening exercises (Appendix II) preoperatively and were instructed to complete these 3 times a day.

Non-attendance at preoperative education

Regardless of whether the patient attended the preoperative education class, all patients received an education booklet at pre-assessment when they were listed for surgery and there were no other differences in treatment pathways. The booklet included advice on protection, rest, ice, compression and elevation (PRICE) principles to help manage postoperative pain and swelling. All patients had standardized inpatient physiotherapy and occupational therapy postoperatively until they met the joint-specific discharge criteria and were discharged from hospital.

Sample size

No formal power analysis was performed. The initial 15-month period of the implementation of a modified ERAS pathway (23) was chosen as study interval, between July 2010 and November 2011 to allow for a minimum of 1,200 consecutive cases.

Statistical analysis

The data were analysed using IBM SPSS Statistics 19. The normality of the data was tested using the Shapiro–Wilk test, and a 2-sample *t*-test was used to detect if there was a statistically significant relationship between attending a preoperative education class and length of hospital stay following total hip and knee replacement surgery. Patients who did or did not at-

Table I. Characteristics and length of stay for patients who underwent total hip and knee replacement between 27 July 2010 and 04 November 2011

	Total hip replacement (n = 590)	Total knee replacement (n = 643)
All (n = 1,233)		
Attended education class		
Patients, n (%)	497 (84.2)	521 (81)
Age, years, mean (SD)	69.87 (9.69)	70.90 (8.22)
Sex, female/male, n	324/173	305/216
Length of stay, days, mean (SD)	4.00 (1.27)	4.14 (1.37)
RAPT score, mean (SD)	8.72 (2.10)	8.84 (1.97)
Did not attend education class		
Patients, n (%)	93 (15.8)	122 (19)
Age, years, mean (SD)	70.96 (10.63)	72.15 (8.73)
Sex (female/male), n	59/34	76/46
Length of stay, days, mean (SD)	4.37 (1.74)	4.91 (2.49)
RAPT score, mean (SD)	8.26 (2.50)	8.33 (2.18)

RAPT: Risk Assessment and Predictor Tool; SD: standard deviation.

tend the pre-operative group, based on 3 sub-categories for each group of RAPT (red, amber and green), were compared using the Kruskal–Wallis test to establish if the score was evenly distributed. A *p*-value of 0.36 showed that the samples came from the same population. All data were analysed at a level of statistical significance of 0.05 and a power of 0.95.

RESULTS

Table I presents mean data from 1,233 patients with elective total hip or knee replacement, sourced from the hospital database. A total of 1,018 patients (82.5%) attended their preoperative education session (hip replacement: 497 (84.2%), knee replacement: 521 (81%)) and 215 (17.5%) did not attend (hip replacement: 93 (15.8%), knee replacement: 122 (19%)). The mean time between the education class and surgery was 7.1 days (range 2–21 days). Mean length of stay was reduced by 0.37 days for patients who had received total hip replacement surgery (95% CI –0.74, –0.01, *p*=0.05) and by 0.77 days for patients who had undergone total knee replacement (95% CI –1.23, –0.31, *p*=0.001) following attendance at a 1-h preoperative education class.

Total hip replacement

There were no statistically significant differences in mean length of stay between patients undergoing hip

replacement who did and did not attend their preoperative education class when data were categorized into red, amber and green RAPT scores (Table II).

Total knee replacement

Patients who received total knee replacement with a red RAPT score and attended the preoperative education class stayed a mean of 2.59 days less in hospital than those who did not attend (mean length of stay 4.52 (SD 1.26) vs 7.11 days (SD 4.18) (95% CI –4.62, –0.54, *p*<0.02). Patients with an amber RAPT score who attended the preoperative education class stayed 0.56 days less in hospital than those who did not attend (mean length of stay 4.34 (SD 1.46) vs 4.90 days (SD 1.99) (95% CI –1.10, –0.03, *p*<0.04). However, there were no significant differences between patients who attended and did not attend the class with a green RAPT score (Table II).

DISCUSSION

This retrospective analysis demonstrates a general reduction in mean length of stay for patients undergoing total hip and knee replacement surgery who attended a preoperative education class, compared with those who did not. The benefits were greatest for patients presenting with a high or medium risk of needing extended inpatient rehabilitation, as classified by RAPT score, and were more clinically significant for patients at high risk and who received knee replacement surgery. Other factors previously reported to contribute to differences in length of stay are: age, use of preoperative walking aid, anaemia, diabetes, hypertension, use of anticoagulants, cardiopulmonary disease, and psychiatric disease (24–27).

The results of the current study are similar to those of Yoon et al. (10), whereby patients who attended an education session experienced a significantly shorter length of stay than non-participants for both total hip replacement (3.1 (SD 0.9) vs 3.9 days (SD 1.4); *p*=0.001) and total knee replacement (3.1 (SD 0.9) vs 4.1 days (SD 1.9); *p*=0.001). However, Yoon et al.'s

Table II. Attendance at class, mean length of stay and RAPT scores for hip and knee replacement

	Red RAPT			Amber RAPT			Green RAPT				
	n (%)	LOS, days, mean (SD)	Difference in LOS (95% CI)	n (%)	LOS, days, mean (SD)	Difference in LOS (95% CI)	n (%)	LOS, days, mean (SD)	Difference in LOS (95% CI)		
<i>Total hip replacement patients</i>											
Attended 40 (74)	5.35 (2.06)	78.75 (8.28)	0.06	249 (84)	4.12 (1.17)	73.2 (8.22)	–0.53	208 (86)	3.59 (0.93)	64.18 (8.36)	0.08
DNA 14 (26)	5.29 (1.81)	80.79 (3.60)	(–1.18, 1.31)	46 (16)	4.65 (2.01)	74.13 (8.95)	(–1.15, 0.08)	33 (14)	3.52 (0.71)	62.36	(–0.26, 0.41)
<i>Total knee replacement patients</i>											
Attended 46 (71)	4.52 (1.26)	77.43 (5.48)	–2.58	249 (80)	4.34 (1.46)	73.63 (7.66)	–0.57	226 (84.5)	3.85 (1.24)	66.59 (7.05)	–0.05
DNA 19 (29)	7.1 (4.18)	79.47 (7.52)	(–4.62, –0.54)	62 (20)	4.9 (1.99)	74.27 (7.61)	(–1.10, –0.03)	41 (15.5)	3.9 (1.22)	65.54 (6.29)	(–0.46, 0.36)

RAPT: Risk Assessment and Predictor Tool; SD: standard deviation; DNA; did not attend; LOS: length of stay.

study included a much smaller number of patients ($n=261$ vs 1,233 in the current study) over a similar time period, with a much higher rate of non-participation (36% vs 17.5%). Similarly, in a study on patients undergoing primary and revision knee replacement (11), implementation of an education session led to a reduction in length of stay from 7 days to 5 days ($p<0.01$). However, the current study differs in that it evaluates attendees and non-attendees, and is not a before and after comparison.

The RAPT questionnaire was originally designed to identify a patient's risk of needing extended inpatient rehabilitation following total hip or knee replacement (21). Seven risk factors related to discharge were recognized as: age, sex, preoperative walking distance, preoperative gait aid, community support, the presence of a caregiver on return home, and patient expectation (21). Patient expectation was found to significantly impact outcome, but was considered unstable due to a range of influences, including patient and caregiver's perceptions of efficacy, and was therefore removed from the final RAPT model (21). Recommendations were given to discuss patient expectations during pre-admission assessment to help clinicians and patients mutually agree a discharge plan (21). Therefore, it is possible that the significant reduction in length of stay between RAPT-graded high-risk patients who did and did not attend a preoperative education class was due to altered patient expectations. The specific aims of the session were to reduce anxiety and provide a detailed explanation of the pathway to both patients and their carers (23), since procedure-related uncertainty in addition to unrealistic expectations of outcome can contribute to anxiety and negatively affect postoperative recovery (28). Anxiety is adaptive in motivating behaviour that helps patients to cope with threatening situations, such as surgery, and, as feelings of control encourage anxiety to become facilitative, it is important that a patient receives sufficient information in order to improve their coping ability. The amount of information required to be facilitative is patient-dependent (18) and therefore personalizing preoperative education to complement the patient's RAPT score, or other preoperative risk screening tools, can help to manage patient expectations.

Furthermore, adequate screening of physiological and cognitive reserves in patients scheduled for surgery can identify those who are elderly, isolated, or functionally impaired preoperatively and enable proactive perioperative management strategies to reduce adverse postoperative outcomes or readmission (29). During the education class, patients were encouraged to discuss any equipment they required for their return home (23). Subsequently, appropriate discharge arrangements

could be made preoperatively in order to facilitate the return home. For example, where community support or additional care was lacking, home health services could be arranged. Failure to attend the class may have resulted in the communication of needs occurring post-operatively, which could delay discharge. Given that outpatient or day-case surgery is now possible for hip and knee replacement procedures (30), healthcare professionals may have less time to identify patients who require additional support. Therefore, attendance at a preoperative education class is important to facilitate the management of high-risk patients.

The results of the current study demonstrate a significant reduction in length of stay for high-risk total knee replacement patients who attended their preoperative education class; however, the effect within the cohort of patients undergoing hip replacement was non-significant. These results are consistent with the wider literature, since, although the 2 procedures are regularly investigated together, they are different procedures and there is a difference in the "success" rate of hip and knee replacements (31). Total hip replacement is considered highly successful, with very good long-term results (32); however, there is evidence that reports patient dissatisfaction (33, 34) and a prolonged recovery in the early and intermediate postoperative period following knee replacement surgery (35, 36). Patients have reported feeling "unsafe" undergoing total knee replacement on an outpatient basis (37), and there are differences in the characteristics of the population that develop knee and hip osteoarthritis, which may affect the psychological status of a patient (31). For example, a high body mass index is often correlated with the development and progression of osteoarthritis of the knee, but not of the hip (38), and obesity has been linked to an increased psychological burden (39). Impaired psychological health, uncertain expectations of surgery and fear of the operation are reported to affect decision-making regarding knee replacement (31), and therefore patients on the waiting list may catastrophize or engage in negative health behaviours. Fortunately, negative thoughts are susceptible to change and can be reframed using cognitive-restructuring techniques, and therefore, high-risk patients undergoing knee replacement may have the most to gain from attending a preoperative education class, as suggested by the results of the current study. Adopting a biopsychological model in education, which focuses on the complex interaction between psychological, social and biological factors that contribute to health problems can help patients to understand the thoughts and feelings that influence their behaviours (40). Therefore, incorporating cognitive-behavioural approaches into the

preoperative class may provide additional benefits to high-risk patients undergoing hip or knee replacement surgery (41).

Retrospective analyses are limited by threats to both internal and external validity (42). As the current study utilized existing clinical data, data collection was secondary and therefore lacks reliability. In addition, the current study is limited by the fact that both patient groups received a procedure-specific information booklet containing information that is also covered in the education class. This may have produced a smaller effect size than if the comparison group received no preoperative education at all. Likewise, the standardized discharge arrangements used in the ERAS pathway (23) may have limited between-group variations.

In conclusion, this study highlights that the inclusion of a preoperative education session in an ERAS pathway may be most beneficial for patients undergoing knee replacement, and who are identified as being at high risk of an extended length of stay. Future work should focus on identifying high-risk patients and subsequently personalizing their education class to meet their biopsychosocial needs.

REFERENCES

1. Registry NJ. National Joint Registry 15th Annual Report. 2018 [cited 2018 Dec 11]; Available from: <http://www.njrcentre.org.uk/njrcentre/Reports-Publications-and-Minutes/Annual-reports>.
2. Ljungqvist O, Scott M, Fearon KC. Enhanced recovery after surgery: a review. *JAMA Surg* 2017; 152: 292–298.
3. Ibrahim MS, Twaij H, Giebaly DE, Nizam I, Haddad FS. Enhanced recovery in total hip replacement: a clinical review. *Bone Joint J* 2013; 95-B: 1587–1594.
4. Ibrahim MS, Alazzawi S, Nizam I, Haddad FS. An evidence-based review of enhanced recovery interventions in knee replacement surgery. *Ann R Coll Surg Engl* 2013; 95: 386–389.
5. Fortin PR, Clarke AE, Joseph L, Liang MH, Tanzer M, Ferland D, et al. Outcomes of total hip and knee replacement: preoperative functional status predicts outcomes at six months after surgery. *Arthritis Rheum* 1999; 42: 1722–1728.
6. Lingard EA, Riddle DL. Impact of psychological distress on pain and function following knee arthroplasty. *J Bone Joint Surg Am* 2007; 89: 1161–1169.
7. Suri P, Morgenroth DC, Hunter DJ. Epidemiology of osteoarthritis and associated comorbidities. *Pm R* 2012; 4: S10–S19.
8. Leite AA, Costa AJG, Lima BdAMd, Padilha AVL, Albuquerque ECd, Marques CDL. Comorbidities in patients with osteoarthritis: frequency and impact on pain and physical function. *Rev Bras Reumatol* 2011; 51: 118–123.
9. Wainwright TW, Gill M, McDonald D, Middleton RG, Reed M, Sahota O, et al. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. *Acta Orthop* 2019 (in press).
10. Yoon RS, Nellans KW, Geller JA, Kim AD, Jacobs MR, Macaulay W. Patient education before hip or knee arthroplasty lowers length of stay. *J Arthroplasty* 2010; 25: 547–551.
11. Jones S, Alnaib M, Kokkinakis M, Wilkinson M, St Clair Gibson A, Kader D. Pre-operative patient education reduces length of stay after knee joint arthroplasty. *Ann Roy Coll Surgeons Engl* 2011; 93: 71–75.
12. Bay S, Kuster L, McLean N, Byrnes M, Kuster MS. A systematic review of psychological interventions in total hip and knee arthroplasty. *BMC Musculoskelet Disord* 2018; 19: 201.
13. Moyer R, Ikert K, Long K, Marsh J. The value of preoperative exercise and education for patients undergoing total hip and knee arthroplasty: a systematic review and meta-analysis. *JBJs Rev* 2017; 5: e2.
14. McDonald S, Page MJ, Beringer K, Wasiak J, Sprowson A. Preoperative education for hip or knee replacement. *Cochrane Database Syst Rev* 2014: CD003526.
15. Jordan RW, Smith NA, Chahal GS, Casson C, Reed MR, Sprowson AP. Enhanced education and physiotherapy before knee replacement; is it worth it? A systematic review. *Physiotherapy* 2014; 100: 305–312.
16. Vranceanu AM, Beks RB, Guitton TG, Janssen SJ, Ring D. How do orthopaedic surgeons address psychological aspects of illness? *Arch Bone Jt Surg* 2017; 5: 2–9.
17. Louw A, Diener I, Butler DS, Puenteadura EJ. Preoperative education addressing postoperative pain in total joint arthroplasty: review of content and educational delivery methods. *Physiother Theory Pract* 2013; 29: 175–194.
18. Daltroy LH, Morlino CI, Eaton HM, Poss R, Liang MH. Preoperative education for total hip and knee replacement patients. *Arthritis Care Res* 1998; 11: 469–478.
19. Gammon J, Mulholland CW. Effect of preparatory information prior to elective total hip replacement on psychological coping outcomes. *J Adv Nurs* 1996; 24: 303–308.
20. Butler GS, Hurley CA, Buchanan KL, Smith-VanHorne J. Prehospital education: effectiveness with total hip replacement surgery patients. *Patient Educ Couns* 1996; 29: 189–197.
21. Oldmeadow LB, McBurney H, Robertson VJ. Predicting risk of extended inpatient rehabilitation after hip or knee arthroplasty. *J Arthroplasty* 2003; 18: 775–779.
22. Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Petersen I, et al. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) statement. *PLoS Med* 2015; 12: e1001885.
23. Wainwright TW, Middleton RG. An orthopaedic enhanced recovery pathway. *Curr Anaesthes Crit Care* 2010; 21: 114–120.
24. Jorgensen CC, Kehlet H, Lundbeck Foundation Centre for Fast-track H, Knee Replacement Collaborative G. Role of patient characteristics for fast-track hip and knee arthroplasty. *Br J Anaesth* 2013; 110: 972–980.
25. Kehlet H, Jorgensen CC. Predicting postoperative morbidity: in what procedures and what patients? *Anesthesiology* 2014; 120: 1297.
26. Husted H, Holm G, Jacobsen S. Predictors of length of stay and patient satisfaction after hip and knee replacement surgery: fast-track experience in 712 patients. *Acta Orthop* 2008; 79: 168–173.
27. Jorgensen CC, Knop J, Nordentoft M, Kehlet H, Lundbeck Foundation Centre for Fast-track H, Knee Replacement Collaborative G. Psychiatric disorders and psychopharmacologic treatment as risk factors in elective fast-track total hip and knee arthroplasty. *Anesthesiology* 2015; 123: 1281–1291.
28. Pritchard MJ. Managing anxiety in the elective surgical patient. *Br J Nurs* 2009; 18: 416–419.
29. Kim S, Brooks AK, Groban L. Preoperative assessment of the older surgical patient: honing in on geriatric syndromes. *Clin Interv Aging* 2015; 10: 13–27.
30. Gromov K, Kjarsgaard-Andersen P, Revald P, Kehlet H, Husted H. Feasibility of outpatient total hip and knee arthroplasty in unselected patients. *Acta Orthopaedica* 2017; 88: 516–521.
31. Barlow T, Griffin D, Barlow D, Realpe A. Patients' decision

- making in total knee arthroplasty: a systematic review of qualitative research. *Bone Joint Res* 2015; 4: 163–169.
32. Learmonth ID, Young C, Rorabeck C. The operation of the century: total hip replacement. *Lancet* 2007; 370: 1508–1519.
 33. Bourne RB, Chesworth B, Davis A, Mahomed N, Charron K. Comparing patient outcomes after THA and TKA: is there a difference? *Clin Orthop Relat Res* 2010; 468: 542–546.
 34. Dickstein R, Heffes Y, Shabtai EI, Markowitz E. Total knee arthroplasty in the elderly: patients' self-appraisal 6 and 12 months postoperatively. *Gerontology* 1998; 44: 204–210.
 35. O'Brien S, Bennett D, Doran E, Beverland DE. Comparison of hip and knee arthroplasty outcomes at early and intermediate follow-up. *Orthopedics* 2009; 32: 168.
 36. Ouellet D, Moffet H. Locomotor deficits before and two months after knee arthroplasty. *Arthrit Rheum* 2002; 47: 484–493.
 37. Adelani MA, Barrack RL. Patient perceptions of the safety of outpatient total knee arthroplasty. *J Arthroplasty* 2019; 34: 462–464.
 38. Grotle M, Hagen KB, Natvig B, Dahl FA, Kvien TK. Obesity and osteoarthritis in knee, hip and/or hand: an epidemiological study in the general population with 10 years follow-up. *BMC Musculoskelet Disord* 2008; 9: 132.
 39. Health Nio. Health implications of obesity. National Institutes of Health Consensus Development Conference Statement. *Ann Intern Med* 1985; 103: 1073–1077.
 40. Birch S, Stilling M, Mechlenburg I, Hansen TB. Effectiveness of a physiotherapist delivered cognitive-behavioral patient education for patients who undergoes operation for total knee arthroplasty: a protocol of a randomized controlled trial. *BMC Musculoskelet Disord* 2017; 18: 116.
 41. O'Shea E, Branney D, Anstee L, Malaffo M, Hopper I. Pre-operative psychological intervention for patients receiving elective hip and knee replacements. 7th UK Enhanced Recovery after Surgery Congress. Newcastle, 2017.
 42. Tofthagen C. Threats to validity in retrospective studies. *J Adv Pract Oncol* 2012; 3: 181–183.



The Royal Bournemouth and Christchurch Hospitals

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RAPT

Please answer the following questions to help us plan your discharge:

	Value	Please tick
1. How old are you?	30-65 years 66-75 years >75 years	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2. Are you male or female?	Male Female	<input type="checkbox"/> <input type="checkbox"/>
3. How far can you walk at the moment?	Over 300 yards (+/- rests) 50-300 yards Housebound most of the time	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4. Do you use any aids to help your walking?	None Stick Crutches or frame	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5. Do you have any additional help at home? (e.g. meals on wheels)	None or one time per week Two or more times per week	<input type="checkbox"/> <input type="checkbox"/>
6. Will you have someone living with you after your operation?	Yes No	<input type="checkbox"/> <input type="checkbox"/>

What type of property do you live in?

- House
- Flat
- Bungalow
- Maisonette
- Other (please specify)

Do you have external steps to access your property?

- Yes
- No

When you are discharged from hospital are you planning to go home or are you staying elsewhere?

- Home
- Elsewhere (e.g. son/daughters home).....


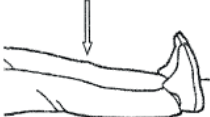



Appendix I. Risk Assessment and Predictor Tool (RAPT) questionnaire.

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Exercises following your Total Hip Replacement

Early Exercises

You should start these exercises 1–3 as soon as you are able to after your operation. These are designed to reduce the risks associated with being on bed rest. You should not complete exercises 4 and 5 until you have seen your physiotherapist, they will show you how to complete these correctly.


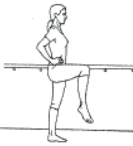


Exercise 1 When lying or sitting, bend and straighten your ankles briskly. Repeat this 10 times every hour .	
Exercise 2 Sitting in bed with your legs out straight. Pull your toes towards you and push your knees down firmly into the bed. Repeat this 10 times every hour . Also squeeze your buttocks together 10 times every hour .	
Exercise 3 Sitting in bed, lift one arm up above your head then return it to your side. Repeat with the other arm. Repeat this 10 times every hour with both arms. Take care if you have a drip in your arm. Additionally regularly take 3 deep breaths in through your nose then out through your mouth.	
Exercise 4 Lie on your back with your leg out straight on the bed. Bend and straighten your hip and knee by sliding your foot up and down the bed. Repeat this 10 times every hour .	
Exercise 5 Lie on your back with your leg out straight on the bed. Slowly slide your leg out to the side then back to the middle. Repeat this 10 times every hour .	

Appendix 2. Physiotherapy exercises.

The Royal Bournemouth and
 Christchurch Hospitals
NHS Foundation Trust


Advanced Exercises

Your physiotherapist will go through these exercises with you when appropriate. You should do these **every hour whilst in hospital** and then continue these **3–4 times a day once home**.









Exercise 1 Stand up straight holding onto a support. Slowly lift your leg out to the side then return it to the starting position. Aim to repeat this 10 times with each leg .	
Exercise 2 Stand up straight holding onto a support. Slowly lift your knee up in front of you then return it to the starting position. Aim to repeat this 10 times with each leg .	
Exercise 3 Stand up straight holding onto a support. Slowly move your leg out behind you, keeping your knee straight, then return it to the starting position. Aim to repeat this 10 times with each leg .	
Exercise 4 Stand up straight holding onto a support with your feet hip width apart. Slowly bend your knees and lower your body a few inches whilst keeping your back straight. Hold this position for 5 seconds then slowly straighten your knees and return to the starting position. Aim to repeat this 10 times .	

Hip Precautions

(You should follow these for 3 months unless told otherwise by your surgeon or physiotherapist)

- DO NOT** cross you legs or ankles
- DO NOT** bring your knee higher than your hip
- DO NOT** reach down past your knees
- DO NOT** twist your body

Appendix II. Cont.

Physiotherapy Following Your Knee Replacement Surgery		
Early Exercises – You need to start these exercises immediately after your operation and continue regularly until your physiotherapist progresses you onto the advanced exercises.		
Exercise 1		When lying or sitting, bend and straighten your ankles briskly. Repeat this 10 times every hour.
Exercise 2		Lie on your back with your legs straight. Pull your toes towards you and push your knees down firmly against the bed. Repeat this 10 times every hour.
Exercise 3		Sitting up in bed. Lift one arm up above your head then return it to your side. Repeat with the other arm. Do this alternately 10 times every hour. Take care if you have a drip in your arm. Regularly take 3 deep breaths whilst lying in bed.
Exercise 4		Lie on your back with your leg out straight and the doughnut under your heel. Bend and straighten your hip and knee by sliding your foot up and down the board. Repeat this 10 times every hour. If you are finding this exercise difficult, only complete it with a Physiotherapist present.
Exercise 5		Lie on your back with your leg straight. Pull your toes towards you keep the knee straight and slowly lift the leg a little way off the bed, hold for 3 seconds then lower back to the starting position. Repeat this 5 times every hour.
Advanced Exercises		
Exercise 1		Sit on a chair with your feet on the floor. Bend your knee as much as possible by sliding it back towards the chair. Use your other leg to help you bend it further. Repeat this 10 times every hour.
Exercise 2		Sit on a chair with your feet on the floor. Pull your toes up towards you, tighten your thigh muscle and straighten your knee. Hold for 3 seconds then slowly lower your leg back down to the floor. Repeat 10 times hourly.
Exercise 3		Sit in a chair with your leg elevated on a stool for 10-15 minutes. Keep your leg as straight as possible.

Appendix II. Cont.