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The Use of Adaptive Equipment Following Total Knee Replacement

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Key Findings:

Although there were no differences pre-operatively or on discharge in pain and function, patients requiring adaptive equipment following total knee replacement had significantly worse pain and function six weeks post-operatively.

What has the study added:

Patients issued with adaptive equipment following total knee replacement will require to use it for a minimum of 4 weeks.

Abstract

Purpose

This study evaluates the need for adaptive equipment following total knee replacement. There are no recent studies to guide Occupational Therapists in the optimum time adaptive equipment is required following total knee replacement.

Method

A non-experimental, concurrent mixed methods approach was used. The study population was patients attending for total knee replacement at a large general hospital. Outcome measures were the Oxford Knee Score, the UK Functional Independence Measure and a weekly diary.

Results

19 patients were included in the study. Following assessment 53% (N = 10) required adaptive equipment following total knee replacement. No significant difference was found in pre-operative pain or function scores, gender or surgical pathway when comparing those who did and did not need adaptive equipment post-operatively. Patients who required adaptive equipment post-operatively had significantly worse pain ($P = 0.030$) and function ($P = 0.040$) at six weeks post-operatively and had significantly longer in-patient stay ($P = 0.041$).

Conclusion

Although there are resource implications patients requiring adaptive equipment following total knee replacement should be assessed by Occupational Therapy staff six weeks post-operatively to ensure optimal functional outcomes following surgery.

Introduction

Total Knee Replacement

Osteoarthritis of the knee is one of the most common causes of disability (Kennedy et al 2008) and total knee replacement is the treatment of choice for end stage knee osteoarthritis (Toye et al 2006). Total knee replacement aims to reduce pain and increase patients' level of function (Jacobson et al 2008). In the United Kingdom, more than 87,000 total knee replacements are completed annually (National Joint Registry 2012).

Enhanced Recovery Pathway

One surgical pathway that has increased in its use is that of the enhanced recovery pathway following total knee replacement. The enhanced recovery pathway is a surgical and anaesthetic technique that can reduce the length of hospital stay and speed up rehabilitation (Kigozi et al 2011).

Occupational Therapy

Following total knee replacement, patients report having difficulty with completing activities of daily living such as washing, dressing and getting on and off of bed, toilet or chair (Beer et al 2012). As part of the Occupational Therapy assessment and intervention, adaptive equipment can be issued to patients to increase or maintain independence (Turner et al 2007). A literature search did not reveal any research which could be used to give patients and therapists advice on the duration of use for adaptive equipment on discharge home following total knee replacement. The aims of this study were to evaluate the use of adaptive equipment following total knee replacement for patients going through both the standard pathway and the enhanced recovery pathway and in particular how long patients continue to use the equipment at home.

Literature Review

Literature Search Approach

Literature search was undertaken using the following databases Medline, Web of Science, the Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Cochrane Reviews. The databases were searched for papers published between 2002 and 2013. Due to the limited research in Occupational Therapy and adaptive equipment, the search time frame was extended to between 1990 and 2013. The search terms used were: arthroplasty, replacement, knee, fast track, enhanced recovery, Occupational Therapy, activities of daily living, Functional Independence Measure, Oxford Knee Score, outcome measure, education and patient perceptions.

Total Knee Replacement

A large number of previous studies have reported that, regardless of factors such as age, gender and body mass index, total knee replacement is effective in reducing pain and increasing function (Vincent et al 2006, Kennedy et al 2006, Vincent et al 2007, Kennedy et al 2008, Nerhus et al 2010, Lopez-Olivo et al 2011). Although previous studies have demonstrated favourable results, the degree of improvement has varied. It has been highlighted that poorer pre-operative function is a predictor for poorer post-operative function (Hall et al 2008, Scott et al 2010).

Enhanced Recovery Pathway

The enhanced recovery pathway is a surgical, anaesthetic and multi-disciplinary pathway that allows for earlier mobilisation, rehabilitation and a reduction in length of stay following surgery. Raphael et al (2011) state the main aspects of the enhanced recovery pathway are; pre-operative patient education, multi-modal analgesia with periarticular injections, early mobilisation and rehabilitation and co-ordinated discharge planning. An enhanced recovery pathway is more cost effective than the standard pathway (Antrobus and Bryson 2011) and if used for all total knee replacements in the UK could save 434,520 bed days per year (Malviya et al 2011).

Occupational Therapy and Adaptive Equipment

Following total knee replacement, the role of the Occupational Therapist is to provide rehabilitation to facilitate the patients' discharge and to promote return to their roles and occupations (Mooney and Ireson 2009). Following functional assessment with

the patient, Occupational Therapists often prescribe adaptive equipment such as bath or shower aids, chair or bed raisers, toilet seats or frames and dressing aids (Turner et al 2007). This adaptive equipment is required to allow the patient to function as independently as possible during the post-operative period when function may be reduced. However, there is little research which looks at patients' compliance and use of the equipment once it has been issued and patients are discharged home. From the results of their literature review Wielandt and Strong (2000) reported that, following discharge from orthopaedics, use of equipment at six weeks post-operatively was 46%. Reasons for stopping use of the equipment were put down to the patients physical health improving and 'living arrangements', however, the term 'living arrangements' was not explained further. They state that safety and levels of independence may be 'compromised' if patients stop using adaptive equipment too early. Neville-Jan et al (1993) sent questionnaires to 80 patients who had received adaptive equipment, three months after hospital discharge. The non-utilisation rate at this time was 36%. Gitlin et al 1999), who studied patients living at home with a wide range of health conditions, and Wielandt et al (2001), who studied patients discharged following general medical or surgical admissions, both specifically investigated patients' use of adaptive bathing equipment. At three months and eight weeks respectively both studies showed a non-utilisation rate of at least 20% (Gitlin et al 1999, Wielandt et al 2001). Wielandt et al (2001) stated that patients will cease use of equipment if their medical condition or level of function improves. These studies however, were not focused specifically on patients following joint replacement.

Two more recent studies showed similar results. Non-utilisation of adaptive equipment was reported as 22% by Sainty et al (2009) and 28% by Thomas et al (2010). However, Sainty et al (2009) studied community patients who had a variety of health conditions and had ongoing health needs. Thomas et al (2010) investigated patients after total hip replacement and showed that the majority of patients continued to use the equipment regardless of time since surgery. The study by Thomas et al (2010) had a very small sample size of 9 and followed patients for up to 4 years post-operatively. This time period may alter patients' opinions and memory of the initial intervention and use of the equipment (Flick 2011). Continued or long term use of adaptive equipment may results in patients becoming reliant on

the equipment, reducing their functional ability. In addition it is important that patients return their equipment when it is no longer needed in order for it to be recycled for future patients. Continuous use of equipment reduces the cycle of return and re-issue and thus has resource implications.

Kiefer and Emery (2006) reviewed records of 47 patients who had a total knee replacement to identify patients' ability with self care and transfer tasks on discharge following total knee replacement. They reported that, as assessed by the Functional Independence Measure, patients required adaptive equipment to be independent with the tasks. In contrast Iyengar et al (2007) stated that, on discharge, all of the 174 patients in their study were independent without the use of adaptive equipment following total knee replacement. These two studies demonstrate the variation in provision of adaptive equipment following total knee replacement.

In summary, previous studies have demonstrated variation on what equipment is issued by Occupational Therapists and furthermore there is variation in the amount of time that patients use adaptive equipment following total knee replacement. This is important as continuing to use equipment for too long can reduce function and create dependence on its use, whereas stopping use of equipment too early can increase the risk of injury (Neville-Jan et al 1993).

Kiefer and Emery (2006), Brittle et al (2007) and Khan et al (2009) identified the need for evidence to support practice and the efficacy of Occupational Therapists issuing adaptive equipment following total knee replacement. This is supported by a Cochrane Review which recommends that further study is required on the effectiveness of specific rehabilitation interventions and components following lower extremity joint replacement (Khan et al 2009). The aims of this study were to evaluate the use of adaptive equipment following total knee replacement for patients going through both the standard pathway and the enhanced recovery pathway and in particular how long patients continue to use the equipment at home.

Methodology

Method

For this study, a non-experimental, concurrent mixed methods approach was used. The study population was patients attending for total knee replacement at a large general hospital. Patients were assessed on three occasions: once pre-operatively, once on day of discharge from in-patient care and once at home six weeks post-operatively.

To be included in the study patients had to be admitted for elective uni-compartmental or total knee replacement (standard or enhanced recovery pathway) and over 18 years old. At the time of the study, the enhanced recovery pathway was being introduced so there was no set criteria for who received which pathway. Surgeons and anaesthetists discussed this with patients on the morning of surgery and made the decision based on clinical judgment.

Patients were excluded if they already had adaptive equipment in place for reasons unrelated to their knee pain, had other significant health problems such as stroke or Chronic Obstructive Pulmonary Disease which reduced their level of function, admitted for bilateral total knee replacement – either simultaneously or staged within 12 weeks, had significant cognitive impairment that would limit their ability to complete the patient diary or Oxford Knee Score questionnaire, or lived further than 30 miles from study hospital. All patients who fulfilled the inclusion and exclusion criteria within the study period were invited to participate.

For patients included in the study, information was recorded on age, gender, surgical pathway, support at home and procedure.

The researcher assessed patients at home, no more than two weeks prior to surgery, on the ward on day of discharge and again at home six weeks following surgery.

Level of function was assessed using the UK Functional Independence Measure on three occasions. The UK Functional Independence Measure is a functional assessment tool, covering areas such as personal care, transfers, mobility, cognitive function and household tasks (Tian et al 2012), and is widely regarded as a valid and reliable tool and suitable for use within orthopaedics (Turner-Stokes et al 1999,

Greenglass et al 2005, Kiefer and Emery 2006, Vincent et al 2007, Vincent et al 2010, Herbold et al 2011, Tian et al 2012). The UK Functional Independence Measure has a 7 point scoring system across 18 items. A score of 1 for an activity indicates the patient requires maximum assistance, or is unable to complete the activity and 7 indicates full independence, thus the total score is between 18 and 126 (Turner-Stokes et al 1999).

All patients completed the Oxford Knee Score once pre-operatively and then once per week following surgery until the week six follow up. The Oxford Knee Score records patients perception of knee pain in areas such as mobility, self care and stairs ability. It contains 12 questions with 5 possible responses for each (0-4). A score of 0 for a question indicates most severity or difficulty and 4 suggests least difficulty or severity, thus a total score of between 0 and 48 is recorded (Dawson et al 1998). The Oxford Knee Score is the 'best and most reliable' measure for the assessment of total knee replacement (Howell and Rogers 2009). In addition, the UK Government and National Joint Registry have adopted the Oxford Knee Score as a validated outcome measure to assess outcome following total knee replacement (Scott et al 2010).

All patients in the study were assessed post-operatively by a support worker, according to local protocol. Patients who were issued with adaptive equipment, completed a weekly diary, for six weeks, to document their use of equipment and highlight if they stopped using the equipment at any point.

Ethics

Ethics approval was gained from the West of Scotland Ethics Committee in January 2013 and all participants gave written, informed consent.

Data Analysis

Quantitative data was analysed using Minitab (Version 15). Descriptive statistics were used to analyse data from the whole sample and to compare the group issued with adaptive equipment post-operatively with the group who were not. 2 sample t tests were used to compare UK Functional Independence Measure scores, Oxford Knee Scores, length of stay, gender, age, method of surgery (enhanced recovery / standard pathway) and need for equipment post-operatively. Statistical significance was taken as a P value of <0.05.

Results

Sample

46 patients were suitable to be included in the study during the recruitment period from January 2013 to May 2013. 25 of these patients were not included in the study, 10 patients were admitted for surgery prior to contact from the researcher, 2 patients were discharged to stay with family out with the study area and 13 patients declined to take part. Therefore 21 patients consented to being included in the study, of which, one patient's surgery was cancelled because of outstanding health issues and one patient was an in-patient for the duration of the follow up period due to a wound infection. Thus the study had a final sample of 19 patients.

There were eight females (42%) and 11 males (58%). The mean age for the sample was 68 years (SD 11.2 years). The mean age for the female group was 72 years (SD 9.0 years) and for males was 66 years (SD 12.4 years). Six people received the enhanced recovery pathway and 13 the standard pathway (Table 1).

Length of Stay

The mean length of stay for the sample was 4.7 days. There was no statistical significance regarding length of stay between males and females (CI -2.447, 1.197, $P = 0.478$).

Patients undergoing total knee replacement through the enhanced recovery pathway (N=6, 32%) had a mean length of stay of 3.3 days (range 1 – 6 days, SD 1.6 days). Patients undergoing total knee replacement through the standard pathway (N=13, 68%) had a mean length of stay of 5.3 days (range 3 – 8 days, SD 1.8 days). The length of stay was significantly shorter for those who received the enhanced recovery pathway compared to the standard pathway (CI 0.194, 3.909, $P = 0.034$) (Figure 1).

Figure 1 Near Here

Is there a difference between patients who receive adaptive equipment following a total knee replacement and those who do not?

Patients who were issued with adaptive equipment had a statistically longer length of stay (5.6 days, SD 1.7) compared with those who were discharged without adaptive equipment (3.7 days, SD 1.7) (CI -3.58, -0.08, $P = 0.041$).

Fifty percent ($N = 3$) of patients undergoing total knee replacement through enhanced recovery pathway and 54% ($N=7$) of those going through the standard pathway required adaptive equipment for discharge home (Table 1). There was no statistically significant difference between the two groups (standard and enhanced recovery pathway) in terms of the number of people being issued with adaptive equipment post-operatively (CI -0.44, 0.52 $P = 0.876$). There was also no statistically significant difference between men and women in terms of the issue of adaptive equipment (CI -0.70, 0.178 $P = 0.244$).

Table 1 Near Here

Patients who were issued with adaptive equipment post-operatively, scored lower on the Oxford Knee Score throughout the six week assessment period compared to those who were not. The difference was not statistically significant pre-operatively (CI -5.81, 11.77, $P = 0.483$) or week one post-operatively (CI -3.89, 9.92, $P = 0.365$), however, at week six the Oxford Knee Score was significantly lower in patients who received adaptive equipment than those who were not (CI 0.82, 12.60, $P = 0.030$) (Figure 2).

Figure 2 near here

Patients who were issued with adaptive equipment post-operatively, had lower UK Functional Independence Measure scores at the three assessment points, than those who were not issued with adaptive equipment. However, the difference was not statistical significant pre-operatively (CI -0.47, 5.50, $P = 0.094$) or on day of discharge (CI -3.40, 4.38, $P = 0.789$). At the week six follow up assessment there

was a statistically significant difference with patients who were issued with adaptive equipment, having significantly lower scores than those who were not (CI 0.063, 2.271, $P = 0.040$).

How long do patients use adaptive equipment following total knee replacement?

Of the 19 patients included in the study, adaptive equipment was issued to 10 patients, three females and seven males. Three patients received one item of adaptive equipment, six patients received two and one patient received five items (Table 2). Twenty items of adaptive equipment were issued, eight were to assist toilet transfers, seven were to assist patients with meal preparation, three to assist bathing, one for chair transfer and one for bed transfers.

Table 2 Near Here

Three (30%) patients required the use of their adaptive equipment beyond the six week follow up assessment. With the exception of one patient who did not use the toilet surround frame as it did not fit in his toilet, all adaptive equipment was used for at least four weeks. The patients who stated they stopped use of the adaptive equipment prior to the follow up assessment at week six, stated they did so as they no longer required its use due to an improvement in their level of function.

Is there a relationship between the patients' level of pain and/or function and the length of time they continue to use adaptive equipment following knee replacement?

There was no statistically significant difference in the Oxford Knee Scores of patients who required ongoing use of adaptive equipment at week six 30.33 (SD 4.93), compared with those who did not 30.43 (SD 1.72) (CI -12.47, 12.66, $P = 0.977$).

There was a statistically significant difference between the two groups in UK Functional Independence Measure scores at week six post-operatively (CI 1.490, 3.748, $P = 0.002$). Patients who required the use of adaptive equipment beyond

week six had a mean UK Functional Independence Measure of 122.66 (SD 0.577) compared with 125.28 (SD 0.756) in the group who no longer required adaptive equipment (CI 1.490, 3.748, $P = 0.002$).

Discussion and Implications

Enhanced Recovery Pathway

Only six (32%) patients out of the 19 had total knee replacement under the enhanced recovery pathway. The low number of patients who received the enhanced recovery pathway was due to the pathway not being performed by all surgeons and anaesthetists in the study hospital. However, in this current study, the use of an enhanced recovery pathway demonstrated significantly shorter lengths of stay compared to the standard pathway (3.3 days compared to 5.3 days).

Following implementation of an enhanced recovery pathway for patients undergoing total knee replacement, both Raphael et al (2011) and Husted et al (2011) indicated a reduction in length of stay when compared to the standard pathway. However, an average length of stay for enhanced recovery patients in the current study, of 3.3 days is longer than that reported in these two studies, with Raphael et al (2011) reporting a length of stay of 47 hours and Husted et al (2011) reporting a length of stay of 2.4 days. The patients in the current study were not given pre-operative education on the enhanced recovery pathway at their pre-operative assessment. The decision to carry out surgery with the enhanced recovery pathway was made by the surgical team on the day of surgery. In comparison, Husted et al (2011) provided a standardised pre-operative education session for patients, to inform the patients about the enhanced recovery procedure and what to expect, and their expectations following surgery.

The current study did not exclude patients based on pre-operative pain or function scores, whereas Raphael et al (2011) chose patients with better general health and pain and function scores for the enhanced recovery pathway. The longer length of stay for enhanced recovery patients in the current study compared to Raphael et al

(2001) may, therefore, be a result of the lack of pre-operative education and that patients were not excluded from the enhanced recovery pathway based on pre-operative function or pain scores.

How Long Do Patients Require Adaptive Equipment Following Total Knee Replacement?

Patients who required adaptive equipment following total knee replacement, needed to use the equipment for a minimum of 4 weeks. The patients who stopped use of their adaptive equipment prior to the follow up assessment at week six stated that they no longer required it due to increased mobility and function. The patients who stopped use of adaptive equipment at week six did so at the follow up assessment. Without the follow up assessment, it is unclear when these patients would have stopped using the equipment. The current study found that 70% of patients issued with adaptive equipment did not need its use after six weeks. As patients in the current study waited until the follow up assessment before stopping its use, this could imply that patients may be inclined to carry on use of adaptive equipment for longer than required without further support or guidance from healthcare staff once at home. This point is supported by Thomas et al (2010) who stated that patients in their study had continued use of adaptive equipment when questioned four years after surgery. It is important then to advise patients to use the equipment for as long as is needed (minimum of 4 weeks) but not for a prolonged period as this may result in reliance on the equipment and reduced independent functional ability.

Wielandt and Strong (2000) claim that for orthopaedic conditions, 46% of patients had stopped using the adaptive equipment six weeks after their operation. Wielandt and Strong (2000) do not give details of the specific orthopaedic surgery or conditions within their study. The current study found 70% of patients were using, but no longer required, adaptive equipment at week six post-operatively. Unlike the present study, the studies reviewed by Wielandt and Strong (2000) did not complete functional assessments with patients, which may explain the difference in utilisation rate of the studies. By completing a functional assessment at the week six follow up, the researcher was able to demonstrate to the patients that they were independent with the relevant area of function and they no longer required the adaptive equipment.

If there is currently no routine follow up service provided to patients following total knee replacement, introducing this service would have resource implications including staffing costs. However, this may be offset by a reduction in equipment costs if more equipment could be returned, recycled and made available for future patients. The introduction of services to provide follow up assessment for total knee replacement patients on discharge home would depend on local policy and service provision and the cost-benefit analysis of such service development.

Kiefer and Emery (2006) and Iyengar et al (2007), do not agree on the need for adaptive equipment following total knee replacement. Kiefer and Emery (2006) stated that adaptive equipment was required to assist transfers and lower half dressing, whereas Iyengar et al (2007) claimed that patients required no adaptive equipment following total knee replacement. The current study issued adaptive equipment to patients that assisted with transfers, meal preparation and showering. The study hospital does not routinely issue adaptive equipment to assist lower half dressing, as this is an aspect of rehabilitation following total knee replacement and patients are encouraged to bend as much as possible to dress their lower half.

Iyengar et al (2007) completed pre-operative assessments to identify patients' suitability for their study and had a programme of rehabilitation for patients on discharge home. The current study provided no follow up or rehabilitation for patients on discharge home, until the six week follow up. The increased input in the study by Iyengar et al (2007) may have allowed patients to be discharged without adaptive equipment, because they had additional support once at home.

The results of this study would suggest that Occupational Therapy staff can inform patients that, if they have been assessed as needing adaptive equipment to maintain independence following total knee replacement, then they will require the use of the adaptive equipment for at least four weeks.

Is There a Relationship Between The Patients' Level Of Pain and / or Function and the Length of Time They Continue to Use Adaptive Equipment Following Total Knee Replacement?

There was no difference in pain scores when comparing patients who required the use of adaptive equipment beyond the follow up assessment at week six and those who no longer required its use ($P = 0.977$). This indicates that level of pain had no impact on patients' level of function,

As could have been expected, function scores for the two groups were significantly different ($P = 0.002$); the group who no longer required adaptive equipment had a higher UK Functional Independence Measure score compared with those still using adaptive equipment. The patients who no longer needed the adaptive equipment demonstrated independence with their activities of daily living without the need for the adaptive equipment. Continued reliance on adaptive equipment implies that patients have not returned to full independence.

Is There a Difference Between Patients Who Receive Adaptive Equipment Following a Total Knee Replacement and Those Who Do Not?

This study found that pre-operative UK Functional Independence Measure score, gender and surgical pathway were not associated with the need for adaptive equipment. Additionally Oxford Knee Score pre-operatively and one week post-operatively were similar between the two groups. These results contradict the studies by Scott et al (2010) and Hall et al (2008) who stated that patients' level of pain and function pre-operatively is a predictor for post-operative level of function.

The study by Scott et al (2010) recruited 1217 patients who were assessed pre and post-operatively using two patient complete questionnaires; one general health (Short Form Health Questionnaire) and one knee specific (Oxford Knee Score). The study by Hall et al (2008) recruited 15 patients and used a grounded theory approach to interview patients who were listed for a total knee replacement. Neither of these studies completed functional assessments with their study group to gain objective data on patients' level of function, therefore, their findings on predictors for post-operative function are based on patient reports only. When completing research, it is suggested that there is a variety of data collection methods (quantitative and qualitative) and outcome measures (disease specific / general health / patient report / clinical observation) used to ensure all aspects of the patients' intervention and level of function are recorded (Polit and Beck 2006).

This current study completed functional assessments at three time points and suggests that there is no association between surgical pathway, gender and pre-operative pain and level of function and the need for adaptive equipment following total knee replacement.

Patients who were issued with adaptive equipment had lower scores for function and pain throughout the six week study period when compared to those not issued with adaptive equipment and at six week follow up, the difference was statistically significant (Pain $P = 0.030$, Function $P = 0.040$). Indeed patients with longer hospital stays had lower function and were more likely to receive adaptive equipment. The reasons for this are not clear however it may be that patients who require adaptive equipment have generally poorer health and wellbeing than those who do not. These results have implications for Occupational Therapists as they indicate that patients who have been issued with adaptive equipment require additional rehabilitation and support to allow them to continue to improve their level of function.

The small sample size in comparison to the total knee replacement population is a limitation of the current study. Another limitation is that the researcher completed the assessments at week six follow up and therefore was not blinded to the aims of the research.

This study has identified a need for further assessment and rehabilitation, on discharge, for patients who were issued with adaptive equipment. Additional input from therapy services, will however, have an added cost implication to the department providing the service.

Conclusion

There was no statistical significance in pre-operative pain and function scores, gender or surgical pathway between those who required adaptive equipment following total knee joint replacement and those who did not. This suggests that patients following total knee replacement require individual assessments whilst in hospital to determine if adaptive equipment is required.

Patients who had been issued with adaptive equipment demonstrated significantly worse pain and function scores six weeks post-operatively. The results of this study would suggest that patients who are issued with adaptive equipment following total knee replacement will require follow up and reassessment six weeks post-operatively.

This study evaluated patients' need for adaptive equipment following total knee replacement. This study demonstrated that those who needed adaptive equipment following total knee replacement required this for a minimum of four weeks. Prior to this study, there was no information on the length of time patients used adaptive equipment following total knee replacement.

Patients who are issued with adaptive equipment following total knee replacement would benefit from additional input and rehabilitation on discharge to improve levels of function and independence and to reduce reliance on adaptive equipment.

References

Antrobus JD, Bryson GL (2011) Enhanced recovery for Arthroplasty: Good For The Patient or Good For The Hospital. Canadian Journal of Anaesthesia 58: pp 891-896

Beer DJ, Petruccelli D, Adili A, Piccirillo L, Wismer D, Winemaker M (2012) Patient Perspective Survey of Total Hip vs Total Knee Arthroplasty Surgery. The Journal of Arthroplasty 27:6 pp 865-869

Brittle N, Lett K, Littlechild R, Sackley C (2007) The Disability Profile of Adults Who Receive Adaptive Equipment From Local Authority Occupational Therapy Services. British Journal of Occupational Therapy 70:11 pp 479-482

Dawson J, Fitzpatrick R, Murray D, Carr A (1998) Questionnaire on the Perceptions of Patients About Total Knee Replacement. The Journal of Bone and Joint Surgery. 80-B:1 pp 63-69

Flick U (2011) Introducing Research Methodology. A Beginners Guide To Doing a Research Project. Sage. London

Gitlin LN, Miller SK, Boyce A (1999) Bathroom Modifications for Frail Elderly Renters: Outcomes of a Community Based Program. Technology and Disability 10: pp 141-149

Greenglass ER, Marques S, deRidder M, Behl S (2005) Positive Coping and Mastery in a Rehabilitation Setting. International Journal of Rehabilitation. 25:4 pp 331-339

Hall M, Migay AM, Persad T, Smith J, Yoshida K, Kennedy D, Pagura S (2008) Individuals' Experience of Living With Osteoarthritis of the Knee and Perceptions of Total Knee Arthroplasty. Physiotherapy Theory and Practice 24:3 pp 167-181

Herbold JA, Bonistall K, Walsh MB (2011) Rehabilitation Following Total Knee Replacement, Total Hip Replacement and Hip Fracture: A Case Controlled Comparison. Journal of Geriatric Physical Therapy. 34: pp 155-160

Howell SM, Rogers SL (2009) Method for Quantifying Patient Expectations and Early Recovery After Total Knee Arthroplasty. Orthopaedics. 32:12 pp 884-893

Husted H, Lunn TH, Troelson A, Gaarn-Larsen L, Kristensen BB, Kehlet K (2011) Why Still In Hospital After fast Track Hip and Knee Arthroplasty? Acta Orthopaedica 82:6pp 679-684

Iyengar KP, Nadkarni JB, Ivanovic N, Mahale A (2007) Targeted Early Rehabilitation at Home After Total Hip and Knee Joint Replacement: Does it Work? Disability and Rehabilitation 29:6 pp 495-502

Jacobson AF, Myerscough RP, DeLambo K, Fleming E, Huddleston AM, Bright N, Varley JD (2008) Patients' Perspectives on Total Knee Replacement. American Journal of Nursing 108:5 pp 54-63

Kennedy DM, Hanna SE, Stratford PW, Wessel J, Gollish JD (2006) Pre-operative Function and Gender Predict Pattern of Functional Recovery After Hip and Knee Arthroplasty. The Journal of Arthroplasty 21:4 pp 559-566

Kennedy DM, Stratford PW, Riddle DL, Hanna SE, Gollish JD (2008) Assessing Recovery and Establishing Prognosis Following Total Knee Arthroplasty. Physical Therapy 88:1 pp 22-32

Khan F, Gonzalez S, Hale T, Turner-Stokes L (2008) Multi-disciplinary Rehabilitation Programmes Following Joint Replacement at The Hip and Knee in Chronic Arthropathy. Cochrane Database of Systematic Reviews Issue 2, Art No CD004957, DOI: 10.1002/14651858.CD004957.pub3

Kiefer DE, Emery LJ (2006) Self-Care and Total Knee. Physical and Occupational Therapy in Geriatrics 24:4 pp 51-62

Kigozi M, McMinn A, Faxall G, Golding S, MacGregor M (2011) Enhancing Recovery Following Total Knee Arthroplasty. Regional Anaesthesia and Pain Medicine.36:7 pp E205

Lopez-Olivo MA, Landon GC, Siff SJ, Edelstein D, Pak C, Kallen MA, Stanley M, Zhang H, Robinson KC, Suarez-Almazor ME (2011) Psychosocial Determinants of Outcomes In Knee Replacement. Annals of Rheumatic Diseases 70: pp 1775-1781

Malviya A, Martin K, Harper I, Muller SD, Emmerson KP, Partington PF, Reed MR (2011) Enhanced Recovery Program For Hip and Knee Replacement Reduces Death Rate. ActaOrthopaedica 82:5 pp 577-581

Mooney M, Ireson C (2009) Occupational Therapy in Orthopaedics and Trauma Wiley-Blackwell, Chichester

Nerhus TK, Heir S, Thirnes E, Madsen JE, Ekeland A (2010) Time-Dependent Improvement in Functional Outcome Following LCS Rotating Platform Knee. ActaOrthopaedica 81:6 pp 727-732

Neville-Jan A, Piersol CV, Kielhofner G, Davis K (1993) Adaptive Equipment: A Study of Utilization After Hospital Discharge. Occupational Therapy in Health Care 8:4 pp 3-14

National Joint Registry (2012)
http://www.njrcentre.org.uk/njrcentre/Portals/0/Documents/England/Reports/10th_annual_report/NJR%2010th%20Annual%20Report%202013%20B.pdf. Accessed 11/12/2013

Polit DF, Beck CT (2006) Essentials of Nursing Research. Methods, Appraisal and Utilization. (6th Ed) Lippincott, Williams and Wilkins. London

Raphael M, Jaeger M, Vlymen JV (2011) Easily Adaptable Total Joint Arthroplasty Program Allows Discharge Home in Two Days. Canadian Journal of Anaesthesia 58: pp 902-910

Sainty M, Lambkin C, Maile L (2009) 'I Feel So Much Safer': Unravelling Community Equipment Outcomes. British Journal of Occupational Therapy 72:11 pp 499-506

Scott CEH, Howie CR, MacDonald D, Biant LC (2010) Predicting Dissatisfaction Following Total Knee Replacement: A Prospective Study of 1217 Patients. The Journal of Bone and Joint Surgery 92B:9 pp 1253-1258

Thomas W, Pinkelman LA, Gardine CJ (2010) The Reasons For Non Compliance With Adaptive Equipment in Patients Returning Home After a Total Hip Replacement. Physical and Occupational Therapy in Geriatrics 28:2 pp 170-180

Tian W, Dejong G, Horn SD, Putman K, Hseih CH, DaVanzo JE (2012) Efficient Rehabilitation care for Joint Replacement Patients: Skilled Nursing Facility or Inpatient Rehabilitation Facility? Medical Decision Making. 32: pp 176-187

Toye FM, Barlow J, Wright C, Lamb SE (2006) Personal Meanings in The Construction of Need For Total Knee Replacement Surgery. Social Science and Medicine 63: pp 43-53

Turner A, Foster M, Johnson SE (Eds) (2007) Occupational Therapy and Physical Dysfunction Churchill Livingstone, Edinburgh

Turner-Stokes L, Nyein K, Turner-Stokes T, Gatehouse C (1999) The UK FIM+FAM: Development and Evaluation. Clinical Rehabilitation. 13: pp 277-287

Vincent KR, Lee LW, Weng J, Alfano AP, Vincent HK (2006) A Preliminary Examination of the CMS Eligibility Criteria in Total Joint Arthroplasty. American Journal of Physical Medicine Rehabilitation 85:11 pp 872-881

Vincent HK, Vincent KR, Lee LW, Alfano AP (2007) Effect of Obesity on Inpatient Rehabilitation Outcomes Following Total Knee Arthroplasty. Clinical Rehabilitation 21: pp 182-190

Vincent HK, Omli MR, Vincent KR (2010) Absence of Combined Effects of Anaemia and Bilateral Surgical Status on Inpatient Rehabilitation Outcomes Following Total Knee Arthroplasty. Disability and Rehabilitation. 32:3 pp 207-215

Wielandt T, Strong J (2000) Compliance With Prescribed Adaptive Equipment: A Literature Review. British Journal of Occupational Therapy 63:2 pp 65-75

Wielandt T, McKenna K, Tooth L, Strong J (2001) Post Discharge Use of Bathing Equipment Prescribed by Occupational Therapists: What Lessons To Be Learned? Physical and Occupational Therapy in Geriatrics 19:3 pp 49-65

	Enhanced Recovery Pathway (n=6)		Standard Pathway (n=13)	
	Equipment Issue (Patients No.)	No Equipment Issued (Patients No)	Equipment Issued	No Equipment Issued (Patients No)
Male	3	2	4	2
Female	0	1	3	4
Totals	3	3	7	6

Table 1. Adaptive equipment issuing / gender / enhanced recovery pathway

Patient	Adaptive Equipment Issued	Time Equipment Used For (Weeks)
A2	Toilet Frame with Seat (combined), Kitchen Trolley	Four weeks*
A3	Chair Raisers, Kitchen Trolley, Bedrail, Perching Stool, Toilet Surround Frame**	More than six weeks
A4	Toilet Frame with Seat (combined), Perching Stool	More than six weeks***
A6	Toilet Surround Frame	Six weeks
A7	Toilet Surround Frame	Six weeks
A10	Kitchen Trolley, Shower Board	Six weeks
A11	Toilet Surround Frame	Six weeks
A14	Toilet Surround Frame, Shower Board	More than six weeks
A16	Kitchen Trolley, Perching Stool	Six Weeks
A18	Toilet Frame with Seat (combined), Shower Board	Five weeks

Table 2 Adaptive equipment issued and length of time it was used.

*Patient stopped using toilet frame with seat at week five. **Patient did not use toilet surround frame on discharge. ***Patient had adaptive equipment in place prior to surgery due to knee pain and was assessed as still requiring adaptive equipment on discharge following total knee replacement.

Figure 1. Mean length of stay for gender and enhanced recovery pathway. F = Female, M = Male. ERP = Enhanced Recovery Pathway. N = No, Y = Yes

Figure 2. Oxford Knee Scores (OKS) pre-op (P) to week 6, comparing equipment issued (Y) with equipment not issued (N).