

Pre-operative patient education reduces length of stay after knee joint arthroplasty

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ABSTRACT

INTRODUCTION The aim of this study was to evaluate the impact of a pre-operative education programme on length of hospital stay after surgery for primary and revision knee arthroplasty patients. The programme was introduced at our hospital in October 2006 to encourage patients to play an active role in their recovery process after surgery.

PATIENTS AND METHODS A multidisciplinary team educated knee arthroplasty patients about their care pathway, knee surgery, pain management, expected discharge goals, in-patient and out-patient arthroplasty rehabilitation. Prospective data were collected from 472 consecutive patients who underwent (primary or revision) knee arthroplasty in the period between January 2006 and November 2007. Patients were separated into two groups, one that received conventional pre-operative treatment ($n = 150$; Conventional group) and another that received the pre-operative education ($n = 322$; Education group). Length of hospital stay was compared using the Mann Whitney U test. In-patient complications, hospital re-admissions within 24 h and 3 months of hospital discharge were compared using the chi-squared test.

RESULTS The mean length of stay was significantly reduced from 7 days in the Conventional group to 5 days in the Education group ($P < 0.01$). In addition, 20% more patients were discharged early (within 1–4 days) in the Education group compared to the Conventional group ($P < 0.01$). There was no difference in the percentage of in-patient complications and re-admissions in 24 h ($P = 1.00$) and 3 months of discharge ($P = 0.92$) between the two groups.

CONCLUSIONS The results suggest that pre-operative education is a safe and effective method of reducing length of stay for knee arthroplasty patients.

KEYWORDS

Knee – Arthritis – Arthroplasty – Patient education

Accepted 19 July 2010; published online 16 August 2010

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The success of knee arthroplasty procedures is reflected in the growing numbers of patients undergoing this procedure. In English NHS hospitals over the past decade, the incidence of primary total knee arthroplasties has doubled, with revision knee arthroplasty increasing by over 300%.¹

Hospitals are adapting to the increased demand for joint arthroplasty surgery² by developing new and more efficient treatment pathways, the aim of which is to reduce length of stay (LOS).^{3–10} Strategies to reduce LOS include: daily goal setting,⁵ early rehabilitation at home,⁶ accelerated rehabilitation,^{7,11} pre-operative screening of potential risk factors,^{8,12} early rehabilitation in hospital⁹ and scheduled discharge.¹⁰ Irrespective of these different methods, the fundamental aim of achieving an earlier discharge has generally been successful.^{3,5,6,8–10} Joint arthroplasty pathways have also included an

educational component.^{5,8,12} A reduced LOS was observed in all studies, but the education was combined with other treatment strategies so it is difficult to determine which specific factor was responsible for the favourable outcome. A Cochrane review suggested that, when education was implemented as a single intervention, it was not an effective method of helping patients to achieve an earlier hospital discharge.¹⁵

The purpose of this study was to assess the validity of the findings of the Cochrane review¹⁵ by evaluating the impact of pre-operative education as a single intervention on LOS after knee arthroplasty at a foundation hospital. The implementation of the pre-operative education programme was hypothesised to reduce length of hospital stay in knee arthroplasty patients without increasing the number of surgical complications or hospital re-admissions.

Table 1 Demographic and clinical features of Conventional and Educational groups

	Conventional	Education	P-value
Mean age in years (± SD)	69.2 (150)	69.5 (322)	0.67
Mean body mass index in kg/m ² (± SD)	29.8 (150)	29.7 (322)	0.89
Gender			
Male % (n)	44.0 (66)	46.3 (149)	0.64
Female % (n)	56.0 (84)	53.7 (173)	
Surgery			
Primary arthroplasty % (n)	91.3 (137)	93.5 (301)	0.41
Revision arthroplasty % (n)	8.7 (13)	6.5 (21)	
American Society of Anesthesiologists Physical Status Score (ASA-PS)			
Grade i % (n)	8.7 (13)	4.3 (14)	0.23
Grade ii % (n)	58.7 (88)	63.0 (203)	
Grade iii % (n)	31.3 (47)	32.0 (103)	
Grade iv % (n)	1.3 (2)	0.6 (2)	
Grade v % (n)	0 (0)	0 (0)	
Indications for surgery			
Osteoarthritis % (n)	90.7 (136)	93.5 (301)	0.23
Inflammatory joint disease % (n)	0.7 (1)	0 (0)	
Joint revision % (n)	8.7 (13)	6.5 (21)	

Table 2 Content of the talks delivered in pre-operative education programme

<p>Format Group education (patients and their family member or friend). Presentation by each member of the multidisciplinary team (in-patient physiotherapist, community physiotherapist, joint care co-ordinator and orthopaedic consultant)</p> <p>In-patient physiotherapist In-patient rehabilitation: mobilisation within 24 h and increased independence with walking aids. Exercises which can be practised before and after surgery. Functional aims for discharge: safe and independent mobilisation, stairs as required, 90° knee flexion</p> <p>Community physiotherapist Environmental visit and demonstration of assistive devices that will be provided postoperatively. Rehabilitation at home under the supervision of community physiotherapy team</p> <p>Joint care co-ordinator Patient pathway from admission to discharge. Preparation for surgery: pre-admission assessment, smoking cessation, preparation of the home and what to bring to hospital. Methods of anaesthesia, nurse call system and pain control after surgery. Wound care, optimal hygiene and protocol for dressing care. Role of the patient in optimising their recovery; independent mobilisation, regular exercise practice, adherence to protocol and pain management after surgery. Education of patients' relative, detailing how they can facilitate recovery. Goal of discharge by the fourth day after surgery or earlier</p> <p>Consent with consultant Explanation of knee arthroplasty procedures (uni-knee, total knee and revision). Risks and benefits of surgery. Response to questions on one-to-one basis. Signing the consent form</p> <p>Teaching aids 17-page information booklet summarising the content of the talks. Posters, knee models and joint implants.</p>

Patients and Methods

Prospective data were collected for 472 patients who underwent knee arthroplasty (391 primary, 47 uni-compartmental and 34 revision) between January 2006 and November 2007. All procedures were performed by four orthopaedic surgeons. The surgical techniques employed and the type of prostheses used did not change during the period of the study.

In the first 9 months of this period, data were collected for the Conventional group (CG), consisting of 150 patients who underwent knee arthroplasty before the education programme was implemented. An Education group (EG) was then formed by 322 patients who took part in the education programme during the 14-month period which followed (Table 1). Data were compared for length of hospital stay, surgical complications and hospital re-admissions for both the EG and the CG.

The data for 34 patients (25 from the CG and 11 from the EG) were excluded from the study because their joint arthroplasty surgery was performed as part of a contractual agreement for another trust and they did not follow the routine pathway of care.

The education programme was delivered in a group format within a 4-week period prior to their knee arthroplasty. The structure, content and format of the programme are summarised in Table 2. The aim of the programme was to provide patients with an optimal level of preparation for knee arthroplasty surgery and help them to understand the essential role they could play in their recovery after knee arthroplasty.

A joint arthroplasty nurse was appointed to implement and organise the educational sessions. All patients were admitted on the day of their operation and the length of hospital stay was defined as the number of nights that a patient stayed in hospital following their operation. The knee arthroplasty pathway and goal of achieving discharge within four days of surgery remained consistent for all patients both before and after the implementation of the education programme. The criteria for discharge were the same for the CG and EG and included: pain controlled by oral analgesia, availability of suitable equipment at home, wounds with no excessive leakage, an acceptable haemoglobin level and the consultant's authorisation that they were medically fit to leave hospital. The multidisciplinary team (MDT) permitted discharge when patients could perform the functional activities detailed in Table 3.

Statistical analyses were performed using SPSS for windows (v15.0; SPSS Inc., Chicago, IL, USA). Group differences in age and body mass index were examined using interdependent *t*-tests, and length of hospital stay using a Mann-Whitney U-test. A 2 × 2 chi-squared test was used to examine differences between the CG and the EG for the

Table 3 Functional discharge criteria for the Conventional and Educational groups

- Transfers from bed to chair and chair to bed independently
- Mobilising safely and independently with appropriate walking aids
- Stair practice completed safely
- Wound is manageable by district nurse and no excessive leakage
- Pain is controlled and manageable
- Straight leg raise with acceptable lag agreed by the consultant
- Appropriate knee flexion to approximately 90° (agreed by the consultant)

percentage of patients discharged in the early period following surgery (1–4 days) and the later period following surgery (5 days onwards). The significance for this study was accepted at $P < 0.05$. Chi-squared and Fisher's Exact tests were used to examine differences between the groups for demographics, in-patient complications and hospital re-admissions.

Results

Age, body mass index, type of joint being replaced, American Society of Anesthesiologists Physical Status (ASA-PS) Score^{14,15} and indication for surgery were similar for both groups (Table 1).

The mean length of hospital stay shortened significantly from 7.0 ± 5.7 days in the CG to 5.0 ± 3.2 days in the EG ($P < 0.01$) after the introduction of the education programme. Additionally, a significantly greater percentage of patients were discharged in the early period following surgery (1–4 days) in the education group compared to the CG ($P < 0.01$). With the exception of patients below 65 years of age, each sub-category within the EG discharged a significantly greater percentage of patients in the early period following surgery compared to the CG (Table 4). The odds ratio showed that the EG were 2.6 times more likely to have a shorter length of hospital stay compared to the CG.

There was no difference between the CG and the EG for the reasons for, or percentage of, re-admissions within 24 h ($P = 1.00$) and 3 months of discharge ($P = 0.92$). During the in-patient period, there were two thrombo-embolic events in both the EG and the CG. There was one superficial knee infection in the CG and one deep knee infection in the EG. There were no blood transfusions in the CG and two blood transfusions in the EG.

Table 4 Percentage of patients discharged in 1–4 days and 5 or more days in the Conventional group (CG) and the Education group (EG)

Arthroplasty patients	<i>n</i>	1–4 days (CG)	1–4 days (EG)	5 or more days (CG)	5 or more days (EG)	<i>P</i> -value
Knee	472	37	57	63	43	< 0.01
Knee below 65 years	128	52	69	48	31	= 0.061
Knee over 65 years	344	31	52	69	48	< 0.01
Knee (females)	257	38	56	62	44	< 0.01
Knee (males)	215	36	57	64	43	< 0.01

Discussion

This study supports the hypothesis that pre-operative education helps patients to achieve an earlier discharge with no associated increase in hospital re-admissions or surgical complications. Following the implementation of the education programme, the LOS significantly reduced from 7 days in the CG to 5 days in the EG for all knee arthroplasty patients (primary and revision; $P < 0.001$). The education programme was effective at helping patients achieve an earlier discharge in a hospital where the length of stay was less than the national average (8 days).¹⁶

There are several limitations of the current study which we have acknowledged. This was a prospective comparative study rather than a randomised, controlled trial. The data for each patient group were, therefore, collected during different periods of time, which means that we cannot account for chronological variation.

Previous authors have raised concerns that early discharge pathways might result in greater strain being placed on other rehabilitation settings.¹⁷ In this study, patients in both the EG and the CG had to fulfil the same discharge criteria before they were considered as being fit for hospital discharge. There was, however, no objective comparison of the physical outcomes or the amount of community rehabilitation required after hospital discharge.

A Cochrane review concluded that pre-operative education offers minimal benefit over and above standard patient care in reducing LOS after knee or hip joint arthroplasty.¹⁵ Our study's findings contradict those of the previous review, which might be explained by differences in the educational formats that were utilised. Five out of the nine studies included in the Cochrane review¹⁵ used written,¹⁸ audiovisual,^{4,19} or a combination of these methods^{20,21} to deliver the education. In contrast, the successful reduction in LOS in our study could be attributed to the education programme being delivered in person by the MDT. The face-to-face contact with the MDT might have allowed patients to develop trust in the healthcare professionals responsible for their

care following surgery. Unlike the audiovisual or written formats, patients who took part in the education programme in this study received immediate feedback to their individual questions. This might have helped to alleviate any of their anxieties in days leading up to their operation.

Educational group sessions²² and spousal support²⁵ are important elements in reducing length of stay and enhancing recovery following surgery. These factors were incorporated into the education programme in the present study and may have facilitated a reduced LOS. Patients may have felt re-assured by interacting with other patients and having support from more informed family members.

In the current study the pre-operative education programme gave patients advanced notification of discharge goals such as mobilisation within 24 h of surgery and discharge by the fourth day following surgery. This may have allowed patients to prepare psychologically for rehabilitation aims and provided them with clear expectations of the recovery process.²⁴ In the current study, the EG's knowledge of how their actions could influence the early recovery period might also have increased their motivation to adhere to the pre-operative advice. Informing patients may increase their sense of responsibility for the success of the surgery⁸ and strengthen the belief that they will be able to cope with the operation.²⁵

Education needs can vary according to population of patients undergoing joint arthroplasty.²⁶ In this study, both male and female patients made a significant improvement in LOS following the implementation of the education programme. In contrast to their older counterparts, patients below 65 years of age achieved a reduced LOS but this did not reach statistical significance. Table 4 shows that the younger group of patients might have had less potential to improve their LOS, because they were already the most successful subgroup at achieving an earlier discharge before the education programme was implemented. An alternative explanation is that the older group of patients might have perceived that they would have a greater level of physical impairment than the younger patients following their knee

joint arthroplasty. The education provided to the older group of patients may have helped to them to achieve a more realistic expectation of what their function following surgery was likely to be.

In this study, an earlier discharge did not result in an increase in either hospital re-admissions or surgical complications. This agrees with the findings of Pennington *et al.*,¹² who also used a knee arthroplasty pathway to achieve an earlier discharge.

This study does not identify which element of the pre-operative education programme was most essential in helping patients to reduce their length of hospital stay. Future research should use qualitative methods to evaluate the reasons for the success of the education programme from the patient's perspective.

Conclusions

In contrast to a previous review,¹⁵ our study supports the original hypothesis that the implementation of education as a single intervention was a safe and effective method of reducing length of hospital stay. Education was also beneficial to the range of patients undergoing knee arthroplasty surgery – males, females and patients above 65 years of age. The only patients who did not make a significant improvement in LOS were those below 65 years of age.

Acknowledgement

The authors thank Sylvia Batey for her assistance in data collection required for this study.

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