No major effects of preoperative education in patients undergoing hip or knee replacement – a systematic review

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ABSTRACT

INTRODUCTION: The outcome of total hip (THA) and knee arthroplasty (TKA) may be optimised through preoperative patient education (PPE). It is hypothesised that PPE reduces anxiety, ensures realistic patient expectations and enhances post-operative outcome. The objective was to determine whether the literature supports an positive effect of PPE on post-operative outcomes including anxiety, pain, length of hospital stay (LOS), patient satisfaction, post-operative complications, mobility, and expectations.

METHODS: PubMed and Embase searches were performed on 1 October 2014. Randomised studies of preoperative education (written, verbal and audiovisual) imparted by health professionals to patients were included.

RESULTS: A total of twelve studies including 1,567 participants were identified. Six studies involved patients undergoing THA, five studies involved both THA and TKA, and one study TKA only. No convincing evidence in favour of PPE on outcomes regarding pain, LOS, patient satisfaction, post-operative complications, mobility and expectations was found. However, there was evidence for a reduction in pre-operative anxiety.

CONCLUSION: PPE has not been shown to affect post-operative outcomes – except for a significant reduction in preoperative anxiety. However, this conclusion may be flawed by the general heterogeneity of the pooled studies. Hence, there is a strong need for properly designed randomised and controlled studies that are sufficiently powered, performed in generalised optimised hospital settings including optimised logistics and clinical enhancements that allow for discrimination between outcome parameters.

Total hip (THA) and knee (TKA) arthroplasty are successful surgical treatments of end-stage osteoarthritis; and in every aspect of the procedures, much is done to optimise the results. Arthroplasty surgery is physically and psychologically stressful for the patient. It is hypothesised that preoperative education reduces anxiety and enhances post-operative outcomes [1-6], affects the length of hospital stay (LOS) [5-9] and positively affects the overall experience [1, 6, 8, 10]. The education techniques are diverse, but may be divided into three major groups, some of which are combined: a) Verbal: group seminar [1, 2, 7, 8, 11], b) Visual: videotape [1-5, 10], and c) Written: booklets [2, 4, 6, 8, 10].

The objective of this review was to determine whether purported positive outcomes of preoperative education are evidence-based regarding effects on: 1) LOS, 2) anxiety, 3) pain, 4) patient satisfaction, 5) patient expectations and 6) post-operative mobility.

METHODS

We searched the PubMed database on 1 October 2014. The following terms and combinations of terms were used in the search field in Pubmed and Embase: "total knee replacement AND pre-operative education", "total knee replacement AND pre-operative information", "total knee replacement AND preoperative education", "total knee replacement AND preoperative information", "arthroplasty replacement AND knee AND hip AND preoperative education", "total hip replacement AND pre-operative education", "total hip replacement AND preoperative education", "total hip replacement AND preoperative information", "total hip replacement AND pre-operative information", "arthroplasty replacement AND knee AND hip AND preoperative information", "arthroplasty replacement AND knee AND hip AND pre-operative information", "arthroplasty replacement AND knee AND hip AND pre-operative education", "total knee arthroplasty AND pre-operative education", "total knee arthroplasty AND preoperative education", "total knee arthroplasty AND preoperative information", "total knee arthroplasty AND pre-operative information", "total hip arthroplasty AND pre-operative information", "total hip arthroplasty AND preoperative information", "total hip arthroplasty AND preoperative education", and "total hip arthroplasty AND pre-operative education".

One author searched and identified potentially qualifying studies. All authors assessed these studies against the inclusion criteria. Included studies were all randomised controlled studies in English. The inclusion criteria were studies that compare specific education to lack hereof given by a health professional prior to THA or TKA. Studies were excluded if participants received a combined preoperative education and pre-/post-opera-

SYSTEMATIC REVIEW

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TABLE 1

Reference	Level of evidence[a]	Procedure	n	Blinded (yes/no)	Randomised, yes/no	Gender, f/m, n	Age, mean, yrs	Lowers LOS	Lowers anxiety
Leal-Blanquet et al, 2013 [12]	1–	TKA	92	No	Yes	69/23	70.0	Not studied	Not studied
Kearney et al, 2011 [1]	2	THA/TKA	150	Yes	No	90/60	65.9	No	Non-significant
Mancuso et al, 2008 [11]	1+	THA/TKA	320	Yes	Yes	181/139	71.0	Not studiwed	Not studied
Johansson et al, 2007 [7]	1–	THA	123	No	Yes	63/60	62.4	Non-significant	Not studied
McGregor et al, 2004 [8]	1–	THA	35	Unknown	Yes	25/10	71.9	Significant	No
Crowe et al, 2003 [9]	1+	THA/TKA	133	Yes	Yes	106/27	68.8	Significant	Not studied
Giraudet-Le Quintrec et al, 2003 [2]	1–	THA	100	No	Yes	56/44	63.5	No	Significant
Doering et al, 2000 [3]	1–	THA	100	Unknown	Yes	38/62	59.6	No	Significant
Bondy et al, 1999 [4]	1–	THA/TKA	134	Unknown	Yes	80/54	65.1	Not studied	Significant
Daltroy et al, 1998 [5]	1–	THA/TKA	222	No	Yes	147/75	64.0	Non-significant	No
Clode-Baker et al, 1997 [10]	1–	THA	78	Unknown	Yes	52/26	–	No	No
Butler et al, 1996 [6]	1–	THA	80	No	Yes	41/39	62.6	No	Significant

LOS = length of hospital stay; THA = total hip arthroplasty; TKA = total knee arthroplasty.
a) Evidence grading was performed according to [13].
b) No difference, but the intervention group coped better with pain and had a significantly lower use of painkillers.
c) Seminar, control patients received the standard class and intervention patients received the standard class plus additional information focusing on recovery expectations during the first 12 months after surgery, when the seminar is imparted was not noted.

tive physical therapy without distinguishing the two factors in terms of outcome measures; the study investigated the effect of physical therapy on post-operative outcomes and was not a randomised trial of preoperative education; the study was not randomised. The outcomes measured were 1) LOS, 2) anxiety, 3) pain, 4) patient satisfaction, 5) patient expectation and 6) post-operative mobility (**Table 1**).

The present study did not require approval from an ethical committee as no human or animal subjects were included. The review followed the PRISMA guidelines, except for a limited number of items regarding methods (Protocol and registration, Summary measures, Additional analyses) and results (Risk of bias within studies, Results of individual studies, Synthesis of results, Risk of bias across studies, Additional analysis). The studies had been reported in manners not allowing for these assessments.

RESULTS

A total of 409 potential studies were initially identified (**Figure 1**). Twelve studies including 1,567 participants were finally included. Six studies involved patients undergoing THA, one study involved TKA cases, whereas five studies comprised both THA and TKA. The outcomes of the studies were assessed preoperatively and/or until discharge. Preoperative education was given within six weeks (range: 1 day-6 weeks) of arthroplasty surgery. The methods used to provide the preoperative education varied: booklets, seminars, videotapes.

The trial populations were generally moderate in size, except for one smaller study that had 35 participants [8]. All studies reported clear inclusion and exclusion criteria. No studies described if an intention-to-treat analysis had been used. In two studies, allocation was described as being sufficiently concealed [8, 11]; this issue was not described in the remaining ten. Blinded outcome assessment was completed in two studies [5, 11], but was not achieved in the remaining ten. Participants were blinded in three studies [1, 9, 11] and un-blinded in five studies [2, 5-7, 12]. Any blinding in the remaining four studies was unclear or not accounted for [3, 4, 8, 10].

An overview of included studies, their design and outcome parameters is presented in Table 1.

Two studies showed a significant reduction in LOS [8, 9], whereas seven studies reported insignificant reduction in LOS [1-3, 5-7, 10]. Three studies did not evaluate an effect on LOS [4, 11, 12].

Six studies reported a significant reduction in preoperative anxiety [1-6], whereas two studies did not find any significant reduction in anxiety [8, 10]. Four studies did not study the effects on anxiety [7, 9, 11, 12].

Four studies found no significant decrease in pain levels [1, 3, 8, 10], but two studies found that the intervention group was better able to cope with pain and had significantly lower use of painkillers than the non-intervention group [1, 3]. Two studies found a significant decrease in pain levels [2, 5]. Six studies did not study the correlation between preoperative education and pain level [4, 6, 7, 9, 11, 12].

TABLE 1, CONTINUED

Post-operative pain	Patient satisfaction	Expectation	Effect on mobility	Intervention (weeks before surgery, n)
Not studied	Not studied	Not studied	No	Video (4)
No	Higher	Not studied	No	Class (2)
Not studied	Not studied	THA: no difference TKA: lowered expectations	Not studied	Class (not reported)[c]
Not studied	Not studied	Not studied	Not studied	Class (2)
No	Higher	Non-significant trend towards lower expectations	No	Class + booklet (2)
Not studied	Not studied	Not studied	Improved function	Video + booklet + physiotherapy (6)
Significant	Not studied	Not studied	Stood sooner	Class + booklet (2-6)
No[b]	Not studied	Not studied	Not studied	Video (not reported)
Not studied	Not studied	Not studied	Not studied	Video + booklet (not reported)
No	Not studied	Not studied	Not studied	Video + audiotape (not reported)
No	Higher	Not studied	Not studied	Video + booklet (4)
Not studied	Higher	Not studied	Not studied	Booklet (4-6)

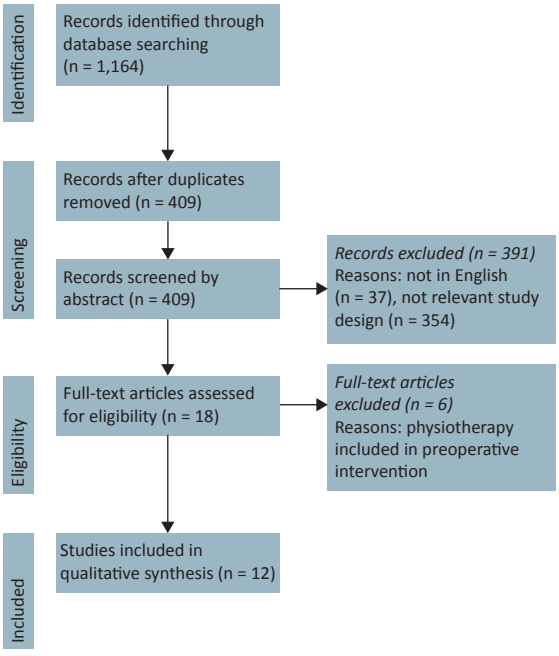
Overview of the included studies, their design and outcome parameters.

Regarding patient satisfaction, four studies reported higher levels of satisfaction and more realistic expectations of surgery, but equal improvements in quality of life [1, 6, 8, 10]. Eight studies did not investigate patient satisfaction [2-5, 7, 9, 11, 12].

Two studies showed that preoperative education lowered the patients' preoperative expectations to match the surgeon's expectations, but only in TKA surgery [7, 11]. Three studies found no significant difference between the intervention and control group regarding mobility [1, 8, 12]. One study reported better function [9], while another found that the intervention group was able to stand sooner after surgery than the non-intervention group [2]. The remaining seven studies did not study mobility [3-7, 10, 11]. One out of 12 studies reported no effect of preoperative education on the risk for complications in patients undergoing THA or TKA [1].

FIGURE 1

Selection of studies. Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) flow chart presenting the retrieved, excluded and analysed papers about preoperative education of patients undergoing total hip and knee arthroplasty.



DISCUSSION

THA and TKA are performed in vast numbers around the globe and many efforts – including tribological and the fast-track methodology – are made to improve the outcomes for these patients. Preoperative patient education (PPE) is widely used to inform patients and relatives about various aspects of the upcoming operation and to motivate patients to be active participants. This review focuses on preoperative education and its potential effect on pre- and post-operative outcomes.

In this study, we found that PPE has not been shown to affect post-operative outcomes for patients undergoing THA and TKA – except for a significant reduction in preoperative anxiety.

Contemporary literature suggests individually customised education to match specific patient needs [1, 14], and new approaches measure socio-psychological conditions such as anxiety, pain and denial in patients to determine how these conditions are affected by preoperative education [15].

A patient education session. In the interval between the preoperative general medical examination and the day of surgery, all patients are invited to an education day where they are taught the basic mechanisms of the affected joint and surgical procedures and informed of the expected outcome.

KEY POINTS

Preoperative patient education is widely used to inform and motivate patients to become active participants.

Interestingly, the literature does not support the idea that preoperative patient education affects pre- and post-operative outcomes. However, preoperative education may cause a significant reduction in preoperative anxiety.

Most studies failed to document any significant effect on patients' LOS. This is not surprising, as information in itself may not influence fulfilment of functional discharge criteria. Thus, even in a well-informed and motivated patient, the ability to mobilise early would depend on multiple factors such as pain treatment and the availability of physiotherapists. Both logistic and clinical barriers could mask any effect, which may explain the insignificant decrease in LOS when many studies (with different regimes) are pooled.

The lack of coping or behavioural strategies in the pre-education programme may also have contributed to the lack of decrease in LOS [2]. The difference in education techniques could affect LOS. An individualised counsellor [15] and a preoperative booklet combined with an oral seminar [1, 2] were measures that yielded a significant reduction in LOS compared with other studies without these elements. Still, the effect on LOS was insignificant and the only used methods were videotapes, booklets, leaflets, etc. [8].

A more personalised education tailored to the patient's specific needs may increase the general success of preoperative education. Yoon et al emphasised the advantage of an individualised and personal one-on-one education programme over a large classroom type of education as the one-to-one measures allowed patients to ask the "live" educator difficult, personal, health-related questions [15].

The studies show that education significantly reduces anxiety. According to the study by Kearney et al, anxiety increases sensitivity to pain and reduced anxiety lessens complaints of pain [1, 2]. Patients undergoing education felt well prepared for surgery and better able to cope with pain after surgery [1, 5]. This correlates with findings in Giraudet-Le Quintrec et al's intervention group which experienced significantly less anxiety and less pain preoperatively [2]. The patients understood the importance of walking soon after surgery and therefore stood sooner (as the clinical and logistic set-up allowed for this) [2].

Daltroy et al studied the relation of education with baseline denial and anxiety and found that preoperative education was not as important as the ability to identify the most and least anxious patients [5]. Patients with a high level of preoperative anxiety had significantly greater post-operative anxiety, pain, need of medication and a longer LOS. The authors concluded that preoperative education was beneficial only for the least anxious patients. Patients with low anxiety who received preoperative education used less pain medication [5]. Furthermore, they found that the least anxious patients benefitted the most from preoperative education as it increased their anxiety level sufficiently to get them to pay attention to important information. Anxiety levels should be just right; too much would disturb rationality and the ability to understand and retain useful information [5].

The studies overall agree that the effect of preoperative education on anxiety depends on the type of education technique (one-on-one programme, seminar, videotape, booklets) the number of patients in class (large classroom type of education versus one-on-one programme) and the type of educator (surgeon, nurse, anaesthetist, rheumatologist, physiotherapist, psychiatrist) [2, 5, 7, 8, 14]. The studies also agree that preoperative education is most beneficial when provided as one-on-one education programmes and in small classes with few patients and a "live" health care professional [1, 2, 5, 8, 14].

Preoperative education enhances patients' knowledge regarding their upcoming surgery and post-operative recovery [2]. Knowledge of the unknown reduces anxiety [1, 2, 5, 8, 14]. Less anxiety does not decrease pain levels significantly, but improves patients' ability to cope with pain and increases their perception of being prepared [1, 2]. These two factors together may boost the patients' sense of control and comfort, improving their overall experience [1, 2, 5, 8, 11, 14, 15].

Regarding preoperative education and its effect on patient satisfaction and expectations concerning their overall treatment, a total of four studies showed higher patient satisfaction [1, 6, 8, 10], whereas the remaining eight did not investigate this [2-5, 7, 9, 11, 12]. Patients undergoing TKA were more likely to reduce their expectations as a result of education. Compared with THA, THA

involves a larger number of rehabilitation challenges. Thus, improvements are experienced at a slower rate in TKA patients than in THA patients [11]. As a result, the moderate recovery in TKA patients led to reduced expectations. Expectations may decrease with poorer functional status, and patients undergoing TKA had a poorer functional status than patients undergoing THA [11].

The studies have several limitations. Patients from the control groups seek information on their own, whereas information was given to intervention groups [1, 2, 8, 11, 14]. The studies compared expectation and satisfaction scores from the intervention group with a control group that had access to the same education as the intervention groups – through friends, family, the Internet and experience from earlier surgery (reoperation/revisions) [8, 11]. The interventions were also discussed in the control class when patients asked specific questions that were included in the educational intervention [11]. Nurses and doctors participating in the study cannot – for ethical reasons – deny answering questions asked by patients from the control group, even though this contributes to limitations weakening the quality of the study [8, 11].

Our review has several limitations. Primarily, the included studies differed considerably as to design, hospital setting (logistic and clinical setting) and the manner and form of the education provided. This could make pooling of the outcomes improper and the results difficult if not impossible to interpret. Also, socio-economic factors such as social status, education and income may play an important role and may affect the outcome of research on preoperative education [8, 11, 12, 14]. Furthermore, "feelings" such as hospital experience, anxiety, pain and denial are subjective and therefore difficult to measure reliably, and validated tools were not used uniformly.

There is limited – if any – pooled evidence supporting preoperative education, but this conclusion may be flawed by the general heterogeneity of the pooled studies. Bias is potentially introduced because of the lack of blinding, the size of the study populations without prior intention-to-treat analyses and the use of different methods of PPE at different times before the operation. Hence, there is a strong need for properly designed, randomised controlled trials, sufficiently powered and performed in generalised optimised hospital settings and which include optimised logistics and clinical enhancements allowing for (potential) discrimination in the outcome parameters. The best teaching form (individual versus group lectures, and verbal versus written, etc.) and what to include in the patient education programme should be standardised. Finally, various patient groups may need different educational measures.

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