osteology

MDPI

Review

The Impact of Preoperative Education on Knee and Hip Replacement: A Systematic Review

Umile Giuseppe Longo [1,2,*], Sergio De Salvatore [2,3], Chiara Rosati [2], Irene Pisani [2], Alice Ceccaroli [1], Giacomo Rizzello [1,2], Maria Grazia De Marinis [4] and Vincenzo Denaro [1,2]

1 Research Unit of Orthopaedic and Trauma Surgery, Fondazione Policlinico Universitario Campus Bio-Medico, Via Alvaro del Portillo, 200, 00128 Rome, Italy; a.ceccaroli@policlinicocampus.it (A.C.); g.rizzello@policlinicocampus.it (G.R.); denaro@policlinicocampus.it (V.D.)
2 Research Unit of Orthopaedic and Trauma Surgery, Department of Medicine and Surgery, Università Campus Bio-Medico di Roma, Via Alvaro del Portillo, 21, 00128 Rome, Italy; s.desalvatore@unicampus.it (S.D.S.); chiararosati1998@gmail.com (C.R.); irene.pisani@outlook.it (I.P.)
3 Department of Orthopedics, Children's Hospital Bambino Gesù, Palidoro, 00165 Rome, Italy
4 Research Unit Nursing Science, Department of Medicine and Surgery, Università Campus Bio-Medico di Roma, Via Alvaro del Portillo, 21, 00128 Rome, Italy; m.demarinis@unicampus.it
* Correspondence: g.longo@policlinicocampus.it; Tel.: +39-0622-5411

Abstract: This review aims to evaluate the usefulness of preoperative education in the orthopedic patient undergoing knee and total hip replacement. The systematic review was conducted by searching the PubMed, Cochrane, CINAHL, and Embase databases from inception to April 2021. Keywords and combinations of keywords were organized according to the PICOs approach to identify relevant studies. Thirty-seven studies involving 5185 patients were included. Preoperative education was associated with decreased postoperative pain compared to the control group. Preoperative anxiety and length of stay were reduced in most studies through preoperative education compared to the control group. Furthermore, other topics such as sleep, mental status, compliance, knowledge, and patient expectations generally showed improvement in the experimental group. For future investigations, it would be imperative to augment the patient sample size to enhance the research's reliability and incorporate the most up-to-date literature.

Keywords: preoperative education; hip replacement; knee replacement; systematic review

Citation: Longo, U.G.; De Salvatore, S.; Rosati, C.; Pisani, I.; Ceccaroli, A.; Rizzello, G.; De Marinis, M.G.; Denaro, V. The Impact of Preoperative Education on Knee and Hip Replacement: A Systematic Review. *Osteology* **2023**, *3*, 94–112. https://doi.org/10.3390/osteology3030010

Academic Editors: Georg Osterhoff and Redha Taiar

Received: 4 May 2023
Revised: 21 July 2023
Accepted: 2 August 2023
Published: 24 August 2023

1. Introduction

Osteoarthritis (OA) is a leading cause of disability, pain, and major utilization of healthcare resources worldwide, affecting more than 14 million people [1]. The prevalence of OA is increasing due to an aging population [2]. Cartilage degradation, subchondral sclerosis, and synovial inflammation can damage other joint structures, such as ligaments and menisci. Diagnosis of OA is based on clinical and radiological findings (e.g., radiography, X-ray, MRI). Osteoarthritis is most observed in the knees and hips, followed by the hands and spine. Treatment options range from patient education, weight loss, exercise and physical therapy, and medications to more invasive options, such as intra-articular corticosteroid injections and arthroplasty. When conservative methods are unsuccessful, total joint replacement (TJR) surgery may be necessary [3].

Preoperative Education

There is an increasing demand for preoperative education for patients undergoing joint replacement surgery. Research has demonstrated that preoperative education can improve patient outcomes and satisfaction with the surgical experience [4,5]. Furthermore, a patient who is well-informed is more likely to be satisfied and take a more active role in their treatment. Preoperative education for surgery requires not only physical preparation

of the patient, but also psychological and emotional preparation. The most effective preparation involves patient preparation pathways that are tailored to the patient's pathology, type of procedure, literacy level, and cultural background. In addition to the traditional verbal interview, various educational support materials can be employed, including one item of printed information: each patient was given a handout with all the key information regarding the surgery [6]. Two websites; three audio–visual media, such as videotapes; four digital video discs with illustrative films; and PowerPoint presentations were very useful because they can be sent to the patient who can view them at any time at their convenience. Of these modalities, the most effective is a personal interview with the educator [6], as this allows the operator to anticipate the user's feelings and behaviors and allows the patient to ask active questions that the nurse or health care figure can answer. During preoperative education, information is provided regarding preparation procedures for surgery, the type of surgery, and the techniques used, as well as associated risks and potential complications. Furthermore, information is given regarding anticipated levels of pain and management strategies, restrictions in daily activities, recovery periods, and potential post-surgical health conditions. Several randomized controlled trials have demonstrated that preoperative education for surgical patients can lead to a decrease in length of hospital stay, a reduction in the need for postoperative pain medication, and an increase in patient and family satisfaction with the surgical process [7,8]. The implementation of this educational program would be beneficial in developing effective strategies to provide guidance and instruction to patients before, during, and after hospitalization. As the frequency of these interventions is increasing and the length of hospital stays is decreasing, patients need this kind of information to make informed decisions. Nurses, working together with a group of healthcare professionals from different areas of expertise, are essential for providing preoperative education to patients, their families, and caregivers (individuals outside of the family who provide care, support, and companionship in an informal capacity). The individual plays an important role in the patient's illness experience and assists in daily caregiving tasks, forming a "dyad": something that consists of two elements or parts and, in this case, represents the relationship between patient and caregiver. Currently, there is a lack of systematic research exploring the educational needs of patients and their families undergoing hip and knee replacement [9,10]. The aim of this review is to evaluate the efficacy of orthopedic patient education in identifying, understanding, managing, and resolving issues related to the joint replacement process from preoperative to postoperative periods.

2. Materials and Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were employed to enhance the reporting of the review. The most recent revision on this topic was published in 2017 [11], and the following article has incorporated recent literature to ensure the results are up to date.

2.1. Eligibility Criteria

This study aimed to identify articles describing patients (P) undergoing total hip arthroplasty (THA) or total knee arthroplasty (TKA) [12] who had received different types of preoperative education (I), and to compare the outcomes (O) between those who had received preoperative training and those who had not (C). Keywords and combinations of keywords were used to search electronic databases, and the research question was formulated using a PICOS-approach: Patient (P), Intervention (I), Comparison (C), Outcome (O), and Study design (S).

The aim of this study was to quantify the outcomes of preoperative education for orthopedic patients and caregivers, as well as to assess the qualitative outcomes and dyad characteristics (e.g., age, social context, and cost) associated with these outcomes. To achieve this, randomized controlled trials, prospective studies, retrospective analyses, pilot

randomized controlled trials, prospective longitudinal cohort studies, feasibility studies, and pilot studies were included in the analysis.

2.1.1. Study Inclusion Criteria

- Studies involving employed individuals of all ages with no restrictions.
- Studies that measure outcomes of patients who have undergone total hip arthroplasty (THA) and total knee arthroplasty (TKA) using generic scales administered to specific groups or at specific times, such as before and after preoperative education, and studies that report scores related to functionality and psychological aspects.
- Score (WOMAC, LOS, SF-36, NRS, AIMS, HAD, OKS, STAI, HR, HADS, NHP, SACL, OHS, PHWSUQ, VAS, RSES, NEADL, OPKQ, MEQ, KSS, KRES, HHS, ADL, APAIS, BPI-I).
- Only articles written in English were included.

2.1.2. Study Exclusion Criteria

- We excluded case reports, technical notes, letters to editors, instructional courses, in vitro and cadaver studies, protocol studies, reviews, validation studies, and books.
- We excluded patients who had not undergone osteoarthritis prostheses, who thus might have had infections, fractures, or tumors.

2.2. Search Strategy

A comprehensive search of Medline, Cochrane, CINAHL, and Embase databases was conducted from inception to April 2021 using a combination of keywords connected by the Boolean operators "AND" and "OR" to screen articles for inclusion in the study. The search process was conducted in an iterative and adaptive manner, considering the capabilities of the search engines of each database. The search strategy for this study was conducted by two reviewers (C.R. and I.P.) using a combination of Medical Subject Heading (MeSH) keywords and free terms, including: preoperative, presurgical care, education, education programs, arthroprotesis, total knee arthroplasty, total hip arthroplasty, total knee replacement, total hip replacement, joint arthroplasty, joint replacement, knee prosthesis, and hip prosthesis.

2.3. Study Selection and Data Collection

We accepted only English publications and conducted a search of the literature using the CADIMA software. The search was performed by two reviewers (I.P. and C.R.) following a previously described protocol. The researchers followed a research order of screening titles first, then abstracts and full papers. If the two independent reviewers could not exclude a paper based on its title and abstract, its full text was reviewed. The number of articles excluded or included were recorded and reported in a PRISMA flowchart (Figure 1), which was designed according to the rules by Moher et al.

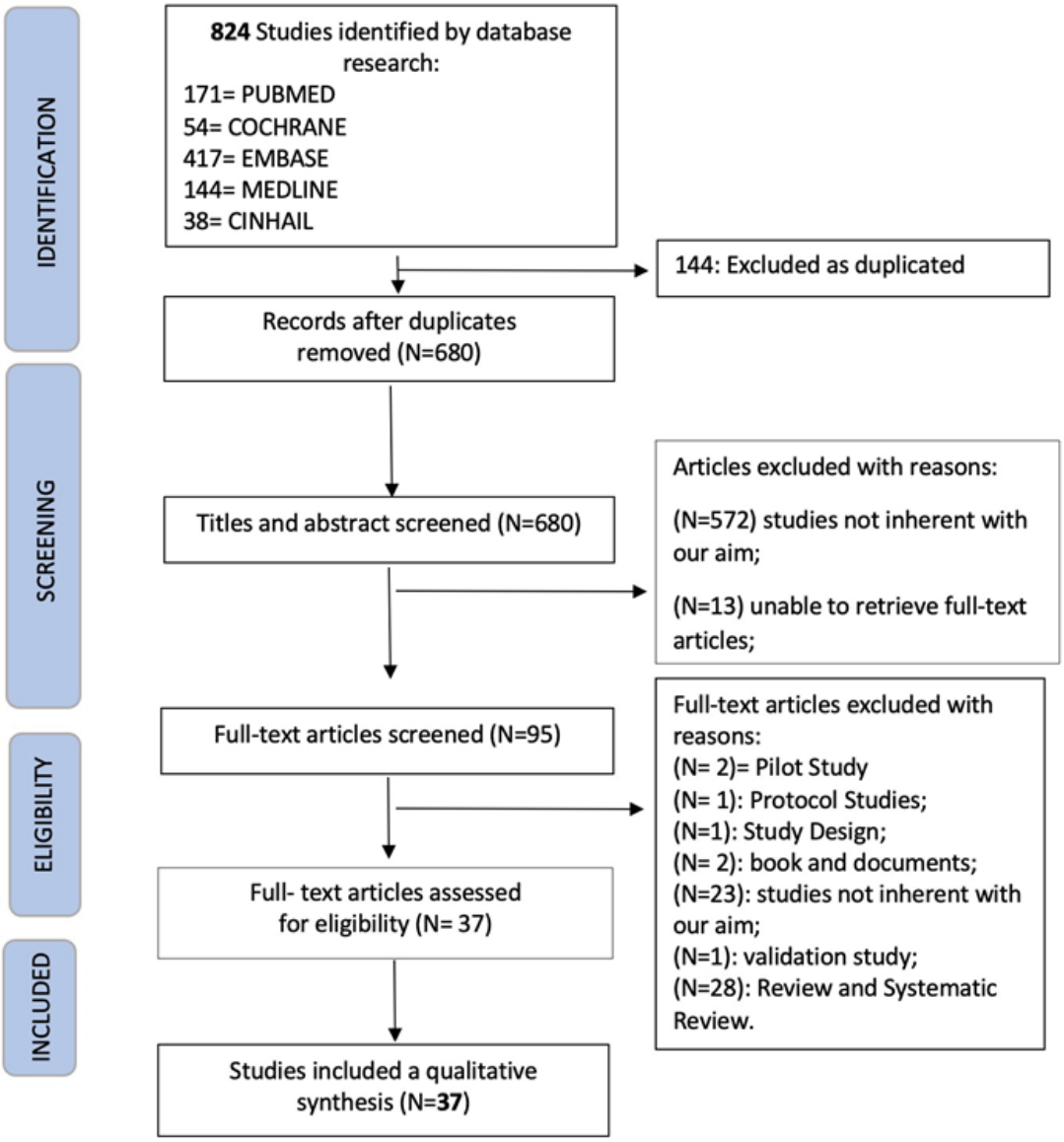

Figure 1. Flow chart of studies selection according to PRISMA guidelines.

2.4. Quality Assessment

Two reviewers (C.R. and I.P.) independently assessed the potential risk of bias in the included studies using the Methodological Index for Non-randomized Studies.

(MINORS) and the Cochrane Risk-of-Bias Tool for Randomized Controlled Trials (RCTs). The items of MINORS were scored 0 if not reported, 1 if reported but inadequate, and 2 if reported and adequate. The Cochrane Risk-of-Bias Tool was used to assess the quality of randomized controlled trials, with criteria including selection, performance, detection, attrition, reporting, and other biases. Each criterion was evaluated by assigning 0 points for low risk, 1 point for unclear risk, and 2 points for high risk of bias. The total score ranged from 0 to 14. A score of 0–1 indicated high quality, 2–3 indicated moderate quality, and a score greater than 3 indicated.

2.5. Data Synthesis and Analysis

Data were extracted and synthesized using Microsoft Excel 365. Characteristics of the study extracted included author, year of publication, country of origin, study design, aim, mean age, sex (Female/Male), joint analyzed, intervention program for the intervention group, follow-up period, outcome measure, outcome results, and conclusion. The codes

of the scales and other abbreviations used in the tables were explained in the legend. Additionally, a comment and the prevalence of the values were expressed as a percentage below.

3. Results

3.1. Study Selection

The selection process is depicted in Figure 1. After conducting a search strategy, 668 articles were identified. Duplicates were removed and titles, abstracts, and full-texts were reviewed. Of these, 37 studies met the criteria for methodological quality and were eligible for review. Only articles in English were included in the initial filter; thus, the number of articles excluded due to being in other languages is not shown in Figure 1.

3.2. Study Characteristics

This study included 5185 patients. The details of the sample size, study design, and purpose of the studies are provided in Table 1. All quantitative studies were reported in Tables 2 and 3. Data reported included mean age, female–male ratio, joint analyzed, type of educational intervention, follow-up, scores used, score results, and conclusions. The results included statistically insignificant data (p-value > 0.05). The conclusions in the table were based on statistically significant data ($p < 0.05$) and allowed for an accurate estimation of the effectiveness of each aspect analyzed. The percentages in the final conclusions were derived from statistically significant data only. Table 4 displays the qualitative studies, which are similar to those in Tables 2 and 3, except that Outcome Measures are not included. The conclusions are consistent with those in Table 3.

Table 1. Characteristics of the included studies of patients receiving prehabilitation prior to arthroplasty (N = 37).

Author	Year	Country	Study Design	Sample Size	Aim
Berge [13]	2004	United Kingdom	RCT	40 (19, 21)	Measure the effects of PMP on patients' pain and function after hip replacement surgery
Biau [14]	2015	France	RCT	209 (105, 102)	Evaluate preoperative education versus no education
Birch [15]	2020	Denmark	RCT	60 (31/29)	Investigate the effectiveness of patient education in pain coping among patients with moderate to high pain catastrophizing score before TKA. Secondary outcomes were physical function, quality of life, self-efficacy, and pain catastrophizing
Bondy [16]	1999	USA	RCT	134 (65/69)	Evaluate the effects that materials mailed to the home relating to anesthetic-focused patient education may have on preoperative patient anxiety
Butler [17]	1996	Canada	RCT	80 (32, 48)	Evaluate pre-hospital education and compare with anxiety, ability to adapt, and length of stay
Clode-Baker [18]	1997	United Kingdom	RCT	78 (41, 37)	Verify that providing adequate information to patients before surgery brings many benefits
Daltroy [19]	1998	USA	RCT	222 (168, 54)	Test two common psychoeducational procedures
Doering [20]	2001	Austria	RCT	100 (46, 54)	Prepare patients before surgery with the aim of reducing stress and improving outcome

Table 1. *Cont.*

Author	Year	Country	Study Design	Sample Size	Aim
O'Connor [21]	2016	USA	RCT	65 (36, 29)	Evaluate the potential impact of viewing this playlist on preoperative anxiety
Gammon [22]	1996A	Great Britain	Not RTC	82 (41, 41)	Evaluate the effect of preparatory information on a patient's postoperative physical coping results following total hip replacement (THR)
Gammon [23]	1996B	United Kingdom	Not RTC	82 (41, 41)	Evaluate the effects of preparatory information on psychological coping outcomes among patients with total hip replacement (THR)
Giraudet-lequintrec [24]	2003	France	RCT	100 (48, 52)	Compare patient education prior to total hip arthroplasty with the usual verbal information
Huang [25]	2017	Taiwan	RCT	116 (59, 57)	Measure the effectiveness of an education empowerment program
Jepson [26]	2016	United Kingdom	RCT	90	Assess the feasibility of a pre-operative occupational therapy intervention
Johansson [27]	2007	Finland	RCT	123 (62,61)	Determine if additional preoperative education is more effective than standard pre-education
Kearney [28]	2011	USA	Descriptive comparative study	150	Compare the results of patients who have attended and have not attended a hospital preoperative education class
Kennedy [29]	2017	Canada	Qualitative Study	32	Assess satisfaction with the educational material provided
Leal-Blanquet [30]	2013	Spain	RCT	92 (42, 50)	Hypothesize that patients receiving standard information plus additional medical information through audiovisual video discs would modify their preoperative expectations more than those only receiving the standard information through medical interviews
Lewis [31]	1997	Australia	Not RTC	87 (38, 49)	Determine the value of orthopaedical education in a pre-admission clinic for patients who were undergoing total knee and total hip replacements.
Lichtenstein [32]	1993	USA	Qualitative Study	535	Describe the development and impact of a hospital-based education program for patients undergoing knee or hip replacement surgery
Lilja [33]	1998	Sweden	RCT	50 (22, 28)	Evaluate the effects of extended preoperative information
Mancuso [34]	2008	USA	RCT	324 (160, 160)	Evaluate the importance of expectations and associations between expectations and function
McDonald [35]	2001	USA	RCT	31 (13, 18)	Test a Preoperative Pain Management Intervention for Elders
McGregor [36]	2004	United Kingdom	RCT	35 (15, 16)	Investigate if preoperative rehabilitation advice with an information booklet can help recovery
Medina-Garzon [37]	2019	Colombia	RCT	56 (28, 28)	Determine the effectiveness of a nursing intervention to diminish preoperative anxiety
Montgomery Orr [38]	1990	USA	Not RCT	203	Use the program to attempt to prevent complications, decrease anxiety, and decrease pain and hospital length of stay

Table 1. *Cont.*

Author	Year	Country	Study Design	Sample Size	Aim
Pelt [39]	2018	USA	Cohort Study	462	Assess the exposure of the pathway on discharge disposition as well as institutional 30-day and 90-day readmissions and reoperations
Prouty [40]	2006	USA	Qualitative Study	2066	Evaluate a preoperative educational program through surveys
O'Reilly [41]	2018	United Kingdom	Cohort Study	57	Assess patient understanding to ensure a sustained, high level of patient care, quality assurance, and educational standards
Roach [42]	1995	USA	Not RCT	463	Highlight the effectiveness of preoperative assessment and educational programs
Santavirta [43]	1994	Finland	RCT	60 (27, 33)	Analyze the patients' needs and study the results of intensified patient teaching
Siggeirsdottir [44]	2005	USA	RCT	50 (27, 23)	Study the effectiveness of preoperative education during a shorter hospital stay
Sisak [45]	2019	United Kingdom	Cohort Study	1233 (1018, 215)	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
Sjoling [46]	2003	Sweden	RCT	60 (30, 30)	Study the impact of preoperative information on state and trait anxiety
Wilson [47]	2016	Canada	RCT	143	Determine the effect of a preoperative educational intervention
Wong [48]	1985	Canada	RCT	98 (51, 47)	Evaluate the effects of a new approach to preoperative teaching
Yoon [49]	2010	USA	Cohort Study	261	Study how education programs influence hospital length of stay

Table 2. Quantitative studies (N = 34).

Author	Mean Age	Female/Male	Joint	Education Program for Intervention Group	Outcome Measures	Conclusion
Berge [13]	i: 71.6 (S.D. = 6) c: 71 (S.D. = 6.1)	12/15	Hip	Pain management education for one to two mornings/week for 6 week	NRS, AIMS	PAIN+ * SLEEP+ * ANALGESIC INTAKE = IMPROVED FUNCTIONS =
Biau [14]	66 (range 60–74)	121/209	Hip	Small group education on postoperative exercises and pain management with practical demonstration. One session 4 week before to surgery	NRS, LOS	PAIN = LOS =
Birch [15]	66 (range 47–82)	40/20	Knee	Two physiotherapists followed a manual describing in detail the content in each of the seven sessions	VAS, OKS, KOOS, EQ-5D, PSEQ, PCS.	PAIN (catastrophizing) = IMPROVED FUNCTION = QUALITY OF LIFE = SELF EFFICACY =
Bondy [16]	i: 65.3 (S.D. = 12.0) c: 64.9 (S.D. = 11.3)	109/81	Both	Two pamphlets and a video describing general and regional anesthesia	STAI	ANXIETY+ *
Butler [17]	62.6 (S.D. 12.95)	41/39	Hip	Booklet about biophysiological, functional, experiential, and social information related to THA	STAI, purpose-designed questionnaire, HR	ANXIETY (preoperative and postoperative)+ * SATISFACTION RATING = LOS = ADHERENCE TO EXERCISES+ * OCCUPATIONAL THERAPY+ *

Table 2. *Cont.*

Author	Mean Age	Female/Male	Joint	Education Program for Intervention Group	Outcome Measures	Conclusion
Clode-Baker [18]	-	52/26	Hip	Video, booklet, and plastic models for patients undergoing total hip replacement	HADS, NHP, and Stress Arousal Checklist.	SATISFACTION RATING+ * CAREGIVER SATISFACTION+ * PAIN = SLEEP = LOS MANAGEMENT+ *
Daltroy [19]	64.0 (S.D. = 12)	147/75	Both	Audiotape slide program presented the day before surgery	Speilberger's Zo-item anxiety, Wilson's three-item scale, LOS, MMSE	PAIN (postoperative) = ANXIETY+ * ANALGESIC INTAKE+ * LOS+ * POSTOPERATIVE MENTAL STATE+ *
Doering [20]	i: 58.7 (S.D. = 10.8) c: 60.4 (S.D. = 8.7)	38/62	Hip	Educational video (1 day)	VAS, STAI	ANXIETY (properative and postoperative)+ * INTRAOPERATIVE VITAL SIGNS+ * PAIN = ANALGESIC INTAKE+ * CORTISOL LEVELS+ *
O'Connor [21]	c: 63.1 (S.D. = 10.7) i: 67.4 (S.D. = 10.3)	31/22	Both	Sixteen YouTube videos aimed at creating a virtual hospital experience for primary total hip and knee joint replacement patients	GAD	ANXIETY (preoperatory)+ SATISFACTION RATING+ *
Gammon [22]	44–82	56/24	Hip	Booklet with information of a sensory and procedural nature and suggestions on possible coping methods and strategies	VAS and purpose designed by postoperative pain analgesia, ability to mobilize, performing exercises, complications, LOS	ANALGESIC INTAKE = ANALGESIC INTAKE (intramuscular)+ * IMPROVED FUNCTIONS+ * ADHERENCE TO EXERCISES+ * COMPLICATIONS–(not statistically significant) LOS+ * COPING+ *
Gammon [23]	44–82	56/24	Hip	Booklet with information of a sensory and procedural nature and suggestions on possible coping methods and strategies	HADS, Healt Illness Questionnaire, Linear Analogue Coping scale	COPING+ * ANXIETY+ * PAIN+ * POSTOPERATIVE MENTAL STATE+ * SELF ESTEEM+ * SENSE OF CONTROL+ *
Giraudet-lequintrec [24]	i: 62.7 (S.D. = 8.8) c: 64.3 (S.D. = 9.5)	56/44	Hip	Collective multidisciplinary information session 2 to 6 weeks before surgery	STAI, VAS, LOS	ANXIETY+ * PAIN (pre-operative and postoperative)+ * IMPROVED FUNCTIONS+ *
Huang [25]	66.05 (S.D. = 9.46)	53/63	Knee	Intervention program for educational empowerment (five meetings in 12 weeks)	THR Self-efficacy Scale, ADL, Barthel, GDS, SF-36	SELF-EFFICACY+ * COMPLIANCE+ * POSTOPERATIVE MENTAL STATE+ * IMPROVED FUNCTIONS =
Jepson [26]	66 (S.D. = 10.8)	33/57	Hip	In-home education by an occupational therapist	LOS, NEADL, HADS, WOMAC	PAIN+ * IMPROVED FUNCTIONS+ * ANXIETY+ *
Johansson [27]	62.4 (range and SD not found)	63/60	Hip	Educational concept maps by biophysiological, functional, experiential, ethical, social, and financial issues related to care for 30–60 min, 2 week prior	OPKQ, MEQ	KNOWLEDGE+ *
Kearney [28]	i: 67.25 (S.D. = 10.8) c: 64.5 (S.D. = 11.2)	90/60	Both	Structured online course including book; brochure; CD from MD; and information from hospital, family, friend, joint class, mailing, and neighbor prior to surgery.	Research questions, NRS	SATISFACTION RATING+ * PAIN = LOS = IMPROVED FUNCTIONS = COMPLICATION RATE =
Leal-Blanquet [30]	i: 72.1 (S.D. = 7.4) c: 73.4 (S.D. = 6.5)	69/23	Knee	Ten-minute DVD with the process from admission to surgical intervention, recovery room, immediate postoperative care, and outpatient care	KSS, KRES	SATISFACTION RATING = IMPROVED FUNCTIONS =
Lewis [31]	(34–87)	42/45	Both	Multidisciplinary team show a video of the type of joint replacement surgery. They instruct on the use of analgesics, devices, and physical exercises	LOS	LOS+ *

Table 2. *Cont.*

Author	Mean Age	Female/Male	Joint	Education Program for Intervention Group	Outcome Measures	Conclusion
Lilja [33]	65 (range and SD not found)	17/33	Hip	Information by the anesthetic nurse about what was going to happen to the patient. This information was given for half an hour on the day before surgery	HADS, VAS, S-Cortisol	PAIN = CORTISOL LEVELS = ANXIETY =
Mancuso [34,35]	THA i: 71 c: 70 (S.D. 6) TKA i: 72 c: 71 (S.D. = 8)	181/139	Both	Educational modules that address recovery over 12 months to make patients' expectations more effective	WOMAC, SF-36	EXPECTATIONS+ *
McDonald [35]	74 (S.D. = 6.16)	8/23	Both	PowerPoint slide shown to teach basic pain management and pain communication skills.	MPQ-SF, PPI	PAIN+ *
McGregor [36]	71.9 (S.D. = 9.3)	25 /10	Hip	Education, gait aid instruction, and exercise for 2–4 week	WOMAC, HHS, ADL	SATISFACTION RATING+ * LOS+ * IMPROVED FUNCTIONS = PAIN =
Medina-Garzon [37]	i: 76.32 (S.D. = 16.1) c: 73.7 (S.D. = 16.6)	26 /29	Knee	Three sessions of motivational interview, each lasting 40 min, during the 6 weeks prior to surgery	APAIS	ANXIETY (preoperative) +
Montgomery Orr [38]	-		Both	Five different classes that started in an outpatient setting and continued in the inpatient unit. The program bridged the gap between the scheduling of surgery, admission to the hospital, surgery, and discharge	LOS, questionnaire	LOS+ * ANXIETY+ *
Pelt [39]	i: 63 (range = 15–87) c: 62 (range = 24–92)	265/197	Both	Nine short videos about what the patient should be learning and doing before surgery and what to expect on the day of surgery, during the hospital stay, and when they return home + "joint academy" class	PAC	COMPLICATION RATE+ *
O'Reilly [41]	64.5 (range and SD not found)	30/27	Both	Combination of PowerPoint presentations, educational videos, and model demonstrations	Kruskal–Wallis H-test	KNOWLEDGE+ *
Roach [42]	-	-	Both	Four-hour multidisciplinary program offered twice a week in the orthopedic unit for patients and their families for 2–4 weeks with written information support	LOS	LOS+ * IMPROVED FUNCTIONS+ * EFFICIENCY+ * CAREGIVER SATISFACTION+ *
Santavirta [43]	58.9 (S.D. = 5.64)	38/22	Hip	Illustrated patient guide	Mann–Whitney U-test, McNemar's test, Wilcoxon signed-rank test	ADHERENCE TO EXERCISES+ * KNOWLEDGE = SATISFACTION+ * COMPLICATION RATE =
Siggeirsdottir [44]	68 (range = 28–86)	26/24	Hip	Preoperative program 1 month before surgery with illustrated brochure and consultancy with specialists: familiarization with exercises and devices	OHS, LOS	LOS+ * PAIN+ * IMPROVED FUNCTIONS+ * SLEEP =
Sisak [45]	THR i: 69.87 (S.D. = 9.7) c: 70.96 (S.D. = 10.63) TKR i: 70.90 (S.D. = 8.22) c: 72.15 (S.D. = 8.73)	629/389	Both	Preoperative education class (range 2–21 days before surgery)	LOS	LOS+ *
Sjoling [46]	71 (range = 54–86)	36/24	Knee	Information class (20–40 min) 1–4 days before surgery	VAS, LOS	PAIN+ * ANXIETY+ * SATISFACTION RATING+ * ANALGESIC INTAKE = LOS =
Wilson [47]	i: 67 (S.D. = 8) c: 66 (S.D. = 8)	89/54	Knee	Three components: the booklet, an individual teaching session, and a follow-up support telephone call	BPI-I, MPQ-SF	PAIN = NAUSEA = ANALGESIC INTAKE =

Table 2. *Cont.*

Author	Mean Age	Female/Male	Joint	Education Program for Intervention Group	Outcome Measures	Conclusion
Wong [48]	(range = 50–89)	67/31	Hip	LAP that included five learning-activity packages	MW (Mann–Whitney)	SATISFACTION RATING+ * ADHERENCE TO EXERCISES+ *
Yoon [49]	66.3 (S.D. = 11.2)	95/163	Both	One-on-one education session via phone regarding the specifics of their scheduled procedure, hospital stay, and recovery	LOS	LOS+ *

Table 3. Outcome results.

Author		Outcome Results
Berge [13]		Intervention group reported significantly less average pain intensity (means for PMP and control groups = 4.47, 6.65, respectively, t (1.34) = −2,99; $p = 0.005$), less average pain distress (means = 4.11, 6.12, t (1.34) = −2,22; $p = 0.033$), and less sleep disturbance from hip pain (means =3.37, 5.29, t (1.34) = −2,04; $p = 0.05$) than waiting list controls. There were no statistically significant differences between groups for the following variables: weak opioid use, NSAID use (x^2, $p > 0.1$), paracetamol use, or any drug use (Fisher's $p > 0.1$); pain interference; AIMS total or subscales of mobility, depression, and anxiety; meters walked in 4 min (t (1.34) = −1:37–1,19; $p > 0.1$); and AIMS physical activity (U = 145.5; $p > 0.1$).
Biau [14]	65	The median time to reach complete independence was five days in all groups. There was no significant effect of either education (HR: 1.1; 95% CI: 0.76–1.5; $p = 0.77$). NRS: Recovery i: 2 (1–5) c: 2 (0–6) ($p = 0.95$). Day 1 i: 2 (1–4) c: 2 (1–4) ($p = 0.43$). Day 3 i: 1 (0–3) c: 2 (0–3) ($p = 0.26$).
Birch [15]	-	VAS during activity Baseline 48 (41–55) 31 49 (42–57) 29, 12 months 12 (5–18) 24 9 (3–15) 26 VAS during rest; Baseline 19 (13–24) 31 25 (19–30) 29, 12 months 7 (1–12) 24 6 (1–12) 26 Oxford Knee Score; Baseline 21 (19–23) 31 22 (20–24) 29, 12 months 33 (29–37) 24 37 (33–41) 24 KOOS pain; Baseline 40 (35–45) 31 37 (32–43) 27, 12 months 75 (67–82) 24 83 (75– 90) 23 EQ-5D; Baseline 0.58 (0.52–0.66) 29 0.62 (0.54–0.70) 26, 12 months 0.78 (0.70–0.86) 24 0.86 (0.81–0.91) 24 PSEQ; Baseline 33 (30–36) 31 34 (31–38) 29, 12 months 49 (44–53) 23 52 (48–57) 25 PCS; Baseline 30 (28–32) 31 31 (29–33) 29, 12 months 11 (7–16) 23 9 (5–14) 25 6 min walk test; Baseline 387 (350–424) 31 334 (296–372) 29, 12 months 441 (402–480) 24 406 (367–446) 26 sit-to-stand; Baseline 10 (9–11) 31 9 (8–10) 29, 12 months 12 (11–14) 24 11 (10–13) 26 ($p < 0.05$).
Bondy [16]		STAI State Score Baseline i: 34.8 ± 13.5 (33.0) c: 30.7 − 12.3 (30.0) Presurgery i: 35.0 ± I5.2 (36.0) c: 34.6 − 11.4 (35.0); Trait Score Baseline i: 33.5 + 10.8 (32.0) c: 30.2 ± 10.4 (30,0); Presurgery i: 31.5 ± 10.8 (30.0) c: 29.3 ± 10.i (29.0) p i: 0.031 c: 0.073.
Butler [17]		Patients in the Booklet Group (N = 30) had a mean percentile score of 27.93 (S.D. = 25.24) at time of hospital admission, and a mean percentile score of 21.57 (S.D. = 18.44) the day prior to discharge. Means for the No-Booklet Group (N = 40) were 42.65 (S.D. = 29.06) at admission and 31.15 (S.D. = 22.93) at discharge. Patients in the Booklet Group were far more likely to practice breathing and coughing exercises (55% of Booklet patients compared to 15% of No-Booklet patients), log rolling (39% vs. 6%); and leg exercises (65% vs. 24%). Despite the differences in anxiety and rates of engaging in prehospital preparatory exercises, there were no significant differences for length of hospital stay between the Booklet (mean = 10.28 days, S.D. = 4.74) and No-Booklet (mean = 10.38 days, S.D. = 5.53) groups. Physioterapy i: 7.29 (2.79) c: 9.24 (4.34) $p < 0.05$. Occupational terapy i: 2.21 (1.35) c: 3.07 (1.99) $p = 0.045$. Deep breathing and coughing exercises i: 55% c: 15% ($p < 0.001$). Leg rolling i: 39% c: 6% ($p < 0.001$). Leg exercises i: 65% c: 24% ($p < 0.001$).
Clode-Baker [18]		Stress Score median i: 5, median c: 3 ($p = 0.31$). Arousal score median i: 4 median C:5 ($p = 0.13$). HAD Anxiety score preoperative. Median i: 6 median c: 8 ($p = 0.1$). Anxiety score postoperative median i: 5 median C:5 ($p = 0.7$). Depression score preoperative median i: 7, median c: 7 ($p = 1$). Depression score postoperative median i: 4, median c: 4 ($p = 0.99$). NHP preoperative median i: 19, median c: 17.5 ($p = 0.89$), postoperative median i: 10, median c: 9 ($p = 0.33$).

Table 3. *Cont.*

Author	Outcome Results
Daltroy [19]	LOS: patients who received information had shorter LOS than controls (0.67 days less, on average); patients in the bottom quartile (least denial) who received information had greater length of stay (1.94 days) than controls. The average anxiety level 4 days postoperatively was 1.9 (scaled 1 = low to 4 = high; SD 0.56). The average pain level 4 days postoperatively was 2.4 (scaled 1 to 5; SD 0.85). General linear models analysis indicated that 24% of the variance in pain was explained by the covariates and intervention effects (F = 6.55, 10,207 df; $p < 0.0001$). The average patient used the equivalent of 9.9 units of morphine during the first 4 days postoperatively (range 0.0–62.1; median 8.0; SD 8.3). Neither the information intervention ($p = 0.059$) nor the relaxation intervention ($p = 0.52$) nor their interaction ($p = 0.51$) was associated with better mental status, although the trend was favorable for information provision.
Doering [20]	Trait anxiety (stanine value) 5.0 ± 1.9 5.3 ± 1.9. Depression (stanine value) 6.1 ± 1.7 6.2 ± 1.9. Pain during previous week (VAS 0–100 mm) 57 ± 25.4 62.1 ± 21.5 ($p > 0.05$).
O'Connor [21]	GAD Median (range) c: 0.0 (−7, 4) i: −1.0 (−12,7) $p = 0.53$.
Gammon [22]	Oral analgesia c: 22.5 i: 18.8 ($p > 0.05$), intramuscular analgesia c: 4 i: 2 ($p < 0.01$), Mobilization Zimmer c: 3 i: 2 ($p < 0.05$), Mobilization Stick c: 5 i: 3 ($p < 0.05$), Breathing exercises c: > 15 i: 1 ($p < 0.05$), Foot/ leg exercises c: > 5 i: 1 ($p < 0.01$), Postoperative complication c: 2.5 i: 2.9 ($p > 0.05$), Length of stay c: 17 i: 14 ($p < 0.001$). The mean number of complications for the experimental group was 2.5 (range G3), and 2.9 (range O-4) for the control. Although the experimental groups had fewer complications, this was not statistically significant. ($p < 0.05$).
Gammon [23]	LOS i: 14 (range 10–22 days) c: 17 (range 12–25) ($p< 0.001$). COPING i;6.6 c: 4.1 ($p < 0.001$) Anxiety observed i: 42 c: 44 ($p < 0.001$). Depression i: 42 c: 68 ($p < 0.001$). Self-esteem i: 19 c: 174 ($p < 0.001$). Sense of control i: 199 c: 112 ($p < 0.01$). Patient assesment of coping i: 66 c: 43 ($p < 0.001$).
Giraudet-lequintrec [24]	Preoperative VAS i: 24 c: 35 (p 0.04). Postoperative VAS i: 21 c: 28 (p 0.07). Preoperative anxiety i: −1.74 c: + 1.81 (p 0.08). Postoperative anxiety i: -4.16 c: -2.53 (p 0.5).
Huang [25]	S-E (T4) i: 2.87 c: 2.66 competence (T4) K i: 14.94 c: 14.59 B i: 21.20 c: 17.33 ADL (T4) i: 99.07 c: 98.33 GDS-15 (T4) i: 2.02 c: 2.87 QOL (T4) i: 69.08 c: 66.74 All ($p < 0.05$).
Jepson [26]	WOMAC c: 61.41 i: 56.50 WOMAC 26 WEEKS c: 15.67 i: 9.95 HADS 6.56 (4.58) 6.71 (5.33) HADS 26 WEEKS 3.52 (3.66) 2.87 (3.62) NEADL 49.26 (10.32) 47.28 (14.67 NEADL 26 WEEKS 57.34 (16.18) 62.53 (6.95).
Johansson [27]	Time for discussions on admission A: M = 13.25 min, B: M = 33.36 min, $p < 0.001$ OPKQ at discharge i: 4.3 c: 4.03 ($p < 0.022$).
Kearney [28]	Patients who had attended the structured preoperative class felt significantly better prepared for surgery (mean 1.2 vs. 1.4, p 0.002, where 1 corresponded to very much so and 2 to somewhat) and they also felt better able to control their pain after surgery (mean 1.4 vs. 1.7, p 0.001, where 1 corresponded to very much so and 2 to somewhat).
Leal-Blanquet [30]	Knee ROM c: 0.1 i: 0 ($p = 0.04$). Going up the stairs c: -0.04 i: 0.1 ($p = 0.03$). Going down the stairs c: −0.02 i: 0.2 ($p = 0.03$). Other result p = n.s.
Lilja [33]	HADS Day0 i: 5 c: 3 ($p < 0.01$) S-Cortisol Day0 i: 370 c: 368 VAS Day3 i: 1.3 c: 2.5
Mancuso [34,35]	WOMAC. Pain i (THA)51 ± 17 c (THA) 49 ± 20 ($p = 0.20$) i (TKA)45 ± 19 c (TKA)48 ± 21 ($p = 0.40$). Stiffness i (THA)54 ± 18 c (THA) 51 ± 19 0.40 i (TKA)50 ± 19 c (TKA)55 ± 19 ($p = 0.20$). Function i (THA)57 ± 16 c (THA)55 ± 18 0.30 i (TKA)52 ± 16 c (TKA)54 ± 19 ($p = 0.60$). SF-36 Physical function i (THA)17 ± 20 c (THA)20 ± 22 0.40 i (TKA)18 ± 18 c (TKA)17 ± 20 ($p = 0.60$). Pain i (THA)39 ± 15 c (THA)43 ± 19 0.20 i (TKA)43 ± 16 c (TKA)40 ± 19 ($p = 0.20$).
McDonald [35]	PPI Intensity DOS i: 2.6 (SD:1.39) c: 2.2 (SD:1.06) POD2 i: 1.6 (SD:0.77) c: 2.2 (SD:1.47) Affective DOS i: 2.3 (SD:1.97) c: 3.8 (SD:2.50) POD2 i: 2.2 (SD:2.28) c: 2.6 (SD:3.00). Sensory DOS i: 9.9 (SD:5.58) c: 7.7 (SD:5.29). POD2 i: 6.1 (SD:4.66) c: 7.6 (SD:6.21).

Table 3. *Cont.*

Author	Outcome Results
McGregor [36]	i: Admission Pain 7.8, Womac Pain 10.2, Womac Stiffness 4.3, Womac Function 35.8, HHS 45.4, Barthel Index 19.2. c: Admission Pain: 7.6, Womac Pain 10.3, Womac Stiffness 4.1, Womac Function 41.0, HHS 43.2, Barthel Index 19 i: 3-Month Review Pain 2.1 Womac Pain 2.7, Womac Stiffness 1.1, Womac Function 15.9, HHS 74.2, Barthel Index 19.9 c: 3-Month Review Pain 3.1 Womac Pain 0.05, Womac Stiffness 1.6, Womac Function 18.4, HHS 68.8, Barthel Index 19.6 ($p < 0.005$).
Medina-Garzon [37]	The mean score of preoperative anxiety was equal in the pre-intervention evaluation in both groups (19.76 in the experimental versus 22.02 in the control = 22.02; $p < 0.226$), while during the post-intervention, the anxiety score was lower in the intervention group compared with the control group (15.56 and 20.30, respectively; $p < 0.013$).
Montgomery Orr [38]	−8/23.
Pelt [39]	There was a 20% absolute reduction in discharges to PACs (<0.001). The frequency of 30-day readmissions was greater in patients who underwent TJA before implementation (incidence rate ratio [IRR]. 1.93, 95% confidence interval [CI]. 1.01–3.69). The risk for 90-day readmissions (IRR 1.70, 95% CI 1.20–2.40) and reoperations (IRR 1.67, 95% CI 1.12–2.53) was greater prior to implementation. Discharge to PACs was associated with 2.4 and 3.10 times greater risk for 30-day readmissions (95% CI 1.28–4.56) and 30-day reoperations (95% CI 1.40–7.0), respectively. Patients discharged to PACs were also at greater risk for both 90-day readmissions (IRR 1.59, 95% CI 1.08–2.32) and 90-day reoperations (IRR 1.75, 95% CI 1.12–2.73), $p <$ 0.001.
O'Reilly [41]	Anesthetic type 0.00210 $p = 0.963$ Anesthetic complications 30.48084 $p < 0.001$. Items required on admission 60.58557 $p < 0.001$ Length of stay 18.07776 $p < 0.001$. Physiotherapy requirements 3.82730 $p = 0.050$ Walking aid requirements 7.37168 $p = 0.007$. Understanding of procedure/operation 36.59683 $p < 0.001$. Smoking-related complications 14.21220 $p < 0.00$.
Roach [42]	Average LOS i: 8.0 days, c: 8.7 days.
Santavirta [43]	The experimental group had followed the instructions for the exercise program more often than the control group ($p = 0.02$, Chi-square). Patients who received information increased fruit consumption ($p = 0.05$, McNemar test). The intervention group's knowledge of symptoms and complications were not statistically better than that of the controls ($p = 0.2$, Mann–Whitney U-test). The experimental group showed more satisfied with the information they had received. There was no statistical difference in the number of early complications and the two- to three-month rehabilitation results between the two groups.
Siggeirsdottir [44]	Confusing or controversial information from different health care professionals/groups t: 422.5 p: 0.2519. Teaching and verbal information presented clearly t: 475.0 p: 0.0913. Teaching and information always adjusted to individual situation t: 305.0 p: 0.3132. At home, many items remained unclear t: 332.5 p: 0.3293. Mean hospital stay was shorter for the SG than for the CG (6.4 days and 10 days, respectively; $p < 0.001$). During the 6-month study period, there were nine non-fatal complications in the SG and 12 in the CG ($p =$ 0.3). The difference in Oxford Hip Score between the groups was not statistically significant before the operation, but was better for the SG at 2 months ($p = 0.03$), and this difference remained more or less constant throughout the study.
Sisak [45]	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, $p = 0.001$).
Sjoling [46]	State anxiety i: 29 (96.7) c: 30 (100) $p = 0.009$ VAS (Day 2) i: 0.28 c: 0.41 $p < 0.05$. Satisfaction i: 100% c: 87% $p < 0.05$.
Wilson [47]	Analgesic intake Day 3 i: 40 (45) c: 40 (42) BPI-I i: 24.4 (14.4) c: 22.4 (15.1) $p = 0.45$ MPQ-SF. Pain right now at rest Day3 i: 2.8 c: 2.8 $p = 0.7$. Pain right now when moving Day3 i: 5.4 c: 6.1 $p = 0.2$ Worst pain last 24 h i: 7.0 c: 7.0 $p = 0.87$.
Wong [48]	Satisfaction, willingness and regularity, accuracy, and deep breathing. MW E > C $p < 0.001$.
Yoon [49]	LOS: total hip arthroplasty 3.1 ± 0.8 days vs. 3.9 ± 1.4 days; $p = 0.0001$; total knee arthroplasty 3.1 ± 0.9 days vs. 4.1 ± 1.9 days; $p = 0.001$.

Table 4. Qualitative studies (N = 3).

Author	Mean Age	Female/Male	Joint	Education Program for Intervention Group	Follow-Up	Outcome Results	Conclusion
Kennedy [29]	67.9 (S.D. = 7.82)	16/16	Both	A focus group guide to address four specific aspects of the patient's experience with educational material and a preoperative education class	12 months	One of the key themes that emerged was a need for more education concerning pain management postoperatively. Poorly managed pain decreases patient satisfaction and the ability to progress functionally	PAIN=
Lichtenstein [32]	65	-	Both	A 1 h education session conducted by a case manager providing information on what to expect from the procedure	2 months, 6 months, 12 months	More than 90 percent of the patients that responded to the questionnaire indicated that the program was helpful in preparing them for their surgical experience and for their home discharge needs. Additionally, the rate of compliance of the patient with medical advice was high, as demonstrated by their adherence to the physical exercise regimen	SATISFACTION RATING+ * COMPLICATION RATE+ *
Prouty [40]	-	-	Both	HOPE educational program: 2 h for 3 week of educational program for the patient and the caregiver	-	Evaluations indicated that patients' expectations of the program were met, they were less anxious about their surgery as a result of attending the classes, and the preoperative teaching by the multidisciplinary team was effective	ANXIETY+ * SELF-EFFICACY+ * SATISFACTION RATING+ *

Legend: * I = intervention group, C = control group, WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index, LOS = length of stay, SF-36 = Short Form-36, NRS = numeric rating scale for pain, AIMS = Arthritis Impact Measurement Scale, HAD = Hospital Anxiety and Depression Score, OKS = Oxford Knee Score, STAI = State-Trait Anxiety Inventory, HR = Hospital records, HADS = Hospital Anxiety and Depression Scale, NHP Nottingham Health Profile, SACL Stress Arousal Checklist, OHS = Oxford Hip Score, PHWSUQ = Perceived Health Website Usability Questionnaire, VAS = visual analog scale for pain, RSES = Rosenburg Self-Esteem Scale, NEADL = Nottingham Extended Activities of Daily Living, OPKQ = Orthopedic Patient Knowledge Questionnaire, MEQ = Modified Empowerment Questionnaire, KSS = Knee Society Score, KRES = Knee Replacement Expectations Survey, HHS = Harris hip score, ADL = Activities of Daily Living, APAIS = Amsterdam Preoperative Anxiety and Information Scale, BPI-I = Brief Pain Inventory Interference, DC = discharge.

3.3. Results of Individual Studies

3.3.1. Outcome: Pain

Seven studies [13,23,24,26,35,44,46] found that preoperative education resulted in a reduction in postoperative pain, while no statistically significant change was observed in other studies [14,15,18,20,28,29,33,36,47]. According to MINORS, the overall quality of evidence in these studies was assessed as being between "low" and "high".

3.3.2. Outcome: Satisfaction

Many studies, including [18,21,28,32,36,40,42,43,46,48], have demonstrated a significant increase in postoperative satisfaction rates. However, Leal Blanquet et al. [30] and Butler et al. [17] did not observe any improvement. According to MINORS, the overall quality of evidence in these studies was rated between "low" and "high".

3.3.3. Outcome: Anxiety

In one trial, ref. [33], education did not reduce anxiety; however, in 12 other studies [16,17,19,21,23,24,26,37,38,40,46], this aspect improved. According to the MINORS scale, the overall quality of evidence in these studies was rated between "low" and "high".

3.3.4. Outcome: LOS

Of fourteen studies, nine [19,22,28,31,36,38,42,44,45,49] demonstrated a decrease in the length of stay (LOS) in comparison to the control group, while the remaining five trials [14,17,18,28,46] reported no significant difference from the hospital average. According to the MINORS scale, the overall quality of evidence for these studies was rated between

"low" and "high". In addition to these topics, sleep, mental state, compliance, knowledge, and patient expectations were all observed to have improved in the experimental group. The results of this are presented in Tables 2 and 3.

3.4. Quality Assessment

3.4.1. Risk of Bias Assessment with MINOR for Non-Randomized Studies

Two authors (C.R., I.P.) independently assessed the potential risk of bias for non-randomized studies using MINOR (Methodological Index for Non-Randomized Studies). Items were scored as 0 for unreported, 1 for inadequate, and 2 for reported and adjusted. Studies that met all MINOR criteria were classified as having a low risk of bias, while those that did not meet all criteria were classified as having a high risk of bias (Table 5).

Table 5. Risk of bias assessment with MINOR for non-randomized studies.

Author	Clearly Stated Aim	Inclusion of Consecutive Patients	Prospective Data Collection	Endpoints Appropriate to Study Aim	Unbiased Assessment of Study Endpoint	Follow-Up Period Appropriate to Study Aim	<5% Lost to Follow-Up	Prospective Calculation of Study Size	Adequate Control Group	Contemporary Groups	Baseline Equivalence of Groups	Adequate Statistical Analyses	Total Score (. . ./24)
Gammon [22], 1996A	2	1	2	2	0	0	0	2	2	2	2	1	15/24
Gammon [23], 1996B	2	1	2	2	0	0	0	2	2	2	2	1	15/24
Kearney [28], 2011	2	1	2	2	1	2	0	2	2	2	2	2	20/24
Kennedy [29], 2017	2	2	2	2	2	2	0	2	NA	0	0	2	16/24
Lewis [31]	2	2	0	1	1	1	0	2	2	2	0	0	13/24
Lichtenstein [32], 1993	2	2	2	2	2	2	1	0	0	0	0	0	13/24
Montgomery Orr [38]	2	0	1	2	2	0	0	0	0	0	0	0	7/24
Pelt [39], 2018	2	2	2	2	2	2	0	0	1	1	0	0	14/24
Prouty [40], 2006	2	0	1	2	0	0	0	0	NA	0	0	0	5/24
O'Reilly [41], 2018	2	2	2	2	2	2	2	1	NA	0	1	2	18/24
Sisak [45]2019	2	2	2	2	2	2	2	0	2	0	0	2	18/24
Yoon [49], 2010	2	0	1	2	1	2	2	0	NA	0	0	0	10/24

3.4.2. Risk of Bias Assessment with MINOR for Randomized Studies

The quality assessment of the RCTs' risk of bias instrument was performed by two authors (C.R., I.P.) independently, using a quantitative score for each item. Unreported items were scored with a 0, inadequate items with 1, and reported and corrected items with 2. An overall quality score was calculated by summing up the values of the different items using the following scale: score $\leq$1 (high quality), score $\leq$3 (moderate quality), and score >3 (low quality) (Table 6).

Table 6. Risk of Bias Assessment with MINOR for Randomized Studies.

Title Article	Sequence Generation	Allocation Concealment	Blinding of Participants and Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data	Selective Outcome Reporting	Other Sources of Bias	Punteggio Totale (Overall Score)
Berge [13], 2004	0	0	1	1	0	0	1	3
Birch [15], 2020	0	0	1	0	0	1	0	2
Biau [14], 2015	0	0	0	0	0	0	0	0
Bondy [16], 1999	0	0	2	2	1	2	2	9
Butler [17], 1996	0	0	1	1	0	0	0	2
Clode-Baker [18], 1997	0	1	1	1	0	0	0	3
Daltroy [19], 1998	0	0	0	0	1	0	0	1
Doering [20], 2000	0	0	0	1	0	0	0	1
Giraudet-Lequintrec [24], 2003	0	0	2	1	0	2	0	5
Huang [25], 2017	0	0	2	0	0	0	0	2
Jepson [26], 2016	0	0	1	0	0	0	0	1
Johansson [27], 2007	0	0	2	2	0	0	0	4
Leal-Blanquet [30], 2012	0	0	2	2	0	0	0	4
Lilja [33], 1998	0	0	2	2	1	0	0	5
Mancuso [34,35], 2008	0	0	0	0	0	0	0	0
McDonald [35], 2001	0	0	0	0	0	0	0	0
McGregor [36], 2004	0	0	1	1	0	0	1	3
Medina-Garzon [37], 2019	0	0	0	0	0	0	0	0
O'Connor [21], 2016	0	1	2	2	0	0	1	6
Roach [42], 1995	0	1	2	2	0	0	0	5
Santavirta [43], 1994	0	0	2	2	0	0	0	4
Siggeirsdottir [44], 2005	0	0	2	2	0	0	0	4
Sjoling [46], 2003	0	0	2	0	0	0	0	2
Wilson [47],2016	0	0	2	0	0	0	0	2
Wong [48], 1985	0	0	2	1	0	0	0	3

High quality $\leq$ 1: N = 7 (28%); Moderate quality $\leq$ 3: N = 9 (36%); Low quality > 3: N = 9 (36%).

3.5. Synthesis of Results

A total of 8129 patients were enrolled in the included studies; 24.5% were female, 20.6% were male, and the remaining 54.9% were unspecified. Most studies analyzed patients undergoing hip replacement (40.5%), 43.3% analyzed patients undergoing either hip or knee replacement, and 16.2% analyzed only knee replacement. Most studies (64.9%) were randomized controlled trials (RCTs), 8.1% were qualitative studies, 13.5% were non-randomized controlled trials (NRCTs), 10.8% were prospective cohort studies, and the remaining 2.7% were descriptive comparative studies. The measured outcomes were highly varied.

The outcomes measured varied greatly. The most frequent outcome measures were length of stay (16%) and pain-related issues (VAS 8%, NRS 4%, and MPQ-SF 2.7%). The second most common outcome measures were anxiety (STAI 5.3% and HADS 4%) and recovery issues with self-efficacy issues, compliance, adherence, and learning accountability (Purpose Design Questionnaire 5.3%). The remaining scores assessed physical function (WOMAC 4%, ADL 2.7%), QoL (SF-36 items 2.7% and EQ-5D 1.3%), and other outcomes with 44%.

4. Discussion

Prior to surgery, patients were provided with educational information to enable them to actively participate in the decision-making process and understand the essential elements of the proposed procedure. Furthermore, research has demonstrated that preoperative education is associated with decreased levels of anxiety and stress, as well as reduced postoperative pain and hospital stay. Patients have reported increased understanding and satisfaction with the process [24].

A total of 37 articles were analyzed, which employed various educational techniques. These included the use of brochures, illustrative PowerPoint presentations, and video lessons. The duration of the educational sessions varied, with some receiving only a few hours of instruction, while others attended classes for a longer period. Additionally, the number of patients instructed differed, with some receiving individual programs and others being grouped into large groups and attending classroom lectures [6]. The results of 37 studies suggest that preoperative education may be beneficial in improving patient-reported outcomes (PROs), such as quality of life, pain, stress, and satisfaction in patients

undergoing hip or knee replacement. Preoperative education was found to reduce pre- and postoperative anxiety in many of the samples analyzed. This psychological state has been associated with a negative impact on the patient's entire hospital course [50]. Anxiety has been shown to not only affect one's psychological state but also to have an impact on functional outcomes [6]. Medina-Garzon et al. [37]. conducted a study to assess the effect of a nurse-led motivational interview on preoperative anxiety in knee replacement candidates [11]. After six weeks of follow-up, the preoperative anxiety score was lower in the intervention group than in the control group. In another study, videotapes were utilized as an educational tool [20].

The results indicate that preoperative education prior to total hip replacement surgery decreased anxiety and stress (as measured by cortisol excretion). Additionally, the intervention group had lower analgesic consumption during the four postoperative days, despite similar pain levels reported in both groups. Preoperative education was associated with a significant reduction in length of stay, with an average decrease of almost one day, according to Sisak et al. (2019). [45] found that mean length of stay was reduced by 0.37 days for patients who had undergone total hip replacement surgery (95% CI −0.74, −0.01, $p = 0.05$) and by 0.77 for patients who had undergone total knee replacement (95% CI −1.23, −0.31, $p = 0.001$). The results of this study can be compared to those reported by Yoon et al. [49], in which patients who participated in a training session had 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); $p = 0.001$). On the other hand, the results of the study by Butler et al. [17] found that the intervention group (which received an educational booklet) had lower levels of anxiety at admission and discharge than the control group; however, there was no significant difference between the two groups in terms of length of stay.

Approximately 30–80% of patients who have undergone surgery report inadequate pain management. Pain is a complex phenomenon that necessitates consideration of multiple factors. Sjöling et al. [46] demonstrated that certain types of information can affect the experience of pain. The treatment group experienced a more rapid decrease in postoperative pain, as well as lower levels of anxiety and greater satisfaction. Postoperative pain decreased more rapidly in the treatment group, accompanied by lower levels of anxiety and greater satisfaction. A separate study demonstrated that providing an educational session 2 to 6 weeks prior to total hip arthroplasty can reduce pain and other factors before surgery [24].

A 1993 study conducted by Wong et al. [48] demonstrated the efficacy of a preoperative education program in preparing patients for surgery and their postoperative needs at home. The sample enrolled revealed significant differences in satisfaction between the groups.

The participants in the experimental group exhibited a greater degree of satisfaction than those in the control group. Furthermore, this study demonstrated that patients' compliance with physician instructions increased following a structured educational program. In 1994, Santavirta et al. [43] found that the experimental group who underwent an intensified education program experienced higher satisfaction and compliance than the control group. In the Oxford English Dictionary, "compliance" is defined as the act of adhering to a desire, request, condition, direction, etc.; consenting to act in accordance with; acceding to; and providing practical assent [51]. Studies have demonstrated that when patients are provided with information regarding the therapeutic process and the rationale for performing certain tasks, patient compliance is improved, which has a positive effect on postoperative recovery [22,23]. Wong et al. [48] observed that patients who received the new approach exhibited a significantly higher level of adherence than those who did not. Generally, patients are considered to be empowered when they possess adequate knowledge to meet their needs. Consequently, it is essential that patients take an active role in the educational process [27]. Pre-admission education appears to result in improved learning outcomes, particularly when concept maps and written material are utilized as opposed to unstructured oral education [27].

5. Limitation

This review has some limitations. Firstly, a control population with no prior knowledge would be necessary to obtain highly reliable results; however, this is not feasible in the included studies due to ethical considerations. It is likely that patients in the control group sought information on their own and asked questions that were not always declined on ethical grounds. Second, non-randomized, descriptive studies were also included in our work to broaden the search; however, comparing two groups provides better data on the impact of the intervention. Third, some articles only provided preoperative training to the intervention group. This comparison has limitations due to ethical considerations, as the control group cannot be denied information.

Another significant limitation of the following study lies in the fact that THA and TKA interventions have significantly different aspects in the assessment of clinical outcomes, particularly in rehabilitation.

6. Conclusions

Based on the comprehensive scientific analyses conducted previously, it is evident that 65.4% of the analyzed parameters demonstrated superior outcomes in the intervention group compared to the control group. These findings underscore the crucial role of preoperative education in the trajectory of orthopedic patients. This review highlighted the need for further research into preoperative education for orthopedic patients. In future research, descriptive studies can offer valuable information; however, to accurately determine the effect of an intervention, it is necessary to incorporate a control group. Therefore, future researchers are advised to expand the research dress with randomized controlled trials.

Author Contributions: Conceptualization, U.G.L. and S.D.S.; methodology, C.R. and I.P.; software, C.R.; validation, M.G.D.M. and V.D.; formal analysis, S.D.S.; investigation, C.R. and G.R.; resources, C.R.; data curation, and C.R.; writing—original draft preparation, C.R. and I.P.; writing—review and editing, A.C.; visualization, V.D.; supervision, U.G.L.; project administration, M.G.D.M.; funding acquisition, U.G.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted according to the guidelines of The Declaration of Helsinki and was approved by the Institutional Review Board of Campus Bio-Medico University of Rome (COSMO study, Protocol number: 78/18 OSS ComEt CBM, 16/10/18).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest: The authors declare no conflict of interest. No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References

1. Neogi, T. The epidemiology and impact of pain in osteoarthritis. *Osteoarthr. Cartil.* **2013**, *21*, 1145–1153. [CrossRef] [PubMed]
2. Loeser, R.F. The Role of Aging in the Development of Osteoarthritis. *Trans. Am. Clin. Climatol. Assoc.* **2017**, *128*, 44–54.
3. Longo, U.G.; De Salvatore, S.; Santamaria, G.; Indiveri, A.; Piergentili, I.; Salvatore, G.; De Marinis, M.G.; Bandini, B.; Denaro, V. Total Hip Replacement: Psychometric Validation of the Italian Version of Forgotten Joint Score (FJS-12). *J. Clin. Med.* **2023**, *12*, 1525. [CrossRef] [PubMed]
4. Maffulli, N.; Margiotti, K.; Longo, U.G.; Loppini, M.; Fazio, V.M.; Denaro, V. The genetics of sports injuries and athletic performance. *Muscles Ligaments Tendons J.* **2013**, *3*, 173–189. [CrossRef] [PubMed]
5. Berton, A.; Longo, U.G.; Candela, V.; Fioravanti, S.; Giannone, L.; Arcangeli, V.; Alciati, V.; Berton, C.; Facchinetti, G.; Marchetti, A.; et al. Virtual Reality, Augmented Reality, Gamification, and Telerehabilitation: Psychological Impact on Orthopedic Patients' Rehabilitation. *J. Clin. Med.* **2020**, *9*, 2567. [CrossRef]
6. McDonald, S.; Page, M.J.; Beringer, K.; Wasiak, J.; Sprowson, A. Preoperative education for hip or knee replacement. *Cochrane Database Syst. Rev.* **2014**, *2014*, CD003526. [CrossRef]

7. Franceschi, F.; Longo, U.G.; Ruzzini, L.; Rizzello, G.; Denaro, V. Arthroscopic management of calcific tendinitis of the subscapularis tendon. *Knee Surg. Sports Traumatol. Arthrosc.* **2007**, *15*, 1482–1485. [CrossRef]
8. Longo, U.G.; Loppini, M.; Denaro, L.; Maffulli, N.; Denaro, V. Conservative management of patients with an osteoporotic vertebral fracture: A review of the literature. *J. Bone Jt. Surg. Br.* **2012**, *94*, 152–157. [CrossRef]
9. Grappiolo, G.; Loppini, M.; Longo, U.G.; Traverso, F.; Mazziotta, G.; Denaro, V. Trabecular Metal Augments for the Management of Paprosky Type III Defects without Pelvic Discontinuity. *J. Arthroplast.* **2015**, *30*, 1024–1029. [CrossRef]
10. Khanna, A.; Gougoulias, N.; Longo, U.G.; Maffulli, N. Minimally invasive total knee arthroplasty: A systematic review. *Orthop. Clin. N. Am.* **2009**, *40*, 479–489. [CrossRef]
11. 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. [CrossRef] [PubMed]
12. Bravi, M.; Longo, U.G.; Laurito, A.; Greco, A.; Marino, M.; Maselli, M.; Sterzi, S.; Santacaterina, F. Supervised versus unsupervised rehabilitation following total knee arthroplasty: A systematic review and meta-analysis. *Knee* **2023**, *40*, 71–89. [CrossRef] [PubMed]
13. Berge, D.J.; Dolin, S.J.; Williams, A.C.; Harman, R. Pre-operative and post-operative effect of a pain management programme prior to total hip replacement: A randomized controlled trial. *Pain* **2004**, *110*, 33–39. [CrossRef]
14. Biau, D.J.; Porcher, R.; Roren, A.; Babinet, A.; Rosencher, N.; Chevret, S.; Poiraudeau, S.; Anract, P. Neither pre-operative education or a minimally invasive procedure have any influence on the recovery time after total hip replacement. *Int. Orthop.* **2015**, *39*, 1475–1481. [CrossRef] [PubMed]
15. Birch, S.; Stilling, M.; Mechlenburg, I.; Hansen, T.B. No effect of cognitive behavioral patient education for patients with pain catastrophizing before total knee arthroplasty: A randomized controlled trial. *Acta Orthop.* **2020**, *91*, 98–103. [CrossRef] [PubMed]
16. Bondy, L.R.; Sims, N.; Schroeder, D.R.; Offord, K.P.; Narr, B.J. The effect of anesthetic patient education on preoperative patient anxiety. *Reg. Anesth. Pain Med.* **1999**, *24*, 158–164. [CrossRef] [PubMed]
17. Butler, G.S.; Hurley, C.A.; Buchanan, K.L.; Smith-VanHorne, J. Prehospital education: Effectiveness with total hip replacement surgery patients. *Patient Educ. Couns.* **1996**, *29*, 189–197. [CrossRef]
18. Clode-Baker, E.; Draper, E.; Raymond, N.; Haslam, C.; Gregg, P. Preparing patients for total hip replacement: A randomized controlled trial of a preoperative educational intervention. *J. Health Psychol.* **1997**, *2*, 107–114. [CrossRef]
19. Daltroy, L.H.; Morlino, C.I.; Eaton, H.M.; Poss, R.; Liang, M.H. Preoperative education for total hip and knee replacement patients. *Arthritis Care Res.* **1998**, *11*, 469–478. [CrossRef]
20. Doering, S.; Katzlberger, F.; Rumpold, G.; Roessler, S.; Hofstoetter, B.; Schatz, D.S.; Behensky, H.; Krismer, M.; Luz, G.; Innerhofer, P.; et al. Videotape preparation of patients before hip replacement surgery reduces stress. *Psychosom. Med.* **2000**, *62*, 365–373. [CrossRef]
21. O'Connor, M.I.; Brennan, K.; Kazmerchak, S.; Pratt, J. YouTube Videos to Create a "Virtual Hospital Experience" for Hip and Knee Replacement Patients to Decrease Preoperative Anxiety: A Randomized Trial. *Interact. J. Med. Res.* **2016**, *5*, e10. [CrossRef] [PubMed]
22. Gammon, J.; Mulholland, C.W. Effect of preparatory information prior to elective total hip replacement on post-operative physical coping outcomes. *Int. J. Nurs. Stud.* **1996**, *33*, 589–604. [CrossRef]
23. Gammon, J.; Mulholland, C.W. Effect of preparatory information prior to elective total hip replacement on psychological coping outcomes. *J. Adv. Nurs.* **1996**, *24*, 303–308. [CrossRef] [PubMed]
24. Giraudet-Le Quintrec, J.S.; Coste, J.; Vastel, L.; Pacault, V.; Jeanne, L.; Lamas, J.P.; Kerboull, L.; Fougeray, M.; Conseiller, C.; Kahan, A.; et al. Positive effect of patient education for hip surgery: A randomized trial. *Clin. Orthop. Relat. Res.* **2003**, *414*, 112–120. [CrossRef] [PubMed]
25. Huang, T.T.; Sung, C.C.; Wang, W.S.; Wang, B.H. The effects of the empowerment education program in older adults with total hip replacement surgery. *J. Adv. Nurs.* **2017**, *73*, 1848–1861. [CrossRef]
26. Jepson, P.; Sands, G.; Beswick, A.D.; Davis, E.T.; Blom, A.W.; Sackley, C.M. A feasibility randomised controlled trial of pre-operative occupational therapy to optimise recovery for patients undergoing primary total hip replacement for osteoarthritis (PROOF-THR). *Clin. Rehabil.* **2016**, *30*, 156–166. [CrossRef]
27. Johansson, K.; Salanterä, S.; Katajisto, J. Empowering orthopaedic patients through preadmission education: Results from a clinical study. *Patient Educ. Couns.* **2007**, *66*, 84–91. [CrossRef]
28. Kearney, M.; Jennrich, M.K.; Lyons, S.; Robinson, R.; Berger, B. Effects of preoperative education on patient outcomes after joint replacement surgery. *Orthop. Nurs.* **2011**, *30*, 391–396. [CrossRef]
29. Kennedy, D.; Wainwright, A.; Pereira, L.; Robarts, S.; Dickson, P.; Christian, J.; Webster, F. A qualitative study of patient education needs for hip and knee replacement. *BMC Musculoskelet. Disord.* **2017**, *18*, 413. [CrossRef]
30. Leal-Blanquet, J.; Alentorn-Geli, E.; Ginés-Cespedosa, A.; Martínez-Díaz, S.; Cáceres, E.; Puig, L. Effects of an educational audiovisual videodisc on patients' pre-operative expectations with total knee arthroplasty: A prospective randomized comparative study. *Knee Surg. Sports Traumatol. Arthrosc.* **2013**, *21*, 2595–2602. [CrossRef]
31. Lewis, C. Value of an orthopaedic pre-admission clinic for total knee and hip replacements in a rural health service. *Aust. J. Rural Health* **1997**, *5*, 90–93. [CrossRef] [PubMed]
32. Lichtenstein, R.; Semaan, S.; Marmar, E.C. Development and impact of a hospital-based perioperative patient education program in a joint replacement center. *Orthop. Nurs.* **1993**, *12*, 17–25. [CrossRef] [PubMed]

33. Lilja, Y.; Rydén, S.; Fridlund, B. Effects of extended preoperative information on perioperative stress: An anaesthetic nurse intervention for patients with breast cancer and total hip replacement. *Intensive Crit. Care Nurs.* **1998**, *14*, 276–282. [CrossRef] [PubMed]
34. Mancuso, C.A.; Graziano, S.; Briskie, L.M.; Peterson, M.G.; Pellicci, P.M.; Salvati, E.A.; Sculco, T.P. Randomized trials to modify patients' preoperative expectations of hip and knee arthroplasties. *Clin. Orthop. Relat. Res.* **2008**, *466*, 424–431. [CrossRef] [PubMed]
35. McDonald, D.D.; Freeland, M.; Thomas, G.; Moore, J. Testing a preoperative pain management intervention for elders. *Res. Nurs. Health* **2001**, *24*, 402–409. [CrossRef]
36. McGregor, A.H.; Rylands, H.; Owen, A.; Doré, C.J.; Hughes, S.P. Does preoperative hip rehabilitation advice improve recovery and patient satisfaction? *J. Arthroplast.* **2004**, *19*, 464–468. [CrossRef]
37. Medina-Garzón, M. Effectiveness of a Nursing Intervention to Diminish Preoperative Anxiety in Patients Programmed for Knee Replacement Surgery: Preventive Controlled and Randomized Clinical Trial. *Investig. Educ. Enferm.* **2019**, *37*. [CrossRef]
38. Orr, P.M. An educational program for total hip and knee replacement patients as part of a total arthritis center program. *Orthop. Nurs.* **1990**, *9*, 61–69. [CrossRef]
39. Pelt, C.E.; Gililland, J.M.; Erickson, J.A.; Trimble, D.E.; Anderson, M.B.; Peters, C.L. Improving Value in Total Joint Arthroplasty: A Comprehensive Patient Education and Management Program Decreases Discharge to Post-Acute Care Facilities and Post-Operative Complications. *J. Arthroplast.* **2018**, *33*, 14–18. [CrossRef]
40. Prouty, A.; Cooper, M.; Thomas, P.; Christensen, J.; Strong, C.; Bowie, L.; Oermann, M.H. Multidisciplinary patient education for total joint replacement surgery patients. *Orthop. Nurs.* **2006**, *25*, 257–261. [CrossRef]
41. O' Reilly, M.; Mohamed, K.; Foy, D.; Sheehan, E. Educational impact of joint replacement school for patients undergoing total hip and knee arthroplasty: A prospective cohort study. *Int. Orthop.* **2018**, *42*, 2745–2754. [CrossRef] [PubMed]
42. Roach, J.A.; Tremblay, L.M.; Bowers, D.L. A preoperative assessment and education program: Implementation and outcomes. *Patient Educ. Couns.* **1995**, *25*, 83–88. [CrossRef] [PubMed]
43. Santavirta, N.; Lillqvist, G.; Sarvimäki, A.; Honkanen, V.; Konttinen, Y.T.; Santavirta, S. Teaching of patients undergoing total hip replacement surgery. *Int. J. Nurs. Stud.* **1994**, *31*, 135–142. [CrossRef] [PubMed]
44. Siggeirsdottir, K.; Olafsson, O.; Jonsson, H.; Iwarsson, S.; Gudnason, V.; Jonsson, B.Y. Short hospital stay augmented with education and home-based rehabilitation improves function and quality of life after hip replacement: Randomized study of 50 patients with 6 months of follow-up. *Acta Orthop.* **2005**, *76*, 555–562. [CrossRef] [PubMed]
45. Sisak, K.; Darch, R.; Burgess, L.C.; Middleton, R.G.; Wainwright, T.W. A preoperative education class reduces length of stay for total knee replacement patients identified at risk of an extended length of stay. *J. Rehabil. Med.* **2019**, *51*, 788–796. [CrossRef]
46. Sjöling, M.; Nordahl, G.; Olofsson, N.; Asplund, K. The impact of preoperative information on state anxiety, postoperative pain and satisfaction with pain management. *Patient Educ. Couns.* **2003**, *51*, 169–176. [CrossRef]
47. Wilson, R.A.; Watt-Watson, J.; Hodnett, E.; Tranmer, J. A Randomized Controlled Trial of an Individualized Preoperative Education Intervention for Symptom Management after Total Knee Arthroplasty. *Orthop. Nurs.* **2016**, *35*, 20–29. [CrossRef]
48. Wong, J.; Wong, S. A randomized controlled trial of a new approach to preoperative teaching and patient compliance. *Int. J. Nurs. Stud.* **1985**, *22*, 105–115. [CrossRef]
49. Yoon, R.S.; Nellans, K.W.; Geller, J.A.; Kim, A.D.; Jacobs, M.R.; Macaulay, W. Patient education before hip or knee arthroplasty lowers length of stay. *J. Arthroplast.* **2010**, *25*, 547–551. [CrossRef]
50. Buonanno, P.; Laiola, A.; Palumbo, C.; Spinelli, G.; Terminiello, V.; Servillo, G. Italian validation of the Amsterdam Preoperative Anxiety and Information Scale. *Minerva Anestesiol.* **2017**, *83*, 705–711. [CrossRef]
51. Aronson, J.K. Compliance, concordance, adherence. *Br. J. Clin. Pharmacol.* **2007**, *63*, 383–384. [CrossRef] [PubMed]