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Review Article

REVIEW ARTICLE

Systematic review and narrative description of the outcomes of group preoperative education before elective major surgery

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Abstract

Background: Group preoperative education is becoming standard care for patients preparing for surgery, alongside optimisation of exercise, diet, and wellbeing. Although patient education is essential, the effectiveness of group education programmes or 'surgery schools' as a means of delivery is unclear. This review examines whether attending group preoperative education improves patient outcomes.
Methods: We systematically reviewed studies of group perioperative education before major elective surgery. Observational or intervention studies with a baseline group or control arm were included. All outcomes reported were collected and, where possible, effect estimates were summarised using random effects meta-analysis.
Results: Twenty-seven studies reported on 48 different outcomes after group education. Overall, there was a 0.7 (95% confidence interval 0.27–1.13) day reduction in mean length of stay. The odds ratio for postoperative complications after abdominal surgery was 0.56 (95% confidence interval 0.36–0.85; nine studies). Patient-centred outcomes were grouped into themes. Most studies reported a benefit from group education, but only postoperative physical impairment, pain, knowledge, activation, preoperative anxiety, and some elements of quality of life were statistically significant.
Conclusion: This review presents a summary of published evidence available for group preoperative education. While these data lend support for such programmes, there is a need for adequately powered prospective studies to evaluate the effectiveness of preoperative education on clinical outcomes and to evaluate whether behaviour change is sustained. Furthermore, the content, timing and mode of delivery, and evaluation measures of preoperative education require standardisation.
Systematic review protocol: PROSPERO (166297).

Keywords: perioperative medicine; prehabilitation; preoperative education; surgery school; systematic review

Preoperative education is an accepted standard for preparing patients for elective surgery, recommended by the Centre for Perioperative Care.[1] Well prepared patients are less anxious and recover more quickly.[2] Traditionally undertaken one-to-one in presurgical clinics, the last decade has seen an increasing shift within the UK towards group-based education, often known as 'surgery schools'.[3] Schools are generally delivered as a single education session by clinicians to groups of patients and cover how to prepare for and recover effectively from surgery. Such schools have the potential to improve clinical outcomes as patients are encouraged to modify lifestyle behaviours that can reduce their risk of

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postoperative complications and may also have a lasting effect on their health.

Individual studies of surgery schools have reported benefits such as reduced length of hospital stay, reduced preoperative anxiety, and reduced postoperative pain.[4,5] Previous systematic reviews are limited to single specialty surgery schools,[6,7] or included a diverse range of patient education interventions rather than focusing on group education.[8,9] All have reported inconclusive evidence. In other fields, group education has been shown to be effective at supporting patients to improve their lifestyle behaviours, is cost-effective, and perceived to be of value to patients.[10,11]

Group preoperative education is rapidly becoming standard care for patients[3] alongside preparation for surgery through the optimisation of exercise, diet, and wellbeing.[12] Given the cost of delivering such interventions,[13–15] there is an urgent need to review the outcomes of group preoperative education across all surgical specialties. This review aims to identify whether group preoperative education for adult patients undergoing major elective surgery improves patient outcomes.

Methods

The Preferred Reporting Items for Systematic Reviews Statement[16] and Cochrane's Handbook for Systematic Reviews of Interventions[17] were used to guide the analysis and reporting.

The protocol for the review was registered on PROSPERO ID 166297 in 2020 and updated in 2023.

Eligibility criteria

To be included in the analysis, the group education intervention was a stand-alone session, delivered to adults and contained core topics including; how to prepare for surgery, what to expect, and description of inpatient stay. For further detail on inclusion and exclusion criteria see Supplementary File 1. Participants were adults preparing for major elective surgery, defined as any invasive repair or resection not routinely undertaken as a day case procedure.

Search strategy

A search strategy was devised and piloted using key terms relating to preoperative education and their synonyms. Intervention concepts were explored using database-specific syntax rules and combined with Boolean operators (see Supplementary File 2 for search strategy). The search was initially undertaken on 28 October 2022 and updated on 19 September 2023, using six electronic databases, including MEDLINE, CINAHL, PsychINFO, EMBASE, Pubmed, and the Cochrane Library. Searches through reference lists of included studies and existing reviews were also undertaken.

Selection process

Electronic search results were imported into the reference management software ENDNOTE, and duplicates removed. The remaining citations were screened by title and abstract and then by full text. A second researcher blindly rescreened 10% of the citations at each stage. On occasions of uncertainty, further discussion ensued until a mutual consensus was reached. When a study provided insufficient detail to assess eligibility, the corresponding author was contacted for clarity.

Data collection process

Data, including study design and aims, participant details, primary and secondary outcomes, type of analysis, and overall findings, were extracted. Data describing the intervention were extracted using the Tidier Framework.[18]

Reporting bias assessment

The methodological quality of the included studies was assessed using the 'Risk of Bias 2' tool[19] for randomised controlled trials and Robins-I[20] for observational studies. The Cochrane GRADE approach[21] was used when summarising the data for each identified outcome.

Data analysis

Study findings were compared, and differences between interventions summarised. Outcome data were grouped into key areas (themes) under the headings of 'clinical outcomes' and 'patient-centred outcomes'. Where multiple studies reported comparable outcomes (length of hospital stay and complications), effect estimates were combined using random effects restricted maximum likelihood (REML) meta-analyses, weighted by sample size. Results were displayed using forest plots. Most studies reported mean and standard deviation for length of stay; where this was missing, authors were contacted for data and on one occasion,[22] values were estimated from a figure included in the published study. I^2 was used to estimate the extent to which the variation between studies was associated with statistical heterogeneity rather than chance. Quantitative analyses were conducted using Stata version 16 (StataCorp LLC, College Station, TX, USA). A narrative synthesis was undertaken for all other reported outcomes.

Results

The literature search yielded a total of 8414 potentially relevant titles, from which 4775 unique titles and abstracts were screened (Prisma Flow Chart, Fig 1.). One hundred and seventy-nine full texts were reviewed, with 27 studies meeting the inclusion criteria. A summary of studies is provided in Table 1.

Study characteristics

Twenty-seven single-centre studies that included 5969 participants were conducted between 1976 and 2022. Four of these were randomised controlled trials,[4,5,26,40] four non-randomised intervention studies,[13,27,33,36] 18 observational studies,[14,15,22,23–25,28,29,31,32,35,37–39,41–43,34] and one qualitative study[30] (Table 1). The sample size ranged from 11 to 1018 participants. The mean age ranged from 28 to 73 yr and all but three studies were mixed gender. One study was women only, one men only, and one transmasculine and non-binary patients. Three studies did not define gender. Two-thirds of the studies originated from four countries: the USA (n=9), the UK (n=7), Ireland (n=2), and Canada (n=2). One study was undertaken in each of Brazil, Netherlands, France, Sweden, Guyana, and Australia. Just over half of the studies were in patients undergoing orthopaedic surgery (n=16). The remaining patient groups were mixed speciality (n=3), colorectal (n=2) and urology, liver transplant, gynaecology, bariatric, breast, and cardiac surgery (n=1).

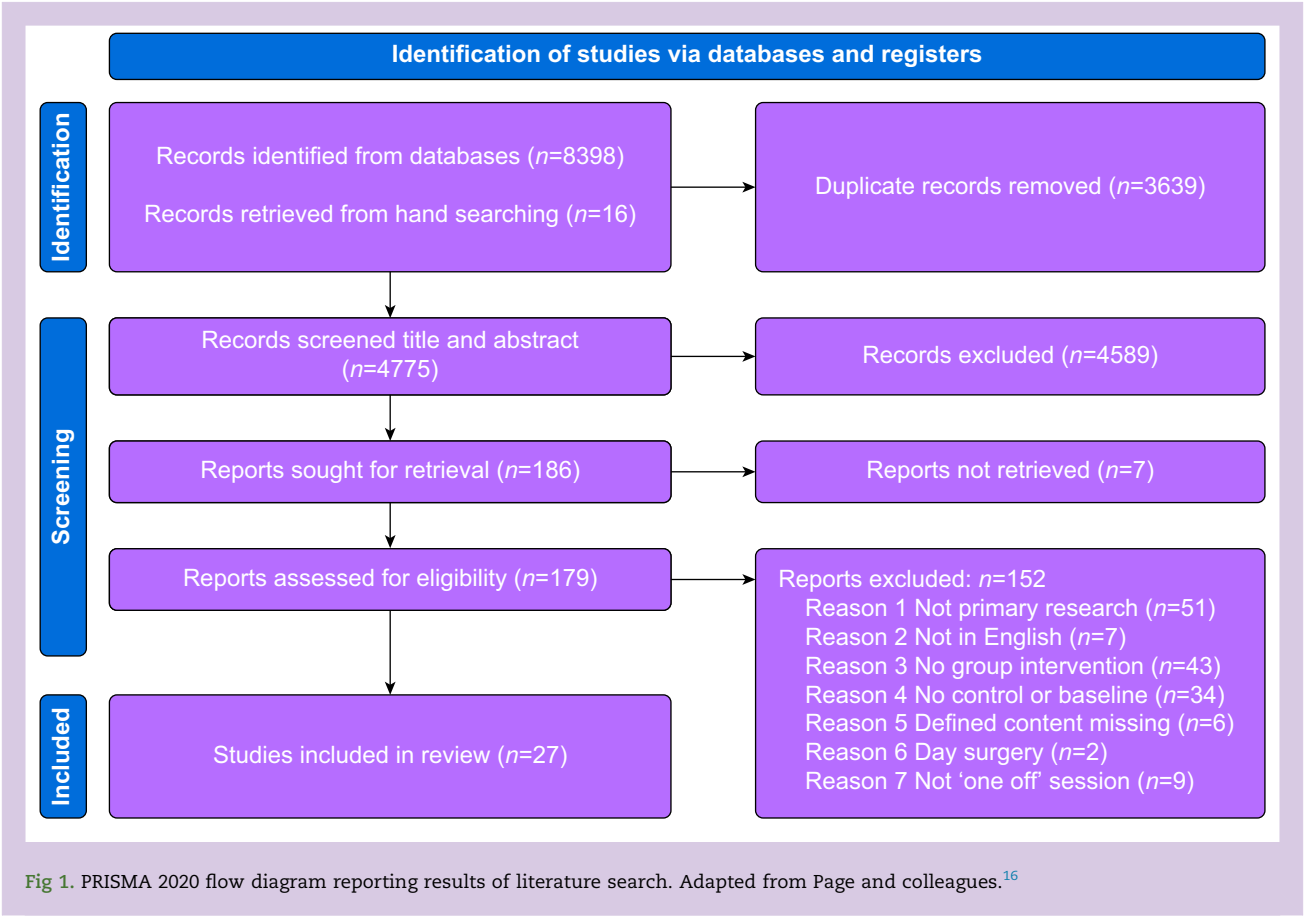

Fig 1. PRISMA 2020 flow diagram reporting results of literature search. Adapted from Page and colleagues.[16]

The intervention across all studies was a stand-alone face-to-face group preoperative education class, covering the required core content as stated in the inclusion criteria (Supplementary File 1). Seventy percent (n=19) of studies described the session duration, which ranged from 35 min[14] to 3 h[5]; the median duration was 90 min (inter-quartile range 60–120 min). The group size was described by 32% (n=9) of the studies, eight of which were delivered to fewer than 15 people at a time (range two[14] to 41[36] patients). Eighty-six percent (n=24) compared their outcomes with a standard care control group which included a consultation with a surgeon, nurse, or anaesthetist or provision of a patient information booklet. The remaining three studies used a pre–post intervention design.

Risk of bias

The risk of bias for three of the four controlled trials was medium, and one was high risk[26] (Table 1). This was primarily because of the inability to blind patients or clinical teams, or where fidelity of the intervention and control groups could not be assured. The non-randomised intervention and observational studies were rated moderate (n=10) or serious (n=9) risk of bias. Three studies did not contain enough information for an assessment to be completed, and we were unable to assess the one qualitative study. Other reasons for elevated risk were possible contamination between intervention and control groups, for example, where care was provided by the same professionals, intervention fidelity, and heterogeneity between participants in the intervention and control groups.

A total of 48 different outcomes were reported (Tables 1 and 2). These were divided into clinical outcomes or patient-centred outcomes, and further grouped under key themes for ease of analysis. An assessment of effect certainty was undertaken using the Cochrane GRADE approach[21] for each outcome (Table 2). Sixty percent of the outcome GRADEs were 'moderate' or 'high' in relation to likelihood of the effect being the true effect.

Clinical outcomes

Hospital length of stay was the most commonly reported outcome (n=13 studies). Eleven studies (85%) reported a reduction in length of stay for patients receiving group preoperative education, although only two of these were statistically significant.[40,43] Five studies (Table 3) presented a difference in mean length of stay without presenting standard deviation or confidence intervals (CIs), and one study used difference in median length of stay. Seven studies of patients undergoing orthopaedic surgery were included in a meta-analysis (Fig 2). Overall, there was a 0.7-day reduction in mean length of stay for patients in the intervention group (95% CI −1.13 to −0.27, I^2=67%). Although there was minimal heterogeneity between studies of patients undergoing hip surgery (I^2=7.63%), there was substantial heterogeneity between studies of patients undergoing knee surgery (I^2=61%).

Postoperative complications were the second most frequently reported outcome (n=9). Complications included mortality,[4] pulmonary infections,[14] or a composite outcome

Table 1 Summary of included studies and outcomes. ADL, activities of daily living; EQVAS, EuropeanQol Group Visual Analogue Scale; IV, intravenous; LoS, length of stay; MDT, Multidisciplinary Team ; N/A, Not applicable; QoL, quality of life; UKEQ5D, EuropeanQol Group 5 Dimensions Scale.

Study	Country	Speciality	Aim	Study design	Sample intervention	Sample control	Outcomes	Method	Analysis	Results	Risk of bias
Fortin, 1976[4]	Canada	Mixed abdominal	To assess efficacy and efficiency of group preoperative education	RCT	37 (Mean age 41.8) (16% male)	32 (Mean age 40.5) (9% male)	**Primary** Functional capacity **Secondary** Analgesia used, comfort, satisfaction, LoS, readmissions and 33-day mortality.	Patient interviews with physical function, comfort, and satisfaction questionnaires at postoperative day 2, 10, and 33. Patient analgesic utilisation diary. Extraction of clinical outcomes and patient characteristics from clinical records.	Descriptive and statistical analysis	Intervention group benefitted from the program regarding physical function, comfort, less pain, and satisfaction. Restored to 'normal life' more quickly.	Low
Phillips, 1977[23]	USA	Hysterectomy	To compare physician individual preoperative education with a group class	Observational study	15	27	**Primary** Understanding of surgery, recovery, impact on post-surgical sexuality, and self-image. **Secondary** Unresolved fears	Preoperative interview	Descriptive statistics and some thematic analysis	Control group cohort had more unanswered questions, had less understanding of impact on sexuality, and expected negative changes in sexuality. Intervention group for positive about after-effects of surgery.	Not enough information reported
Crabtree, 1978[14]	USA	Mixed abdominal and thoracic	To assess whether group or individual teaching is most cost-effective	Observational study	15	15	**Primary** Cost analysis **Secondary** LoS, vital capacity, and pulmonary complications.	Retrospective log of chargeable activity, extraction of clinical outcomes from clinical records.	Descriptive and statistical analysis	Group session costs more per patient than individual teaching. Vital capacity and LoS no significant difference. Group intervention patients developed significantly fewer	Not enough information reported

Table 1 Continued

										pulmonary complications.	
Kosik, 1986[24]	USA	Mixed abdominal	Evaluation of intervention outcomes	Observational study	60 (12% Male)	77 (16% Male)	**Primary** IV analgesia requirements, walking ability at days 1 and 3 and LoS.	Retrospective extraction of clinical outcomes from clinical records.	Descriptive statistics	Intervention group used less IV analgesia, were more likely to walk on day 1, 1 day less LoS	Low
Spalding 1995[13]	UK	Orthopaedics (hips)	To investigate the benefits to the patient and organisation of the intervention	Non-randomised intervention study	20 (Mean age 71.1) (43% male)	21 (Mean age 71.2) (62% male)	**Primary** LoS **Secondary** Postoperative mobility, IV. analgesia requirements, preparedness for home, number of home visits, complications, and cost analysis.	Data collected after surgery included patient characteristics, preparation checklist, morphine usage, mobility, number of home visits, and postoperative complications from clinical records.	Descriptive statistics	Intervention group used less morphine, were independent with frame and stick earlier, shorter LoS, fewer home visits, fewer complications. Intervention was more cost-effective as a result of improved outcomes.	Moderate
Nelson, 1996[25]	UK	Cardiac	Evaluation of whether the intervention reduced patient preoperative fears and anxiety	Observational study (service evaluation)	20 (Age range 40 −79) (70% male)	20 (Age range 30 −89) (70% male)	**Primary** Preoperative fears **Secondary** Pain expectation and satisfaction.	Questionnaire with closed and open questions, completed 24 −48 hours before discharge	Descriptive statistics and some thematic analysis	100% Of intervention group with fears had them reduced, no difference in pain expectation, and high level of intervention satisfaction.	Moderate
Hörchner, 1999[26]	Netherlands	Bariatric surgery	To investigate effect of intervention on postoperative pain, analgesic use, vomiting, and nursing care duration	RCT	11 (Mean age 32.6) (100% female)	14 (Mean age 37.9) (100% female)	**Primary** Pain, frequency of vomiting, and analgesic use and LoS.	McGill pain questionnaire with data collected 6, 12, 24, and 72 hours after surgery. Extraction of clinical outcomes from clinical records.	Statistical analysis	Statistical differences in favour of the intervention in postoperative pain, analgesia use, vomiting and duration of nursing care (LoS).	Moderate
Giraudet-Le Quintrec, 2003[5]	France	Orthopaedics (hips)	To investigate effect of MDT group intervention on preoperative and postoperative anxiety	RCT	48 (Mean age 62.7) (50% male)	52 (Mean age 64.3) (40% male)	**Primary** Preoperative and postoperative anxiety. **Secondary** Preoperative and postoperative pain, morphine usage,1st day of standing up after surgery, LoS, blood transfusion, complications, and satisfaction.	Preoperative and post-surgery self-evaluation functional score, health assessment questionnaire, depression rating scale, anxiety self-evaluation state, and trait inventory.	Statistical analysis	Intervention group patients were less anxious and had less preoperative pain and could stand sooner. After surgery, intervention group showed trend toward lower anxiety; this was not statistically significant.	Low

Continued

Table 1 Continued

Study	Country	Speciality	Aim	Study design	Sample intervention	Sample control	Outcomes	Method	Analysis	Results	Risk of bias
Guimaro, 2007[27]	Brazil	Liver transplant	To compare knowledge levels before and after intervention	Non-randomised intervention study	113 (Mean age 48.7) 47% male	N/A	**Primary** Knowledge pre- and post-intervention	Pre- and post-intervention knowledge questionnaire.	Descriptive and statistical analysis	Knowledge in all areas increased, knowledge regarding what to expect while in hospital was statistically significant.	Moderate
Jones, 2011[28]	UK	Orthopaedics (knees)	To evaluate the impact of intervention on LoS	Observational study	322 (Mean age 69.5) (46% male)	150 (Mean age 69.2) (44% male)	**Primary** LoS, in-patient complications, and hospital readmissions.	Prospective extraction of clinical outcomes from clinical records.	Statistical analysis	The mean LoS was reduced by 2 days in the intervention group. Some 20% more of the intervention group were discharged within 1–4 days. No difference in complications and readmissions between the two groups.	Moderate
Papanastassiou, 2011[29]	USA	Orthopaedics (spines)	To compare intervention and control group perceptions of their pain management	Observational study	77 (Mean age 55) 14% male	78 (Mean age 55) 14% male	**Primary** Overall satisfaction and pain relief satisfaction	Retrospective analysis of a post-discharge satisfaction questionnaire.	Statistical analysis	Intervention group reported better satisfaction with pain control which was statistically significant. No statistical difference was found in overall satisfaction.	Serious
Lane-Carlson, 2012[30]	USA	Orthopaedics (hips and knees)	To compare surgery experiences between intervention and control group	Qualitative study	16 38% Male	8 25% Male	**Primary** Experience **Secondary** Differences in perception of physical, social, and psychological needs and what facilitated surgery preparation.	Semi-structured interviews.	Narrative analysis	The Total Joint Replacement Class promoted a sense of social connectedness and engaged participants in fostering independence. Attendees exercised more and were more mentally prepared than those who did not.	N/A
Collin, 2015[31]	USA	Prostates	To evaluate the impact of intervention on postoperative calls to nurses	Observational study	123 (Mean age 61)	69 (Mean age 62)	**Primary** Postoperative calls by patients to specialist nurses.	Calls logged 7–12 days after surgery until catheter removed.	Statistical analysis and thematic analysis of reason for calls	No significant difference in the number of calls, but reassurance-related calls	Serious

Table 1 Continued

							Secondary Type of call			were significantly lower in intervention group	
Kim, 2015[32]	USA	Orthopaedics (hips and knees)	Impact of intervention on adherence to preoperative instructions	Observational study	104 (Mean age 64) 35% male	140 (Mean age 63) 36% male	**Primary** Attendance, adherence to preoperative protocol, warfarin, celecoxib, mupirocin, chlorhexidine wash, no shaving, and no marking.	Adherence to protocol questionnaire administered on day of surgery.	Statistical analysis	Attendance 46%, no difference in medication adherence, and no relationship between adherence and time difference between class and surgery.	Serious
Moulton, 2015[22]	UK	Orthopaedics (hips and knees)	To assess the impact of intervention on patient outcomes	Observational study	233 (Mean age 70)	85 (Mean age 73)	**Primary** LoS **Secondary** Hip scores and mobilisation on day of surgery.	Retrospective analysis of Oxford Hip Scores collected before surgery, 6 months and 2 yr after surgery. Extraction of LoS from clinical records.	Statistical analysis	Significant reduction in LoS for intervention 3.53 *vs* 4.27. Positive effect on mobilisation and outcome scores.	Moderate
O'Reilly, 2018[33]	Southern Ireland	Orthopaedics (hips and knees)	To assess knowledge levels pre- and post-intervention	Non-randomised intervention study	57 (Mean age 64.5) 47% male	N/A	**Primary** Patient knowledge	Pre- and post-intervention, knowledge questionnaire	Descriptive and statistical analysis	Aside from questions regarding anaesthesia and physiotherapy, knowledge improved in all other areas after intervention with statistical significance.	Serious
Eastwood, 2019[34]	Canada	Orthopaedics (spines)	To evaluate whether intervention reduced patient dissatisfaction with surgical expectations	Observational study	103	103	**Primary** Postoperative satisfaction **Secondary** Postoperative pain, disability, emergency department admissions.	Pre- and post-intervention (12 weeks postoperative) back pain, leg pain, and disability scale. Postoperative satisfaction survey, postoperative expectations survey.	Descriptive and statistical analysis	Intervention group more satisfied with outcomes at 12 weeks after surgery. Control less likely to have expectations met. Intervention group also had significantly lower back pain and fewer emergency department admissions.	Serious
Sisak, 2019[35]	UK	Orthopaedics (hips and knees)	To investigate whether intervention decreased LoS	Observational study	1018 Hip: (Mean age 69.9) (35% male). Knee:	215 Hip: (Mean age 71) (37% male). Knee: (Mean	**Primary** LoS and attendance	Data on attendance at class and mean LoS collected	Statistical analysis	Intervention hip patients' mean LoS reduced by 0.37 days and 0.77 days for	Moderate

Continued

Table 1 Continued

Study	Country	Speciality	Aim	Study design	Sample intervention	Sample control	Outcomes	Method	Analysis	Results	Risk of bias
					(Mean age 70.9) (41% male)	age 72.2) (38% male)		from medical notes.		intervention knee patients, statistically significant. High-risk intervention knee patients mean LoS of 2.59 days less in hospital than control.	
Solano, 2020[36]	Guyana	Orthopaedics (hips and knees)	To assess if the intervention improved knowledge and anxiety before surgery	Non-randomised intervention study	41 patients (Age range 61–70) 59% male 15 carers	N/A	**Primary** Knowledge and anxiety	Pre- and post-intervention questionnaires, 16-question knowledge survey and State and Trait Anxiety inventory Score.	Statistical analysis	Knowledge scores for patients and carers both increased significantly. State anxiety improved, no change in trait anxiety; both significant findings.	Serious
Walming, 2022[37]	Sweden	Colorectal	To explore and compare intervention and control group patient experiences	Observational study	37 (Median age 68) 29% male	72 (Median age 67) 57% male	**Primary** Patient experience **Secondary** Characteristics of two groups including QoL.	Satisfaction with information source questionnaire, provided to both groups with EQ5D & EQVAS. Experience questionnaire given to attendees only.	Descriptive	Both groups felt they received sufficient information, but more of the control group sought alternative information sources, including the internet. Patient characteristics of note: control group more often experienced pain, anxiety/depression, and difficulties with ADLs pre-surgery.	Serious
Tong, 2021[38]	USA	Female top surgery	To investigate whether intervention improved surgical outcomes	Observational study	130 (Mean age 28.3)	488 (Mean age 26.9)	**Primary** Complications **Secondary** Patient experience	Patient satisfaction survey and extraction of clinical outcomes from clinical records.	Statistical analysis	Patients attending group sessions were 16.5% less likely to experience minor complications.	Serious
Lewis, 2020[15]	Australia	Orthopaedics (hips and knees)	To assess impact of intervention on clinical outcomes	Observational study	166 Knee: (Mean age 70.1) 42% male. Hip: (Mean age 67.9) 43% male	160 Knee (Mean age 70.2) 43% male. Hip (Mean age 64.4) (65% male)	**Primary** LOS, costs, discharge destination and complications. **Secondary** Possible	Extraction of clinical outcomes from clinical records from clinical record data.	Descriptive and statistical analysis	LoS 1 day less and fewer complications in the intervention group, but neither are	Not enough information reported

Table 1 Continued

							contributing factors to non-attendance: distance from hospital, lead time.			statistically significant findings.	
Ahmad, 2021[39]	Southern Ireland	Orthopaedics (hips & knees)	To investigate whether intervention reduced LoS	Observational study	226 48% Male	294 50% Male	**Primary** LoS	Extraction of clinical outcomes from clinical record data.	Descriptive and statistical analysis	0.3-day reduction in LoS. Not statistically significant findings.	Moderate
Koet, 2021[40]	Netherlands	Colorectal	To assess whether the intervention improved QoL and clinical outcomes	RCT	36 (Mean age 72.6) 69% male	39 (Mean age 70.5) 56% male	**Primary** QoL **Secondary** LOS and complications	Pre-intervention: EORTC-QLQ-30, EORTC-QLQ-CR29, and EORTC-QLQ-info25. Post-intervention, 1, 3, and 6-month follow-up: EORTC-QLQ-C30 and EORTC-QLQ-CR29. Extraction of clinical outcomes from clinical records.	Descriptive and statistical analysis	Intervention group developed more realistic expectations resulting in improved QoL and body image 1 month after surgery. No significant difference in other domains of QoL. Statistically significant reduction in LoS (2 days).	Low
Pelkowski, 2021[41]	USA	Orthopaedics (hips and knees)	To assess whether the intervention reduced the number of postoperative phone calls to nurses	Observational study	50 (Mean age 69.5) 52% male	50 (Mean age 71.3) 50% male	**Primary** Patient experience and number of calls made. **Secondary** Anxiety	Patient experience survey and call log	Descriptive statistics	Intervention group reported reduced anxiety (but no baseline, only retrospective self-report), called nurses less and felt better prepared.	Critical
Blong, 2023[42]	UK	Orthopaedics (hips and knees)	To evaluate if patient activation could be improved through a preoperative group education intervention	Observational study	109 (Mean age 71) 48% male	N/A	**Primary** Pre- and post-intervention patient activation measure. **Secondary** Subgroup analysis based on initial activation scores. Correlation between Hip/knee scores and patient activation	Patient activation measure.	Descriptive and statistical analysis	Increase in patients' activation across levels 1 −3 post-intervention. Only patients with pre-intervention activation level 1 and 2 increases were statistically significant.	Moderate

Continued

Table 1 Continued

Study	Country	Speciality	Aim	Study design	Sample intervention	Sample control	Outcomes	Method	Analysis	Results	Risk of bias
Edwards, 2022[43]	UK	Orthopaedics (spines)	To evaluate if the intervention was safe and reduced LoS	Observational study	65 (Mean age 57.3) 46% Male	Prospective: 85 (Mean age 55.9) 32% male Historic: 100 (Mean age 56.4) 45% male	**Primary** LoS **Secondary** Readmission (6 months), complications (up to 6 months), preparedness, familiarisation, anxiety.	Pre and post Likert scales for preparedness, familiarisation, anxiety. Extraction of clinical outcomes from clinical records.	Descriptive and statistical analysis	Significant reduction in LoS 2 days less than baseline. Significant difference towards greater surgical preparation, procedural familiarity, and less anxiety pre- and post-intervention.	Moderate

comprising 'all complications',[5,13,15,40,28,38,43] All but one study[5] suggested a reduction in postoperative complications for patients undergoing group education. The combined odds ratio (95% CI) for three studies of postoperative complications in patients undergoing major abdominal surgery was 0.32 (95% CI 0.15–0.67, I^2 25%, Fig 3). In five studies of patients undergoing orthopaedic surgery, the combined odds ratio was 0.73 (95% CI 0.49–1.10, I^2=0%). The overall effect across all studies of postoperative complications was 0.56 (95% CI 0.36–0.85, I^2=25%, Fig 3). Again, there was minimal heterogeneity across studies of patients undergoing orthopaedic surgery, with slightly more between studies of patients having major abdominal surgery.

Readmissions were reported by four studies[4,28,43,34]; the time from discharge to readmission was different in all studies and so not amenable to meta-analysis. No difference was noted between the intervention and control groups in any of studies aside from Eastwood and colleagues,[34] who reported fewer postoperative visits to the emergency department in their intervention group.

Cost was reported by four studies.[13–15,22] All acknowledged that group education costs more to deliver than standard care, although a comparison in costs was not possible because of the different staffing and educational resources used. Three studies[13,14,22] suggested that the reduction in length of stay and complications seen in their intervention groups offset the additional cost of delivering the session. However, limited quantitative data were provided to support this, and in the most recent study[15] no significant difference was found in the total cost of education and inpatient stay between the two groups despite a length of stay reduction.

Three studies reported on health professional utilisation. The intervention groups made significantly fewer phone calls to nurses for reassurance[31,41] (not amenable to meta-analysis because of differing time points in data collection) and required fewer postoperative home visits.[13] Although fewer reassurance calls were reported, only Collin[31] presented statistical analysis, and no difference was found in relation to calls concerning complications.

Patient centred outcomes

Satisfaction was the most frequently reported patient-centred outcome. Eleven studies measured patient satisfaction using a variety of tools. Overall, patients who received preoperative group education reported a high level of satisfaction with the intervention,[4,25,37,38,41,30] although, only one study compared satisfaction with a control group ($P<0.05$[4]). Three studies reported on levels of satisfaction with subsequent hospital stay[4,5,29] and found no significant effect of group education. However, one of the most recent studies[34] reported a significant increase (P=0.001) in satisfaction with outcome of surgery in their intervention group. They also found that those who received group education were more likely to report a fulfilment of their expectations after surgery with performance of activities of daily living, walking capacity, and reduced back pain. This finding is supported by Pelkowski and colleagues,[41] who reported that 84% of their intervention group had their postoperative expectations met, although they did not compare this with control group expectations. Two studies used attendance as a marker of acceptability.[32,35] However, the variation in attendance (>80% and 42%) makes it difficult to draw any conclusions.

Table 2 Summary of outcome findings. ADL, activities of daily living; CI, confidence interval; IM, Intramuscular; IV, Intravenous.

Themes	Outcomes	Total number of participants	Effect of intervention	Quality of evidence (Using GRADE[21])
Clinical outcomes				
Length of hospital stay	Length of hospital stay[4,5,13–15,22,26,40,24,28,35,39,43]	3732	0.7-Day reduction on meta-analysis (95% CI −1.13 to 0.27) (2866 participants)[5,13,15,22,28,35,39]	MODERATE
Postoperative complications	33-Day mortality[4]	69	No effect	MODERATE
	Pulmonary complications[14]	30	Significant reduction in pulmonary complications	VERY LOW
	Complications up to 90 days[38]	618	Significant reduction in minor complications	VERY LOW
	Complications up to 6 months[43]	200	No effect	MODERATE
	In-patient complications[28]	472	No effect	LOW
	Complications unspecified time period[5,13,15,40]	542	No effect seen in meta-analysis	MODERATE
Readmission	Post-discharge visits to the emergency department[34]	206	Less post discharge visits to emergency department	VERY LOW
	24-h and 3-month readmission[28]	472	No effect	MODERATE
	33-Day readmission[4]	69	No effect	MODERATE
	6-Month readmission[43]	200	No effect	MODERATE
Cost	Cost per patient/session[13–15,22]	715	Intervention greater cost than standard care	LOW
	Cost effectiveness[13–15]	397	Inconclusive	LOW
Health professional utilisation	Postoperative calls to nurses[31,41]	292	Significant reduction in postoperative calls to nurses	LOW
	Home visits[13]	41	Reduction in postoperative home visits	LOW
Patient-centred outcomes				
Satisfaction	Acceptability (attendance)[32,35]	1377	Inconclusive because of variability	VERY LOW
	Satisfaction with intervention[4,25,37,38,41,30]	1432	High level of satisfaction with experience of intervention	MODERATE
	Satisfaction with hospital experience[4,5,29]	324	Inconclusive	MODERATE
	Satisfaction with outcomes of surgery[34]	206	Increase in satisfaction	MODERATE
	Fulfilment of postoperative expectations[41,34]	306	Intervention more likely to have expectations fulfilled in performance of ADLs and walking capacity, reduced back pain. Some 84% of intervention felt expectations met.	LOW
Physical function	Functional capacity[4]	69	Significantly less functional impairment at all stages.	HIGH
	Vital capacity[14]	30	No effect	VERY LOW
	Mobilisation day of surgery[22,24]	455	No effect	MODERATE
	Mobilisation postoperative days 1 and 3[24]	137	More likely to mobilise by day 1 and 3.	MODERATE
	Oxford Hip scores 6 months and 2 yr[22]	318	No significant effect	LOW
	Time to standing[5]	100	No significant effect	HIGH
	Days to independence with stick/frame[13]	41	Independence regained sooner.	VERY LOW
	Discharge destination[15]	326	No significant effect	VERY LOW
Comfort	Preoperative pain[5]	100	Significantly less preoperative pain	HIGH
	Postoperative IM analgesia requirements[4]	69	Significantly less requirement for intramuscular analgesia	HIGH
	Postoperative IV analgesia requirements[13,26,24]	193	Inconclusive	MODERATE
	Oral analgesia requirements[4]	69	No significant effect	HIGH
		100	No significant effect	HIGH

Continued

Table 2 Continued

Themes	Outcomes	Total number of participants	Effect of intervention	Quality of evidence (Using GRADE[21])
Clinical outcomes				
	Morphine and psychotropics use[5]			
	Pain intensity and site[26]	15	No significant effect	MODERATE
	Postoperative pain perceptions[5]	100	Significantly less perceived pain.	HIGH
	Pain expectation[25]	40	No significant effect	VERY LOW
	Pain relief satisfaction[29]	155	Significantly more satisfied with pain relief.	VERY LOW
	Vomiting[4,26]	84	No significant effect	MODERATE
Knowledge	Knowledge and understanding of preoperative care, procedure, and recovery[27,33,36,23]	253	Significant increase in knowledge.	MODERATE
	Patient activation[42]	109	Significant increase in activation level, for those with a baseline of 1 and 2.	MODERATE
Anxiety	Preoperative anxiety[5,36,25,41,43]	381	Significant reduction in preoperative anxiety.	MODERATE
	Postoperative anxiety[4,5]	169	No effect	HIGH
Quality of life	General quality of life 1, 3, and 6 months[40]	75	Quicker return to the preoperative global health status, and persistent improved body image after surgery.	MODERATE
	Impact on sexuality and self-image[23]	42	Less unanswered questions and better understanding of impact on sexuality, more positive outlook on after-effects of surgery.	VERY LOW
Preparedness	Differences in perception of physical, social, and psychological needs[30]	24	More physically and mentally prepared for surgery.	MODERATE
	Pre- and post-intervention preparedness and familiarisation[43]	100	Significantly more prepared post-intervention and more procedurally familiar.	MODERATE
	Preparedness for home checklist[13]	41	Better prepared	VERY LOW
	Compliance with preoperative preparation protocols[32]	244	No effect	LOW

Table 3 Length of stay data not amenable to meta-analysis. LoS, length of stay.

Study	Total number participants	Intervention mean LoS	Control mean LoS	Mean difference in days	Significance
Fortin, 1976[4]	69	6.35	6.44	−0.09	P>0.5
Crabtree, 1978[14]	30	9	8.5	+0.5	Not calculated
Kosik, 1986[24]	137	8.4	9.7	−1.3	Not calculated
Hörchner, 1999[26]	26	3.73	4.5	−0.77	P=0.105
Koet, 2021[40]	75	6	8	−2	P=0.033
	Total number participants	**Intervention median LoS**	**Control median LoS**	**Difference in days**	
Edwards, 2022[43]	150	3	4	-1	P=0.014

Seven studies reported on outcomes related to post-operative physical function. These included degree of physical impairment (functional capacity) on postoperative days 2, 10, and 33,[4] days off work,[4] vital capacity,[14] postoperative mobility,[5,13,22,24] discharge destination,[15] and Oxford Hip scores at 6 months and 2 yr.[22] Each study measured different levels of mobility at different time points, which made the outcomes less amenable to meta-analysis. There were, however, several positive findings; patients receiving the intervention were less likely to experience functional impairment

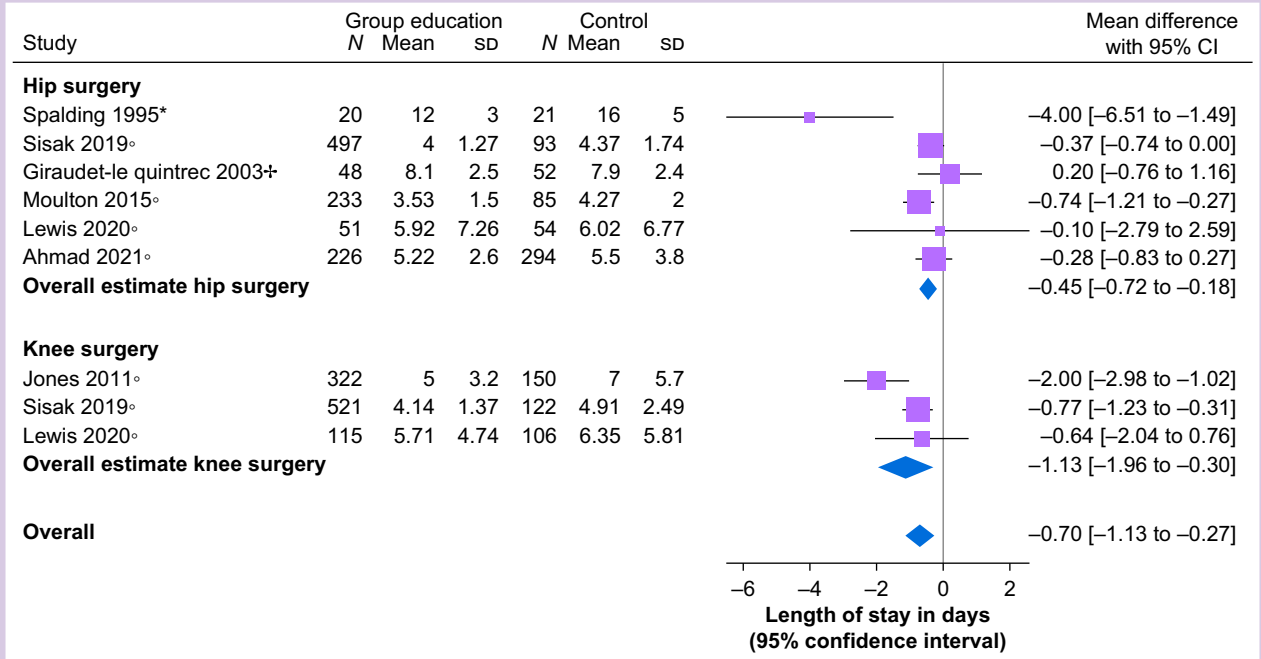

Fig 2. Meta-analysis of length of hospital stay of participants attending group preoperative education *vs* control. Random effects meta-analysis model. Study design: ✣RCT, *non-randomised intervention study, ◦observational study. Mean difference l<0 days supports a reduction in length of stay in the intervention group. Overall, 66.9% of variation across studies is as a result of heterogeneity rather than chance (I^2). CI, confidence interval; SD, standard deviation.

up to 1 month after surgery ($P<0.05$).[4] They were also more likely to mobilise on postoperative day 1[24] and regain their independence sooner,[13] although no statistical analysis was reported. There was no association reported between group preoperative education and vital capacity,[14] mobilisation on day of surgery,[22,24] Oxford Hip scores,[22] time to standing,[5] or discharge destination.[15]

Seven studies presented outcomes related to patient comfort, such as pain and vomiting. One study showed that patients in the intervention group experienced less preoperative pain ($P=0.04$).[5] Five studies reported on postoperative analgesia use, but all measured this at different time points and with different tools. Fortin and Kirouac[4] reported that patients receiving group education required less IM analgesia ($P=0.025$), although an effect on IV analgesia usage reported by three studies[13,26,24] was less conclusive. Patients in all three intervention groups used less IV analgesia, but only one[26] study published a statistical analysis, which did not show a significant effect at any of their three time points. Use of other analgesia, including oral preparations, morphine, or psychotropics, did not differ significantly between groups.[4,5] However, the experience of pain, including intensity, site, perceptions, and satisfaction were all improved in patients receiving the intervention; this effect was statistically significant in two studies ($P=0.04$,[5] $P=0.01$[29]). Only one study[25] reported no effect of the intervention on participants' expectations of pain. No studies reported a positive association with postoperative vomiting.[4,26]

Patient knowledge and understanding of their surgery and recovery increased after group education in four studies,[27,33,36,23] of which three reported a significant effect.[27,33,36] Knowledge was measured using study-specific post-session surveys, the content of which varied extensively. 'Patient activation' levels (measurement of knowledge, skills, and confidence to manage one's own health) increased significantly in one study for patients who scored at the lower end of the activation scale before the intervention.[42]

Six studies reported that patients who received the intervention had reduced preoperative fear and anxiety compared with baseline, with a control group, or both. Two studies[5,36] used a validated tool (State and Trait Anxiety Scale[44]), one of which found a statistically significant improvement ($P=0.047$).[36] Two used their own questionnaires for patients to self-report anxiety,[25,41] and another interviewed patients.[23] Two studies[4,5] that reported on postoperative anxiety found no statistical difference between the two groups.

Quality of life was measured by two studies.[40,23] The first collected data from patients after colorectal surgery and stoma formation, using nine different quality of life questionnaires at four time points covering global health, physical, cognitive, social, role, body image, and stoma. Although almost all scores were higher in the intervention group, only a higher global health status at 1 month ($P=0.047$) and body image at 6 months after surgery was statistically significant ($P=0.010$).[40] The second study[23] explored the impact on sexuality and self-image after hysterectomy and found that the intervention group had a more positive outlook than the control.

The final outcome was preparedness for surgery. Patients undergoing group education interventions were reportedly better prepared for surgery[43,30] or specifically for discharge[13] compared with controls. Preparedness was measured

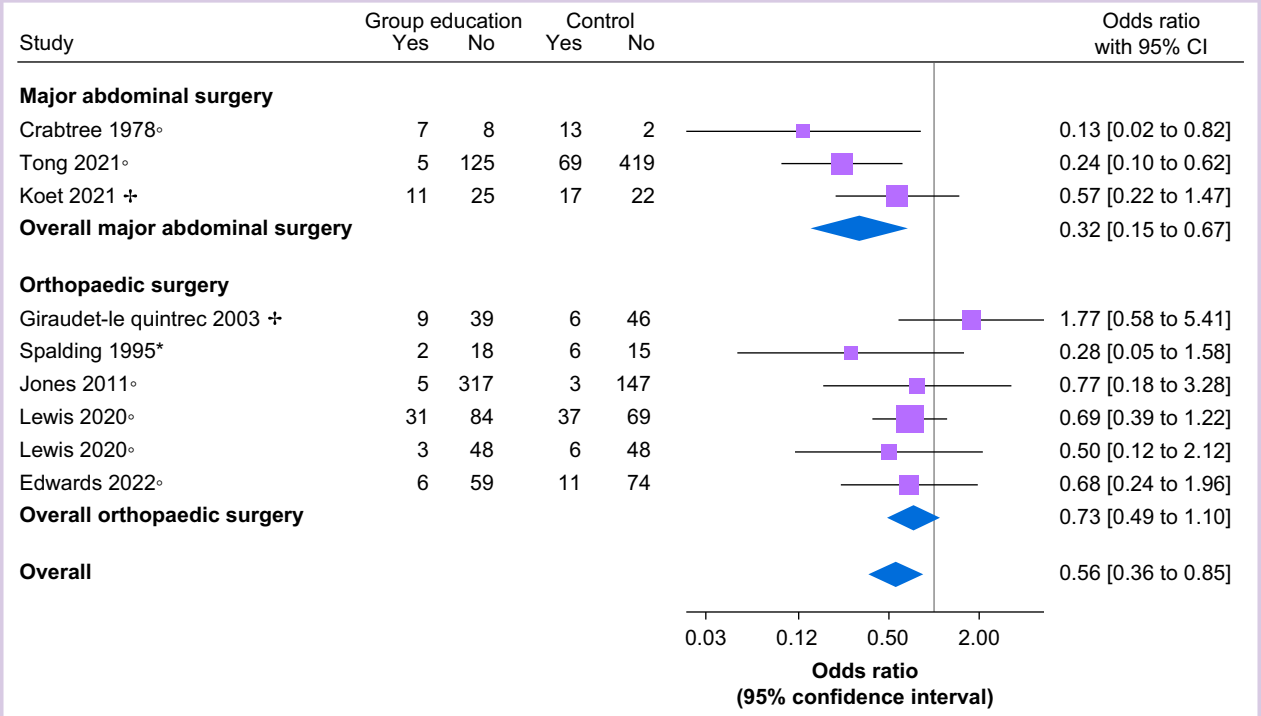

Fig 3. Complications distribution of participants attending group preoperative education *vs* control. Random effects meta-analysis. Study design: ✣RCT, *non-randomised intervention study, ◦observational study. A lower odds ratio (OR) supports a reduction in complications for the intervention group. Any variation across orthopaedics studies is likely because of chance rather than heterogeneity (I^2=0.00%). Some 25.14% of the variation across studies of major abdominal surgery is as a result of heterogeneity rather than chance. CI, confidence interval.

through non-validated questionnaires and interviews. Edwards and colleagues[43] reported a significant increase in patient-preparedness (P=0.001) after a group education intervention. Finally, no difference was found in compliance with preoperative medication regimes.[32]

Discussion

This systematic review comprises the most comprehensive review of published data evaluating group preoperative education across a wide range of clinical and patient-centred outcomes. Attending a group preoperative education class is associated with a shorter length of hospital stay and may reduce the risk of complications. Other benefits include a reduction in health professional support required and improved postoperative physical function, knowledge, and preparedness. Reductions were also seen in perception of pain and anxiety.

As internationally accepted markers for quality of care,[45] length of stay and complications perhaps carry the most weight for organisations considering implementing such programmes. However, patient-centred outcomes, in particular those with 'moderate' or 'high' GRADE assessment (satisfaction, knowledge, comfort, anxiety and preparedness), are no less relevant given their relationship with clinical outcomes. For example, well-informed, prepared patients feel less anxious,[46] and evidence suggests less anxious patients experience less pain and have a better recovery.[47,48] Patients with higher activation levels are also known to have better health outcomes.[49]

Interestingly, although the outcomes relating to satisfaction identified that patients were very satisfied with the intervention itself and felt more prepared for their surgical admission as a result (Table 2), there was little difference between intervention and control groups in terms of satisfaction with surgery and hospital stay. One would expect better informed and less anxious patients to have a better inpatient experience, especially as the data suggest they are more comfortable and less anxious. Further work is needed to understand why this does not appear to be the case.

Of the many studies reporting positive outcomes, none suggested why they thought their intervention was effective (mechanism of action). One likely mechanism is lifestyle behaviour change.[10] Our previous work[50] (excluded from this review because of the absence of a control group), identified that 86% of patients attending group education intended to make a lifestyle change. Those changes, including preoperative smoking cessation, breathing exercises, and physical activity, are all known to improve postoperative outcomes.[51–53] However, none of the studies measured possible mechanisms of behaviour change (e.g. increase in physical activity, participation in self-management exercises) as an outcome.

The number of different outcomes reported in the literature (n=48) is substantial, and the degree of variation within the 11 themes makes synthesis challenging. Consensus is required as to which outcomes are the most useful to measure

the effectiveness of surgery schools, not only as a stand-alone intervention but also as part of an integrated perioperative pathway.

This review has several limitations. Of the 27 included studies, only four were randomised controlled trials. Of the remaining 23, only 17 (74%) used inferential statistics to address whether their findings were statistically significant. Without these analyses, it is difficult to quantify any meaningful change resulting from the intervention.

There are limitations with the reliability of the data. The risk of bias assessments (Table 1) identified that 33% of the studies were a serious risk of bias, 37% moderate risk, and 11% not containing enough information to make an assessment. Although the risk was elevated primarily because most of the studies were observational, other methodological issues were also identified. When assessing the certainty of the evidence, over a third of the 48 outcome effects were identified to be 'low' or 'very low' meaning that the true effect of the intervention on these outcomes is likely to be markedly different from the estimated effect.[21] The reasons for the lower GRADE was because of small sample sizes and significant variation in how the research was conducted, the tools used, and when data were collected. The selection and inclusion criteria for the intervention and control groups also varied. For example, high-risk patients were not included consistently, perhaps because of the likely complexity of their recovery and potentially longer lengths of stay. Furthermore, where patients were not randomised to study groups, bias may be introduced in the selection of controls, for example, those who chose not to attend the class, those who did not have time to attend, or a historic group before the intervention was implemented.

There is also no consensus regarding the 'standard care' given to control groups, resulting in considerable heterogeneity. Experience from practice suggests that although some surgeons provide extensive preoperative information and support, others may adopt a more limited approach. This may be because of the allocated time in clinic, the nature of the surgery, or preconceived notions of the relevance of lifestyle information for patients before operation. However, this is likely to impact the potential benefits of preoperative group education.

Although the interventions all contained the core content outlined in the inclusion criteria (Supplementary File 1), only 70% provided the full educational content and delivery of their intervention, and considerable variation is noted in both content and duration. This finding was supported by a UK surgery school survey[3] and an international review of orthopaedic surgery schools,[54] and is acknowledged to make evaluation of outcomes across institutions difficult. There was also likely to be variation in what was delivered within studies where data were collected over significant time frames. The time between the group education intervention and patients having surgery is also relevant, as recall of information will decrease as time from intervention to surgery increases. Furthermore, time is needed to realise the benefit of any lifestyle change.

There is a risk of publication bias, as studies generally reported positive outcomes. Furthermore, there is a trend towards reporting small studies with non-significant positive effects over the past 50 yr. This highlights the need for further work using robust methodology with clearly defined outcomes.

Despite these limitations, this review highlights the positive impact group education programmes may have on both patient experience and clinical outcomes. This work is supported by empirical qualitative research in this area and personal observations from clinical practice. Patients value and perceive the benefits of attending group education and particularly value the in-person element, which establishes trust with the clinicians caring for them.[46,50,55,56]

Suggestions for future research

Notwithstanding the lack of robust evidence, surgery schools appear to be here to stay. There is therefore an urgent need for larger-scale prospective evaluation of these interventions. Standardisation in how and what is currently delivered within surgery schools, and minimum standards for reporting outcomes, would reduce variability and help improve the reliability of future meta-analysis. There is also a need for comprehensive cost-effectiveness analysis given the costs associated with delivering these interventions.

Conclusions

This systematic review provides evidence that group preoperative education improves clinical and patient-centred outcomes. However, the studies were small, single centre, and at moderate-to-high risk of bias. There is therefore a need for an adequately powered prospective study to evaluate the effectiveness of preoperative group education on clinical outcomes, and to evaluate whether behaviour change is sustained. Furthermore, the content, timing, and mode of delivery, and evaluation measures of preoperative education require standardisation.

Authors' contributions

Study design: IFJ, CG, DL
Study execution, primary author of manuscript: IFJ
Protocol development; verified 10% of literature search results: CG
Informed analysis and discussion; editing final draft: BA
Statistical calculations, manuscript editing: FW
Data extraction from half of the final papers; editing final manuscript: LR
Interpretation of data: MG
Drafting of manuscript: MG, DL

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Declarations of interest

The authors declare that they have no conflicts of interest.

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Appendix A. Supplementary data

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References

1. Centre for Perioperative Care. *Preoperative assessment and optimisation for adult surgery*. Available from Preoperative Assessment and Optimisation for Adult Surgery. Centre for Perioperative Care; 2021. cpoc.org.uk), . [Accessed 19 March 2024]
2. Kruzik N. Benefits of preoperative education for adult elective surgery patients. *AORN J* 2009; **90**: 381–7
3. Fecher-Jones I, Grimmett C, Carter FJ, Conway DH, Levett DZH, Moore JA. Surgery school-who, what, when, and how: results of a national survey of multidisciplinary teams delivering group preoperative education. *Perioper Med (Lond)* 2021; **10**: 20
4. Fortin F, Kirouac S. Randomized controlled trial of preoperative patient education. *Int J Nurs Stud* 1976; **13**: 11–24
5. Giraudet-Le Quintrec JS, Coste J, Vastel L, et al. Positive effect of patient education for hip surgery: a randomized trial. *Clin Orthop Relat Res* 2003; **414**: 112–20
6. Guo P, East L, Arthur A. Preoperative education interventions to reduce anxiety and improve recovery among cardiac surgery patients: a review of randomised controlled trials. *J Clin Nurs* 2015; **24**: 34–46
7. Louw A, Diener I, Butler DS, Puentedura EJ. Preoperative education addressing postoperative pain in total joint arthroplasty: review of content and educational delivery methods. *Physiother Theory Pract* 2013; **29**: 175–94
8. McDonald S, Page MJ, Beringer K, Wasiak J, Sprowson A. Preoperative education for hip or knee replacement. *Cochrane Database Syst Rev* 2014; **2014**, CD003526
9. Groller KD. Systematic review of patient education practices in weight loss surgery. *Surg Obes Relat Dis* 2017; **13**: 1072–85
10. Borek AJ, Abraham C, Greaves CJ, Tarrant M. Group-based diet and physical activity weight-loss interventions: a systematic review and meta-analysis of randomised controlled trials. *Appl Psychol Health Well Being* 2018; **10**: 62–86
11. Stead LF, Carroll AJ, Lancaster T. Group behaviour therapy programmes for smoking cessation. *Cochrane Database Syst Rev* 2017; **3**: CD001007
12. Macmillan. *Principles and guidance for prehabilitation within the management and support of people with cancer*. Available from: https://www.macmillan.org.uk/dfsmedia/1a6f23537f7f4519bb0cf14c45b2a629/13225-source/prehabilitation-for-people-with-cancer. [Accessed 19 February 2024]
13. Spalding NJ. A comparative study of the effectiveness of a preoperative education programme for total hip replacement patients. *Br J Occup Ther* 1995; **58**: 526–31
14. Crabtree M. Application of cost-benefit analysis to clinical nursing practice: a comparison of individual and group preoperative teaching. *J Nurs Adm* 1978; **8**: 11–6
15. Lewis D, Fullard K, Kolbe T, et al. Does face-to-face preoperative joint replacement education reduce hospital costs in a regional Australian hospital? A descriptive retrospective clinical audit. *Eur J Orthop Surg Traumatol* 2020; **30**: 257–65
16. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021; **372**: n71
17. Cochrane Handbook for systematic reviews of interventionsHiggins JPT, Thomas J, Chandler J, et al., editors. *version 6.4 Cochrane* 2023. Available from: www.training.cochrane.org/handbook. [Accessed 19 February 2024]
18. Hoffmann TC, Glasziou PP, Boutron I, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ* 2014; **348**: g1687
19. Sterne JAC, Savović J, Page MJ, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ* 2019; **366**: l4898
20. Sterne JA, Hernán MA, Reeves BC, et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ* 2016; **355**: i4919
21. Schünemann HJ, Vist GE, Glasziou P, Akl EA, Skoetz N, Guyatt GH. Chapter 14: completing 'Summary of findings' tables and grading the certainty of the evidence. In: Higgins JPT, Thomas J, Chandler J, editors. *Cochrane Handbook for systematic reviews of interventions version 6.4 Cochrane*; 2023. Available from: www.training.cochrane.org/handbook. [Accessed 19 February 2024]
22. Moulton LS, Evans PA, Starks I, Smith T. Pre-operative education prior to elective hip arthroplasty surgery improves postoperative outcome. *Int Orthop* 2015; **39**: 1483–6
23. Phillips CR. The hysterectomy patient in the obstetrics service: a presurgery class helps meet her needs. *JOGN Nurs* 1977; **6**: 45–9
24. Kosik SL, Reynolds PJ. A nursing contribution to cost containment: a group preoperative teaching program that shortens hospital stay. *J Nurs Staff Dev* 1986; **2**: 18–22
25. Nelson S. Pre-admission education for patients undergoing cardiac surgery. *Br J Nurs* 1996; **5**: 335–40
26. Hörchner R, Tuinebreijer W. Preoperative preparatory program has no effect on morbidly obese patients undergoing a Lap-Band operation. *Obes Surg* 1999; **9**: 250–7
27. Guimaro MS, Lacerda SS, Bacoccina TD, et al. Evaluation of efficacy in a liver pretransplantation orientation group. *Transplant Proc* 2007; **39**: 2522–4
28. Jones S, Alnaib M, Kokkinakis M, Wilkinson M, St Clair Gibson A, Kader D. Pre-operative patient education reduces length of stay after knee joint arthroplasty. *Ann R Coll Surg Engl* 2011; **93**: 71–5
29. Papanastassiou I, Anderson R, Barber N, Conover C, Castellvi AE. Effects of preoperative education on spinal surgery patients. *SAS J* 2011; **5**: 120–4
30. Lane-Carlson M-L, Kumar J. Engaging patients in managing their health care: patient perceptions of the effect of a total joint replacement presurgical class. *Perm J* 2012; **16**: 42–7
31. Collin C, Bellas N, Haddock P, Wagner J. Pre-operative education classes prior to robotic prostatectomy benefit both patients and clinicians. *Urol Nurs* 2015; **35**: 281–5
32. Kim K, Chin G, Moore T, Schwarzkopf R. Does a preoperative educational class increase patient compliance. *Geriatr Orthop Surg Rehabil* 2015; **6**: 153–6
33. 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**: 2745–54

34. Eastwood D, Manson N, Bigney E, et al. Improving postoperative patient reported benefits and satisfaction following spinal fusion with a single preoperative education session. *Spine J* 2019; **19**: 840–5
35. Sisak K, Darch R, Burgess LC, Middleton RG, Wainwright TW. A preoperative education classes reduced length of stay for total knee replacement patients identified at risk of an extended length of stay. *J Rehabil Med* 2019; **51**: 788–96
36. Solano MA, Ramcharran KK, Jones LC, Sterling RS, Samaroo DR, Khanuja HS. Preoperative patient education class during an orthopedic mission trip: effects on knowledge, anxiety, and informed consent. *J Arthroplasty* 2020; **35**: 2410–7
37. Walming S, Angenete E, Bock D, et al. Preoperative group consultation prior to surgery for colorectal cancer - an explorative study of a new patient education method. *J Cancer Educ* 2022; **37**: 1304–11
38. Tong E, Lakhardt K, Wenzel CF, Tong W. A study on the effectiveness of a multidisciplinary class for gender-affirming chest surgery in transmasculine and nonbinary patients and their support persons. *J Plast Reconstr Aesthet Surg* 2021; **74**: 3168–77
39. Ahmad M, Ur Rehman H, Shaikh AA. Enhanced recovery program: does preoperative education reduces length of hospital stay in primary hip and knee arthroplasty? *Cureus* 2021; **13**, e18639
40. Koet LL, Kraima A, Derksen I, et al. Effectiveness of preoperative group education for patients with colorectal cancer: managing expectations. *Support Care Cancer* 2021; **29**: 5263–71
41. Pelkowski JN, Saunjoo LY, Adams S. Benefits of implementation of preoperative education classes for hip and knee arthroplasty. *Curr Orthop Pract* 2021; **32**: 112–7
42. Blong J, Hoggett L, Robinson H, Bokhari SA, Sloan A. Improving Patient Activation Measure® in lower limb arthroplasty: quantitative assessment of patient activation following a pre-operative patient education programme. *Musculoskelet Care* 2023; **21**: 143–7
43. Edwards R, Gibson J, Mungin-Jenkins E, Pickford R, Lucas JD, Jones GD. A Preoperative Spinal Education intervention for spinal fusion surgery designed using the Rehabilitation Treatment Specification System is safe and could reduce hospital length of stay, normalize expectations, and reduce anxiety: a prospective cohort study. *Bone Jt Open* 2022; **3**: 135–44
44. Spielberger CD, Gorsuch RL, Lushene R, Vagg PR, Jacobs GA. In: *Manual for the state-trait anxiety inventory*. Palo Alto, CA: Consulting Psychologists Press; 1983
45. Bottle A, Middleton S, Kalkman CJ, Livingston EH, Aylin P. Global comparators project: international comparison of hospital outcomes using administrative data. *Health Serv Res* 2013; **48**: 2081–100
46. Spalding NJ. Reducing anxiety by pre-operative education: make the future familiar. *Occup Ther Int* 2003; **10**: 278–93
47. Geoffrion R, Koenig NA, Zheng M, et al. Preoperative depression and anxiety impact on inpatient surgery outcomes: a prospective cohort study. *Ann Surg Open* 2021; **2**: e049
48. Tadesse M, Ahmed S, Regassa T, et al. Effect of preoperative anxiety on postoperative pain on patients undergoing elective surgery: prospective cohort study. *Ann Med Surg (Lond)* 2022; **73**, 103190
49. Gilbert H, Supporting people to manage their health: an introduction to patient activation, The Kings Fund, London. Available from: https://www.kingsfund.org.uk/insight-and-analysis/reports/supporting-people-to-manage-their-health (Accessed 20 February 2024), 2014.
50. Fecher-Jones I, Grimmett C, Edwards MR, et al. Development and evaluation of a novel pre-operative surgery school and behavioural change intervention for patients undergoing elective major surgery: fit-4-Surgery School. *Anaesthesia* 2021; **76**: 1207–11
51. Tønnesen H, Nielsen PR, Lauritzen JB, Møller AM. Smoking and alcohol intervention before surgery: evidence for best practice. *Br J Anaesth* 2009; **102**: 297–306
52. Pu CY, Batarseh H, Zafron ML, Mador MJ, Yendamuri S, Ray AD. Effects of preoperative breathing exercise on postoperative outcomes for patients with lung cancer undergoing curative intent lung resection: a meta-analysis. *Arch Phys Med Rehabil* 2021; **102**: 2416–27
53. Perry R, Herbert G, Atkinson C, et al. Pre-admission interventions (prehabilitation) to improve outcome after major elective surgery: a systematic review and meta-analysis. *BMJ Open* 2021; **11**, e050806
54. Pitaro NL, Herrera MM, Stern BZ, et al. Synthesis of 'joint class' curricula at high volume joint replacement centres and a preliminary model for development and evaluation. *J Eval Clin Pract* 2024; **30**: 46–59
55. Mezzanotte EJ. Group instruction in preparation for surgery. *Am J Nurs* 1970; **70**: 89–91
56. Conradsen S, Gjerseth MM, Kvangarsnes M. Patients' experiences from an education programme ahead of orthopaedic surgery – a qualitative study. *J Clin Nurs* 2016; **25**: 2798–806

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