Systematic review

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Patient education about recovery after colorectal surgery: systematic scoping review

S. J. Chapman*, J. A. Helliwell*, M. D. S. Lonsdale†, J. P. Tiernan‡ and D. G. Jayne*

*Leeds Institute of Medical Research at St James's, University of Leeds, Leeds, UK, †School of Design, University of Leeds, Leeds, UK, and ‡John Goligher Colorectal Unit, St James's University Hospital, Leeds, UK

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Abstract

Aim Enhanced recovery after surgery (ERAS) protocols aim to optimize recovery through a series of evidence-based recommendations. A key component of ERAS is the provision of patient education. Whilst the recommendation for this is strong, the evidence to inform its format, timing and delivery is unclear. The aim of this review was to describe previous educational interventions used to improve recovery after colorectal surgery and to explore opportunities for future research.

Methods A systematic scoping review was performed. MEDLINE and Embase databases were searched between 1 January 1990 and 12 February 2020. Studies which described or assessed the effectiveness of a patient education or information resource to improve recovery after colorectal surgery were eligible. Outcomes of interest included the format, timing and delivery of interventions, as well as key features of intervention and study design. A narrative synthesis of data was produced through a process of charting and summarizing key results.

Results A total of 1298 papers were inspected, and 11 were eligible for inclusion. Five papers were reports of randomized controlled trials, and others reported a mix of non-randomized and qualitative studies. The design of educational interventions included audio-visual resources ($n = 3$), smartphone device applications ($n = 3$) and approaches to facilitate person-to-person counselling ($n = 5$). Most of the counselling interventions reported positive outcomes (mainly in length of hospital stay), whereas the other types reported mixed results. Patients and the public were seldom involved as collaborators in the design of interventions.

Conclusions Patient education is generally advantageous, but there is insufficient evidence to optimize its design and delivery in the setting of colorectal surgery.

Keywords colorectal surgery, enhanced recovery after surgery, patient education

Introduction

Enhanced recovery after surgery (ERAS) protocols have led to fundamental changes in the management of patients undergoing colorectal surgery [1]. These comprise a series of evidence-based recommendations that aim to restore normal physiology after surgery, reduce postoperative morbidity and shorten the duration of hospital admission. The delivery of ERAS requires contributions from multiple healthcare-related specialties both before and after surgery [2]. Owing to their success across a wide range of healthcare systems, ERAS protocols are increasingly adopted as standard practice [3].

A large body of evidence has explored how ERAS protocols can be optimized. Some studies have aimed to delineate the mechanisms through which ERAS leads to improved recovery. Much of this has focused on metabolic and inflammatory stress responses after surgery [4]. Other research has explored how individual components of ERAS can be improved. Common areas of investigation have included the recovery of bowel function, the management of postoperative pain and the delivery of anaesthesia [5]. The present consensus suggests that the clinical benefits of ERAS are brought by small gains across all of these areas [6]. Patient education and counselling is another key component of recovery and is strongly recommended by enhanced

Correspondence to: S. J. Chapman, Section of Translational Anaesthesia and Surgery, Leeds Institute of Medical Research at St James's, University of Leeds, Leeds LS9 7TF, UK.
E-mail: s.chapman@leeds.ac.uk
@SJ_Chapman

recovery guidelines in Europe and North America [2,7]. This can be delivered to patients in a number of ways, but the most appropriate format, timing and setting is unclear. This is important for ensuring that patients are prepared for surgery and to increase their understanding and compliance to other important principles of recovery.

The aim of this review was to describe previous educational interventions used to improve recovery after colorectal surgery. Since high heterogeneity was expected across the search results, the review also aimed to describe key features of intervention and study design and to identify opportunities for further research.

Method

Study design

A systematic scoping review was performed according to a predefined protocol. Scoping reviews are not eligible for registration on the PROSPERO database of systematic reviews. Since a high degree of heterogeneity was expected, a quantitative synthesis of outcomes was not planned. The public were not involved in the conduct of this review, but the results will form a key resource for a series of patient engagement exercises. The paper is reported in line with the PRISMA Extension for Scoping Reviews [8].

Search strategy

A search strategy was developed to identify patient education and information resources designed to improve recovery after colorectal surgery (Table S1). A search of MEDLINE and Embase (via OvidSP) was performed for articles published online or in print between 1 January 1990 and 12 February 2020. The final search was performed on 12 February 2020. The titles, abstracts and full-text papers were inspected by two independent investigators (SJC and JH), with discrepancies addressed through discussion with the review team until consensus was agreed. Both investigators had a background of formal research training.

Eligibility criteria

Studies describing or assessing the effectiveness of a patient education or information resource to improve recovery after colorectal surgery were eligible. Mixed surgical populations were considered if the predominant type of surgery was colorectal. Eligible studies had to present a developed resource, rather than a description of desirable characteristics from stakeholder groups. All original study types were eligible, including those with a qualitative or mixed-methods design. Education and information resources which focused on paediatric-, parent- or stoma-specific populations were excluded since these represent unique populations that merit dedicated review. Articles published in non-English languages were excluded due to limited resources, as was grey literature (such as conference abstracts).

Definitions

For the purpose of this study, patient education and information resources were defined as any material that aimed to instil specific information to improve recovery after surgery. No restriction on the format, timing, route of delivery or characteristics of the resources were predefined. Colorectal surgery was defined as surgery on the colon or rectum, irrespective of surgical approach or clinical indication.

Outcomes

As a scoping review, no predefined outcomes were set and a high level of heterogeneity was expected. Variables of interest broadly comprised intervention characteristics (such as format, timing of delivery, public involvement in resource development) and methodological outcomes (such as study design and choice of study outcomes). Where possible, clinical outcomes to describe the effectiveness of the educational intervention (such as patient quality of life, morbidity, length of hospital stay) were collected and summarized.

Data charting

A single investigator charted all data from eligible papers. This was done using a semi-structured charting pro-forma designed for the purpose of this study (Appendix S1). Narrative summaries were produced for each eligible study, which were reviewed for agreement by an independent investigator. Where related development studies were identified from reference lists, these were inspected to maximize data completeness. Discrepancies in charting were addressed through further review and discussion between investigators.

Statistical analysis

Descriptive data were expressed using simple statistics, including proportions and averages. No quantitative syntheses of outcomes or assessments of study quality were undertaken. A narrative synthesis of data collected from eligible papers is presented.

Results

Study characteristics

A total of 1298 papers were reviewed and 11 were eligible for inclusion (Fig. 1). These were undertaken across a range of geographical settings, including Asia, Australasia, Europe and North America. Five papers reported a randomized controlled trial (RCT), four reported non-randomized comparative studies, one reported a mixed-methods study done alongside an RCT, and one reported a non-comparative study. Most studies ($n = 7/11$) included mixed populations of patients (i.e. benign and malignancy) (Table 1). A total of 14 outcomes and 28 outcome measures/instruments were prospectively reported in the papers. The most common primary outcome was length of hospital stay ($n = 3$) (Table 2).

Intervention design

A full outline of intervention designs is shown in Table 1. Three interventions focused on audio-visual resources. In one of these, animations describing the impact/benefits of postoperative mobility on key bodily processes (i.e. lung function, circulation) were shown to patients during their hospital stay [9]. In another, a 13-min cartoon depicting the in-hospital journey was shown on a desktop computer prior to admission, along with an accompanying fact sheet [10]. The third audio-visual resource was a 15-min video describing key elements of preoperative assessment, recovery and advice on going home [11]. Three interventions were delivered using smartphone or tablet devices. One comprised a milestone checklist, progress surveys and a library of reference information provided during admission [12]. Another involved an eHealth package, consisting of a website, a smartphone application, an activity tracker and an electronic consult facility before and after surgery [13]. The third involved an online educational programme delivered through a device-accessed website after discharge [14]. Five further interventions focused on patient counselling. Two involved nurse-led scripted telephone calls after surgery, one involved an extended series of nurse-led face-to-face meetings before and after surgery, and one involved a nurse-facilitated ward protocol with a focus on education [15–18]. The final intervention involved a written resource delivered

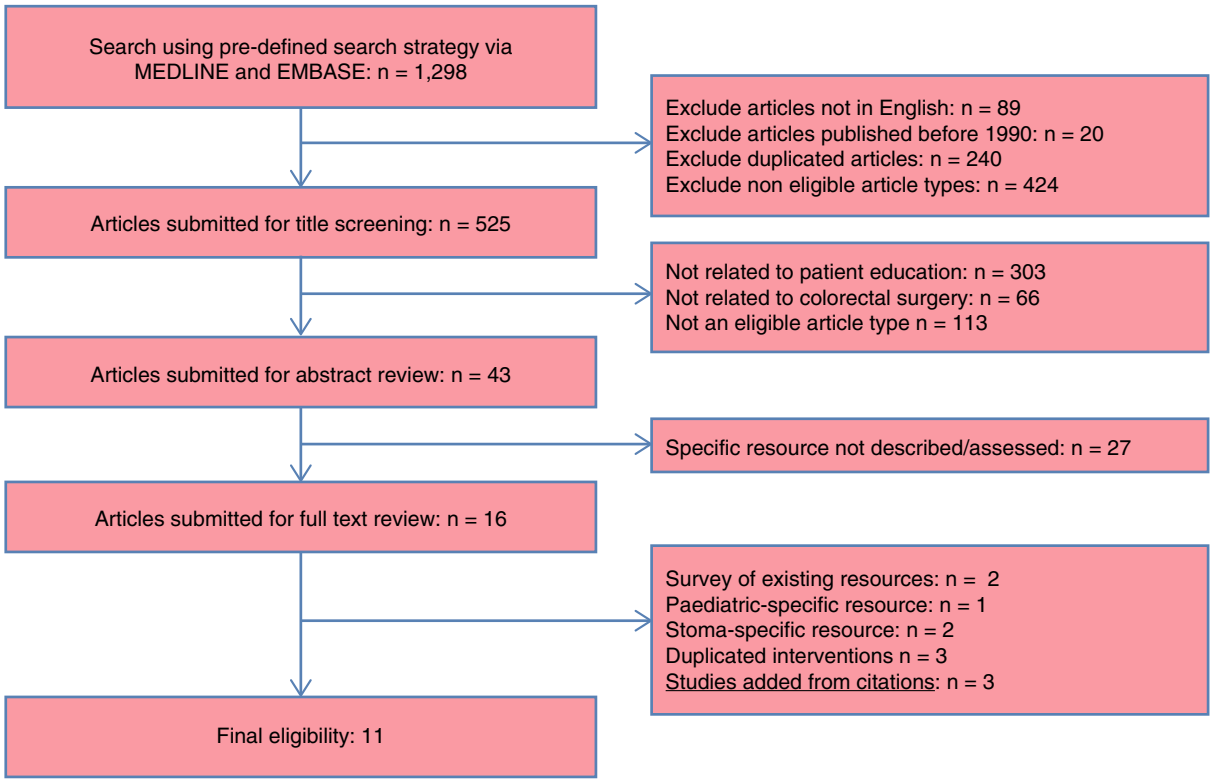

Figure 1 Flow diagram of study eligibility.

Table 1 Characteristics of eligible studies.

Study (year)	Country	Study design	Study population	Primary clinical outcome	Intervention type (*vs* comparator)	Intervention delivery	Patient involvement
Mata (2020) [12]	Canada	RCT	100 Mixed disease*	Compliance to ERP bundle	Mobile device application (*vs* sham device)	Postoperative (pre-discharge)	None reported
den Bakker (2019) [13]	Netherlands	Mixed-methods alongside RCT	151 Mixed disease*	N/A	Electronic eHealth programme	Preoperative and postoperative	Yes – focus groups*
Öhlén (2019) [19]	Sweden	Non-randomized comparative	488 Malignancy	Preparedness for surgery	Person-centred communication (*vs* standard care/ information)	Preoperative and postoperative	Yes – co-developed
Jones (2019) [9]	New Zealand	RCT	96 Mixed disease*	Mobility up to 1 week post discharge	Animated visualization (*vs* sham non-animated script)	Postoperative (pre-discharge)	None reported
Cavallaro (2018) [15]	USA	Non-randomized comparative	505 Mixed disease*	Hospital length of stay	Scripted nurse-led phone call (*vs* standard care/ information)	Preoperative	None reported
Forsmo (2018) [17]	Norway	RCT	179 Mixed disease*	Hospital length of stay	Extended counselling (*vs* standard care/ information)	Preoperative and postoperative	None reported
Kim (2018) [14]	South Korea	Non-randomized comparative	131 Malignancy	Quality of life at 4 weeks post surgery	Two-week device-accessed online education programme (*vs* standard care/ information)	Postoperative (post discharge)	Yes – piloted by patients
Kim (2016) [18]	South Korea	Non-randomized comparative	219 Malignancy	Unclear	Educational ward-care protocol (*vs* standard care/ information)	Preoperative and postoperative	None reported
Tou (2013) [10]	UK	RCT	31 Mixed disease*	Anxiety	Animated visualization (*vs* standard care/ information)	Preoperative	None reported
Ihedioha (2013) [11]	UK	RCT	61 Mixed disease*	Hospital length of stay	Patient educational videos (*vs* standard care/ information)	Preoperative**	None reported
Burch (2012) [16]	UK	Non-comparative	200 Unclear	Unclear	Educational phone follow-up	Postoperative (post discharge)	Yes – focus groups

ERP, enhanced recovery programme; N/A, not applicable; RCT, randomized controlled trial.

*Mixed disease refers to non-specific population (i.e. malignancy or benign); all interventions involving preoperative delivery were delivered in home settings, aside from

**where the specific location of delivery was not clear.

Table 2 Outcomes and outcome measures used in eligible studies.

Outcomes	Outcome measure/instrument
Length of stay*	• Duration of postoperative hospital stay • Duration of total hospital stay
Readmission	• Readmission to hospital • Readmission to hospital department
Morbidity	• Comprehensive complication index (CCI) • Clavien–Dindo classification • Short Form 36 (SF-36) • Incidence of postoperative ileus • Incidence of wound infection • Incidence of postoperative pyrexia
Pain	• Visual analogue scale (VAS) • Analgesia consumption
Mobility*	• Step count • Self-reported exercise
Mortality	• 30-day mortality
Adherence to ERP*	• Adherence to bundle of five ERP items
Preparedness for surgery*	• Preparedness for Colorectal Cancer Surgery Questionnaire (PCSQ)*
Quality of recovery	• Quality of Recovery Short Form (QoR-15) • Brief Illness Perception Questionnaire • Self-designed Likert scale
Patient satisfaction	• Consumer Assessment of Healthcare Providers and Systems Surgical Care Survey (S-CAHPS)
Quality of life	• EORTC QLQ-C30 • Functional Assessment of Cancer – Colorectal survey (FACIT-C)
Patient distress	• National Comprehensive Cancer Network (NCCS) Distress Thermometer
Anxiety/ depression*	• Hospital Anxiety and Depression Scale • State-trait anxiety inventory (STAI) • Visual analogue scale (VAS)
Resilience	• Resilience scale

ERP, enhanced recovery protocol.
*Indicates use as a primary outcome in at least one eligible study included in this review.

alongside a person-centred approach to communication. This encouraged dialogue, reflection and consideration of patients' individual situations [19].

Control and comparator groups

Of the nine comparative studies, seven included control or comparator groups akin to local standard care. In one smartphone/tablet intervention, the control group involved an internet-enabled device without access to the application itself [12]. In another audio-visual intervention, both an active control (audio only) and control group (standard care) were assessed alongside the animated intervention [9].

Intervention development

Details of the development team/contributors were available for eight out of 11 interventions (72.7%). Five involved peer review by clinical individuals or teams outside of the direct authorship group. One intervention was designed collaboratively with specialists in the field of patient education and another involved collaboration with industry. Patient and/or public involvement was reported in the development of four interventions. Two of these included focus group consultations during the early phases of development, one involved piloting of the intervention during its later phases and one involved co-production. There were no reports of patient involvement in the wider study designs.

Study findings

Audio-visual interventions

Two out of three audio-visual interventions led to improved clinical outcomes when evaluated in RCT study designs. Participants who viewed animations about mobility during their hospital stay achieved a higher step count after surgery (mean daily count 2294.6 *vs* 1347.3; $P = 0.05$) and those who viewed cartoons about the in-hospital journey reported reduced anxiety compared to usual care (*original data not available*; $P = 0.03$) [9,10]. In another RCT, videos about pre-assessment and recovery shown before surgery failed to have any impact on length of hospital stay (median 5 *vs* 5 days; $P = 0.239$) [11].

Smartphone and tablet interventions

Two out of three smartphone and tablet resources led to clinical benefits when assessed in non-randomized comparative study designs. Participants who used the interactive eHealth package throughout recovery described greater experiences of security, reassurance and motivation [13]. Those who used the online education programme after surgery reported improved quality of life [Functional Assessment of Cancer – Colorectal survey (FACIT-C): 93.7 *vs* 82.7; $P = 0.002$], anxiety levels (Hospital Anxiety and Depression Scale 3.6 *vs* 6.1; $P = 0.001$) and reduced depression (Hospital Anxiety and Depression Scale 5.9 *vs* 9.4; $P = 0.001$)] compared to usual care [14]. In contrast, there were no differences in morbidity or length of hospital stay when patients engaged with smartphone-facilitated milestone checklists and progress surveys [12].

Counselling interventions

Positive results were reported for the majority of counselling interventions. Length of hospital stay was significantly shorter for participants who took part in scripted telephone calls before surgery (mean 3.2 *vs* 3.7 days; $P = 0.005$) [15] and an extended series of counselling sessions (median 5 *vs* 7 days; $P < 0.001$) compared to usual care [17]. The latter was assessed within an RCT study design. Similarly, participants who took part in an education-focused ward protocol regained bowel function quicker (time to first soft diet 55.0 *vs* 66.7 h; $P = 0.013$) and had a shorter length of hospital stay (4.9 *vs* 5.5 days; $P = 0.039$) [18]. When a person-centred communication approach was used, no overall difference in preparedness for surgery was demonstrated, although some improvements in specific domains of the Preparedness for Colorectal Cancer Surgery Questionnaire (such as 'making sense of recovery' and 'searching for and making use of information') were reported [19].

Discussion

Education about recovery is a key principle of ERAS, yet few studies have explored how this can be optimized after colorectal surgery. The present review describes a range of interventions that focused on visual animations, smartphone resources and approaches to personal counselling. The outcomes of these studies were variable, as were the study designs and methods, but the majority showed some sort of clinical benefit. The most common primary outcome was length of hospital stay, but the relevance of this to patients recovering after major surgery is unclear. The approach to developing information resources was mixed and seldom involved information design specialists or members of the public working in collaborative roles.

Patient education before major surgery is important for a number of reasons. First, appropriate and timely information has been shown to mitigate feelings of anxiety and stress [20]. This is undoubtedly important for patients' psychological health before and after surgery, but also possibly for reducing short-term physiological complications. Previous studies have shown that anxiety is associated with increased postoperative pain and psychological stress may be associated with poor wound healing [21,22]. Whether these relate to biological mechanisms, behavioural traits or a mix of the two remains unclear. Second, appropriate information is important for maximizing the retention of knowledge and for optimizing patient compliance to recovery goals. Previous research has shown that the incidence of postoperative morbidity reduces as patients' compliance to ERAS protocols increases [6]. Greater compliance to ERAS has also been associated with lower resource utilization and reduced healthcare costs [23]. Finally, some approaches to patient education empower patients to participate in key decision-making relating to their recovery. In some settings, this has facilitated greater alignment of patient and clinician perceptions of risk, such as the choice of regional anaesthesia (rather than general anaesthesia) during orthopaedic procedures [24]. In the setting of colorectal surgery, previous qualitative evidence has shown that patients want to be proactively involved in their recovery to facilitate a return to their everyday lives [25]. In a recent patient focus group, highly emotional situations and poor information design (i.e. inaccessible language) were key barriers to effective understanding. Patients explained that good information should (i) address individualized information needs; (ii) empower patients to take an active role in their recovery; (iii) provide support through meaningful education and signposting; and (iv) recognize patients' need for information after discharge [26]. Taken together with the present findings showing that patient involvement is uncommon, it is clear that patients must be equal partners in the development of effective information resources.

Strengths and limitations of this review are recognized. The key strength is the broad inclusion of study designs. This was essential to construct a representative summary of such heterogeneous literature without applying overly excessive exclusion criteria. A key limitation is the extensive scope of the subject area and the difficulty in making meaningful comparisons between studies. Accepting this heterogeneity, both in the design of interventions and study methods, a narrative synthesis represents the most feasible synthesis of data, particularly since the aim of the study is to describe previous evidence and identify opportunities for future investigation. Another limitation is the colorectal-specific nature of this study rather than broader abdominal surgery. This was desirable since unique considerations exist for patients undergoing colorectal surgery, such as the management and counselling related to colorectal cancer pathways and the potential impact on short- and long-term bowel function. Although some of the findings described by the current data could apply to other types of non-gastrointestinal abdominal surgery, generalizing these results is discouraged.

In summary, the delivery of patient information to support colorectal surgery requires further investigation. Whilst the recommendation for preoperative education is justified, the evidence to inform its delivery is low. A key challenge is the development of evidence-based information materials. These must be developed

according to academic principles of information design and cognitive understanding. The most appropriate outcomes to measure effectiveness of resources must be agreed and may not necessarily include length of stay. Across all of this, it is clear that key stakeholders, including patients and healthcare professionals, must be integrated closely in future research.

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Conflicts of interest

None to declare. The work was unfunded.

Author contributions

All authors conceptualized and had input into the design of the review. SJC and JH collected and analysed data. All authors drafted the manuscript and approved the final version for submission. DGJ is the study guarantor.

Data availability statement

All available data are provided in the paper and appendices.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:
Table S1. Search strategy.
Appendix S1. Charting pro-forma.

