Supplementary Materials 2: Non-prioritised studies eligible for inclusion in the effectiveness arm of the review

One hundred and thirty-five studies (138 articles) were non-RCTs conducted outside of the UK[1-138], the most common of which included: 32 articles from the USA, 13 articles each from Canada[1, 54, 63-66, 70, 81, 82, 94, 103, 114, 122] and Denmark[3, 13, 14, 27, 41, 44, 47, 51, 61, 62, 74, 95], 10 from Japan[55, 59, 73, 80, 87, 92, 118, 133, 134, 136], eight from Germany[18, 35, 60, 104, 105, 108, 113, 130], and seven articles each from Italy[11, 17, 21, 91, 98, 109, 128], the Netherlands[19, 20, 33, 49, 50, 121, 125] and New Zealand.[29, 43, 56, 111, 117, 137, 138] Two studies were conducted in across more than one country.[85, 124] One study was an interrupted time series[126], two studies were controlled before-and-after trials[97, 135], 28 were controlled-trials and 104 were uncontrolled before-and-after (UBA) trials.

The most common reasons for admission, according to the broad procedural categories, were: colorectal surgery (n=41 studies), lower-limb arthroplasty (n=34), upper abdominal surgery (n=26) and pelvic surgery (n=13). The most frequently assigned category of intervention being evaluated was ERP (n=122). Other common intervention categories included Preoperative Assessment and/or Care Plan: n=4 studies[44, 50, 88-90], Specialist Unit: n=3 studies[15, 25, 46] and Multi-disciplinary working: n=3 studies.[5, 31, 95] Interventions targeted a mean number of three of the five stages care from pre-admission through to follow-up care. The stages of care targeted by each intervention, along with a brief description of the intervention and comparator used within each of these non-prioritised studies are summarised below in Table 1.

Table 1. Non-RCTs and studies conducted outside of the UK which were not prioritised for inclusion in the effectiveness synthesis

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Abdominal surgery															
Chen 2011,[24] Taiwan	Hospital Elder Life Programme	ERP	Early mobilisation, oral and nutritional assistance, orienting communication	Early mobilization, nutritional assistance, and therapeutic (cognitive) activities implemented by a trained nurse	Abdominal surgery	UBA	179(Intervention: 102, Comparator: 77)	Intervention: 73.3(5.4), Comparator: 72.6(6.1)	Urban medical centre				x		1
Chang 2000,[22] Taiwan	Clinical pathway	ERP	Key documentation, laboratory tests, patient education, I.V. Fluid management, antibiotics, pain management, assigned nurse to monitor pathway adherence, meetings between members of clinical pathway team to resolve deviance from pathway	Group 1: Prior to pathway implementation, Group 2: First year of pathway implementation	Radical nephric-tomy	UBA	Total: 5232 (Intervention: 3617, Comparator: 1615)	Intervention 1: 60(range 32-89), Intervention 2: 62(range 32-91), Comparator: 58(range 33-74)	Hospital		x	x	x		3
Chen 2014,[23] Taiwan	Hospital Elder Life Programme	ERP	Early mobilisation, oral and nutritional assistance, orienting communication	Usual Care: Standard hospital care provided by physicians and nurses. Referral to dietician/PT as required	Major elective abdominal surgery	UBA	(As extracted for All participants) Total: 189, Intervention: 107, Comparator: 82)	(As extracted for All participants) Intervention: 73.3 (6.2), Comparator: 72.8 (5.6)	Urban medical centre				x		1

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
So 2008,[115] Singapore	Clinical Pathway	ERP	Information, counselling and education, pain control, early mobilisation plan/nasogastric tube removal/resumption of diet/protein supplement, discharge planning	Pre-ERP	Radical gastrectomy	UBA	115(Intervention: 61, Comparator:54)	Intervention: 66.3, Comparator: 63.7	University hospital	x	x	x	x		4
Tarin 2014,[120] USA	Common Clinical Pathway	ERP	Post-op Day 0-Day 2: Bed rest, fluid intake, nutrition, mobilisation, pain relief	Pre-Pathway	Partial and radical nephrectomy	UBA	Total: 2800, Intervention: 1790, Comparator: 1010	Median Ages Intervention - Radical/Open: 62 (IQR 52-69), Radical/Minimally Invasive: 60(IQR 51-68) Partial/Open: 61(IQR 52-69), Partial/Minimally Invasive: 60 (IQR 52-69). Median ages Comparator-Radical/Open: 67(IQR-55-74), Radical/Minimally Invasive: 59(IQR 51-	Research hospital				x		1

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
								70), Partial/Open: 61(IQR 52-69), Partial/Minimally Invasive: 63(IQR 55-71)							
Yamada 2012,[133] Japan	Enhanced Recovery After Surgery Protocol	ERP	Allowed to eat until midnight prior to surgery, drink until 3h before surgery, mild bowel preparation, surgical protocol, drain protocol, immediate nasogastric tube removal, NSAIDs, early mobilisation, oral fluid and nutrition supplement intake POD2	Pre-ERAS: fluid stopped at midnight, gastric stenosis not given, bowel preparation, drains NG tube removed POD1, analgesic given when needed, fluids given POD3, food POD4, no antithrombotic agent administered prophylactically	Radical gastrectomy	UBA	191(Intervention: 91, Comparator: 100)	Median age intervention: 67(Range 42-84), Comparator: 65(Range 29-84)	Cancer centre		x	x	x		3
Cardiac surgery															
Chindhy 2014,[25] USA	Acuity adaptable patient care unit system	Specialist ward	Continuous patient-focused care from surgery to discharge. After surgery patients transferred to Acuity Adaptable Patient Care unit to receive ICU level care and discharged without moving to another unit	Pre-ACC: Patients immediately transferred to ICU and cared for by nursing/surgical teams. Stepped down to surgery unit then discharged	Cardiac surgery	UBA	Total: 2930 (Intervention: 1901, Comparator: 1029)	Intervention: 62.1(13.3), Comparator: 62.2(12.9)	University hospital				x		1

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
El Baz 2009,[33] Netherlands	Clinical pathway	ERP	Clinical pathway from admission until discharge, education	Control: no structural educational sessions and no controlling for LOS	CABG	UBA	Total: 198 (Intervention: 120, Comparator: 78)	Intervention: 64.93 (9.60), Comparator: 64.83 (9.95)	University hospital		x	x	x		3
Emanminia 2012,[34] USA	Universal bed model	Patient centred care	Care delivery system that maintains patients in the same room from immediately post operation to discharge. Adapts equipment, staff, and other resources to a patient's level of acuity	Traditional model of admission	Cardiac surgery	CT	Total: 225 963 (Intervention: 610, Comparator: 225353)	Intervention: 69.7 (Standard error of the mean 2.82), Comparator: 67.4 (SEM 0.14)	Suburban hospital				x		1
Ender 2008,[35] Germany	Fast track protocol	ERP	Protocol of care within a Post Anaesthesia Care Unit; premedication, warming blanket, anaesthesia, non-invasive ventilation after extubation	Pre Fast-track protocol: premedication, anaesthesia protocol, admission to ICU after surgery	Cardiac surgery	UBA	Total: 842, Intervention: 421, Comparator: 421	Intervention: 64(13), Comparator: 64(12)	General hospital		x	x			2
Moon 2001,[77] Canada	Fast track	ERP	Continued regular cardiac medications until am of surgery, preoperative assessment, education, anaesthesia	Non Fast-Track recovery without admission to ICU	Coronary artery bypass surgery	CT	617(Intervention: 219, Comparator: 398)	64.69(10.63) Intervention: 64.3(11.2), Comparator: 64.9(10.3)	2x University tertiary care centres	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			protocol, transfer to recovery room, postoperative pain management protocol, deep breathing and coughing exercises, early mobilisation and nutrition												
Ospasich 2010,[91] Italy	Physiotherapy programme	Rehab	Early, post-surgery, in-hospital, elderly-centred rehabilitation programme	Usual care	Cardiac surgery	CT	Total:224: Intervention: 150, Comparator: 74	Intervention: 74.6(3.6), Comparator: 75(3.9)	Cardiolog-ical rehab unit				x		1
Yanatori 2007,[134] Japan	Fast-Track Recovery Program	ERP	12 day admission pathway. Preoperative education after admission, operation 4 days post admission, admission to ICU for 24 hours post op with food and fluid management	Pre Fast-Track Program	Cardiopulm onary bypass	UBA	Total: 94, Intervention: 54, Comparator: 40	Intervention: 64.8(11.6), Comparator: 66.2(7.4)	General hospital		x		x	x	3
Colorectal surgery															
Andersen 2007,[3] Denmark	Planned hospital stay of 2 vs 3 days	Changing planned LOS	Planned length of stay increased to 3 days	Hospital stay 3 days	Colonic resections	UBA	541 (Intervention: 133, Comparator: 408)	Intervention: 64, Comparator: 66.5	University hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Archibald 2011,[6] USA	Enhanced recovery programme	ERP	Patient education before surgery; fluid management before, during and after surgery; opioid-sparing strategies after surgery; nasal gastric tube removed before extubation and abdominal drains avoided; ambulation once or twice during day of surgery; clear liquids on day of surgery and feeding of POD 2; discharge based on functional criteria rather than specific POD; bowel preparation at surgeon's choice	Historical control	Colonic surgery	UBA	3031 (Intervention: 1358, Comparator: 1673)	Intervention: 61.6(15.8), Comparator: 60.9(15.7)	8 x Commun-ity Hospitals		x	x	x		3
Arroyo 2012,[7] Spain	Enhanced recovery programme	ERP	Information, supplements for malnourished patients, no colon prep, 2 enemas, nutrition/fluid protocol, carbohydrate loading, Enema, antibiotic prophylaxis, prophylaxis for pulmonary thromboembolism, no drainage,	Pre-ERP	Colorectal resection	UBA	501(Interventio n: 300, Comparator: 201)	Intervention: 68.23(13.7), Comparator: 67.68(10.9)	12 centres including General and university hospitals	x	x	x	x	x	5

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			nasogastric tube moved prior to extubation, fluid management, temperature maintenance, early mobilisation and liquid diet, epidural analgesia, paracetamol analgesia, telephone monitoring post discharge												
Basse 2000,[13] Denmark	Clinical Pathway	ERP	2 day stay: early mobilisation, fluids, pain Comparator, catheter removal	Comparator A: Patients with special factors that precluded a 2 day hospital stay identified prior to surgery. Comparator B: Factors precluding 2 day stay identified during surgery	Open colonic resection	CT	Total: 60 Intervention: 53 Comparator A : 4, Comparator B: 3	Total: 74 (Range 33-94)	University hospital				x	x	2
Basse 2004[14] , Denmark	Accelerated rehabilitation	ERP	No premedication, transverse/curved incision, reduced epidural analgesia, NASIDs, early nutrition and mobilisation protocols	Conventional care: premedication, median laparotomy, 3 day continuous epidural analgesia, use of opioids, no standard care protocol	Colonic resection	CT	Total: 260 Intervention: 130, Comparator: 130	Intervention: 72 (Range 33-94), Comparator: 74 (Range 37-92)	Two university hospitals		x	x	x		3
Cakir 2013,[20] Netherlands	ERAS	ERP	Carbohydrate loading, bowel preparation, thoracic epidural analgesia, anti-emetics, vasopressors,	Pre-ERAS pathway	Colonic resection	UBA	Total: 383 (Intervention: 316, Comparator: 67)	Intervention: 71.15(11.48) , Comparator: 71.9(11.1)	Teaching hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			forced body heating, nasogastric tube and epidural removal, no drains, early mobilisation, laxatives, pain management												
Christensen 2011,[27] Denmark	Fast-Track Model	ERP	1 ward dedicated staff, info on ward, if lived alone discharged to patient hotel, avoidance of discharge at weekends, no premedication, catheter management, postoperative pain relief only supplemented with opiates as rescue medication, Kehlet's multimodal recovery nursing programme, laxative, outpatient follow up on POD 9, telephone with nurse at 4 weeks	Normal regimen: 3 wards, all staff. Information provided by all surgeons in outpatient clinic, no schedule, surgery on any day/time, no protocol for incision, premedication, no postoperative programme, no laxative, 3 month follow up in clinic	Open colonic surgery	CT	170(Intervention: 131, Comparator: 39)	Median age Intervention: 66(range 65-72), Comparator: 69(43-91)	University hospital	x	x	x	x	x	5
Ehrlich 2015,[32] Finland	Fast-Track protocol	ERP	Preoperative counselling, oral carbohydrates until 2 h before surgery, I.V. anaesthesia, short	Traditional perioperative care: Open and laparoscopic groups	Colonic resection	UBA	Total: 232 (Intervention1: FT/Lap 73, Intervention 2: FT/Open 43; Comparator 1:	Intervention 1: 62.8(12.2), Comparator 1: 64.1(12.1);	Hospital	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			acting anaesthetic, standardised pain management, discontinuation of intravenous (IV) fluids as soon as possible, early postoperative feeding, removal of urinary catheter on the first postoperative day, and early mobilisation. Set discharge criteria. Those undergoing open surgery technique compared to those undergoing laparoscopic technique				Traditional/Lap 73, Comparator 2: Traditional/Open 43)	Intervention 2: 60.8(12.0), Comparator 2: 61.7(12.9)							
Esteban 2014,[36] Spain	Fast-track postoperative protocol	ERP	preoperative information, no bowel preparation, a high-carbohydrate drink 1 day before and on the morning of the operation, prophylaxis for pulmonary thromboembolism, antibiotic prophylaxis, anaesthesia protocol, goal-directed water and other fluid,	Pre Fast-track programme	Colorectal surgery	UBA	Intervention 1: Lap/FT: 150, Intervention 2: OP/FT: 103, Comparator 1: Lap/CC: 56, Comparator 2: OP/CC: 136	Lap/FT: 68.04(9.9), OP/FT: 66.8(12.5), Lap/CC: 64.79(14), OP/CC: 69.6(13.4)	Multi-centre	x	x	x	x	x	5

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			management, body temperature control during surgery, no drainage or nasogastric tube, early postoperative mobilisation and early oral intake, analgesia protocol, telephone monitoring after discharge, outpatient appointment 10-1 days post-surgery												
Feo 2009,[37] USA	Fast-track postoperative management	ERP	Postoperative epidural analgesia, ambulation	Control group: alternative protocol	Colorectal resection	UBA	100(Intervention: 50, Comparator: 50)	Intervention: 64.16(11.4), Comparator: 67.6(10.4)	University hospital				x		1
Garfinkle 2018,[39] Canada	ERP	ERP	Psychological preparation for surgery, preoperative exercises at home, bowel preparation only if diverting ileostomy, routine epidural catheter, and structured postoperative mobilisation. Those undergoing open surgery technique compared to those undergoing laparoscopic	Conventional care: Open and laparoscopic groups	Rectal surgery	CT	Intervention 1: Lap/ERP: 108, Intervention 2: OP/ERP: 38, Comparator 1: Lap/CC: 34, Comparator 2: OP/CC: 201	Lap/ERP: 62.5(13.2), OP/ERP: 62.8(12.5), Comparator 1: Lap/CC: 60.8(12.0), Comparator 2: OP/CC: 65.8(13.6)	University hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			technique												
Geltzeiler 2014,[40] USA	Enhanced Recovery After Surgery	ERP	preadmission patient education, selective preoperative bowel preparation, limited fasting, loco regional anaesthetic use, conservative peri and intraoperative fluid management, minimized postoperative narcotic use, early resumption of oral intake/ambulation	Pre-ERAS implementation	Colorectal surgery	UBA	244(Intervention 2011: 96, Intervention 2012: 80, Comparator: 68)	Intervention 2011: 60, Intervention 2012: 61, Comparator: 65	Community hospital	x	x	x	x		4
Gouvas 2012,[42] Greece	Fast-Track Protocol	ERP	Information, visit of anaesthetist, reduced fasting, carbohydrate loading, early feeding and mobilisation, catheter removal: open or laparoscopic surgery	Standard care: visited by surgeon and anaesthetist, fasting 16h before surgery, bowel preparation, I.V. fluids and catheter placement at anaesthetist's discretion, no mobilisation protocol, opioid analgesia	Rectal cancer surgery	CT	156: Intervention 1: Open/FT: 36, Comparator 1: Open: 45, Intervention 2: Lap/FT: 42, Comparator: Lap: 33	Median age: Open/FT: 67(Range: 38-85), Open:62(Range35-88), Lap/FT: 64(Range 31-83), Lap: 68(Range 34-85)	Hospital			x	x		2
Huibers 2012,[49] Netherlands	Enhanced Recovery After Surgery	ERP	Pre-surgery prep including normal diet until midnight, no bowel preparation and epidural	Pre-ERAS: admission day before surgery, oral bowel preparation, fasting from midnight, general	Total mesorectal excision for rectal cancer	UBA	76(Intervention :43, Comparator: 33)	Median age Intervention: 66(Range 36-79), Comparator: 64(Range	Hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			catheter. Surgical protocol and postoperative nutrition, early mobilisation and pain control.	anaesthesia, NG tubes used, 1 drain, postop oral intake restricted, I.V. protocol, drain and tube removal at surgeons discretion, solid food as tolerated				27-88)							
Indrakusuma 2015,[50] Netherlands	Comprehensive geriatric assessment	PACP	Comprehensive geriatric assessment aims to preoperatively optimize the patient to improve postoperative outcomes.	Regular treatment: Not referred for geriatric assessment and received regular treatment	Colorectal resection	UBA	Total: 443 (Intervention: 221, Comparator: 222)	Intervention: 77(range 73.5-82), Comparator 77(range 73-81)	Hospital		x				1
Hjort Jakobsen 2004,[47] Denmark	Fast Track Rehabilitation Programme	ERP	Information, early mobilisation and nutrition, catheter removal, discharge planning	Conventional care: no defined nursing care program, fluids or food after, physicians orders, bladder catheter > 2 days, epidural catheter > 4 days, discharge 8–10 days postoperatively	Colonic resection	CT	Total: 60, Intervention: 30, Comparator: 30	Intervention: 72(NR) Comparator: 72(NR)	University hospital	x	x	x	x		4
Jakobsen 2006,[51] Denmark	Fast track rehabilitation	ERP	Information, early mobilisation and nutrition, catheter removal, discharge planning	Conventional care: no well-defined criteria for use of nasogastric tubes, mobilisation and oral fluid and nutrition or planned hospital stay	Colon surgery	CT	Total: 160, Intervention: 80, Comparator: 80	Intervention: 68(NR), Comparator: 69(NR)	University hospital	x	x		x		3
Keane 2012,[56] New Zealand	Enhanced Recovery After Surgery	ERP	Information, carbohydrate loading, bowel preparation, oral fluids, coughing	Conventional care: patients managed according to the individual surgeon's practice and the	Colonic or rectal surgery	CT	240(Intervention: 80, Comparator: 160)	Median age intervention: 67.8(range 31-86.1), Comparator,	University hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			exercises, discharge planning, mobilisation and nutrition management. Social work/OT assessment	policies of the Canterbury District Health Board				69.5(range 26.5-98.3)							
Lee 2015,[64] Canada	Enhanced Recovery Pathway	ERP	Counselling, education, pre-op physical exercises, carbohydrate loading, no pre op sedation, fluid management, early mobilisation, catheter removal, analgesia	Conventional care: medical optimization, no formal education or preoperative exercise instructions, no bowel prep or sedation protocols, no structured mobilisation, thoracic epidural analgesia or PCA. Use of opioids	Colorectal resection	CT	Total: 190 Intervention: 95, Control: 95	Intervention: 63.9(13.1), Comparator: 61.6(13.4)	University hospital	x	x	x	x		4
Li 2013,[65] Canada	Trimodal prehabilitation program	ERP	Exercise, nutritional counselling, protein supplementation and anxiety reduction	Pre-implementation of prehabilitation program	Colorectal surgery	UBA	87 (Intervention: 42, Comparator: 45)	66.88(11.54) Intervention: 67.11 (11), Comparator: 66.4 (12)	University health centre	x					1
Martin 2016,[72] USA	Enhanced Recovery Pathway	ERP	Education, bowel preparation, carbohydrate loading anaesthetic protocol, Thromboembolism prophylaxis, Pain management protocol, prevention of	Pre-Enhanced Recovery Pathway	Colorectal surgery	UBA	1036(Intervention: 513, Comparator: 523)	Median age Intervention: 63(IQR: 53-72), Comparator: 63(IQR: 52-72)	Academic non-university hospital	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			nausea, Fluid protocol, Catheter management, Early postoperative feeding and mobilisation												
Melbert 2002,[75] USA	Critical Pathway	ERP	Guidelines for staff to follow when patients admitted to hospital. How and when to give patient education, forms to complete, hospital systems to put in place	No critical care pathway	Abdominal colon or rectal surgery	CT	Total: 385, Intervention: 263, Comparator: 122	Total median age: 67(range 19-99), Intervention median age: 68(range 19-94), Comparator: 66(range 22-99)	General hospital	x	x	x	x		4
Mohn 2009,[76] Norway	Enhanced Recovery After Surgery	ERP	Information, discharge planning with local healthcare system, normal diet and nutritional supplement, fluid management, preoperative enema, antibiotic prophylaxis, no preanaesthetic medication, I.V. fluid management, early mobilisation, fluid, nutrition and pain management, physical activity questionnaire and clinical follow up	Traditional recovery	Colorectal surgery	UBA	247(Intervention: 94, Comparator: 153)	Median age Intervention: 66(Range 19-90), Comparator; 71(Range 15-90)	University hospital	x	x	x	x	x	5

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Nelson 2016[82]; Nelson 2016,[81] Canada	Enhanced Recovery After Surgery	ERP	Information, bowel preparation, carbohydrate loading, pre-medication, thrombosis/antibiotic prophylaxis, Surgical protocol, oral and I.V. fluid management, postoperative nutrition and mobilisation, 30 day follow up	Pre-ERAS Pathway	Colorectal surgery	UBA	1331(Intervention: 981, Comparator: 350)	Intervention: 64, Comparator: 62	6 x hospitals	x	x	x	x	x	5
Nygren 2005,[85] Denmark/ Norway/ Netherlands/ UK	Fast-Track Perioperative Care	ERP	Varied across different sites	Conventional care	Colorectal surgery	CT	451(Intervention: 118, Comparator: 333)	Total: 69(13)	Five surgical unit in university centres in Norway, UK, Sweden, Denmark, Netherlands		x	x	x		3
Nygren 2009,[86] Sweden	Enhanced Recovery Protocol	ERP	Education, avoidance of systemic opioid analgesia, immediate food intake, oral nutritional supplements until discharge, immediate postoperative mobilisation	Pre ERP: no education, bowel preparation, no laxative, use of opioids, delayed nutrition and mobilisation	Colorectal resection	UBA	168(Intervention: 99, Comparator, 69)	Intervention: 65(SEM 1), Comparator: 65(SEM 2)	Hospital	x			x		2

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Ota 2017,[92] Japan	Enhanced Recovery After Surgery Programme	ERP	Perioperative routines included 'as many as possible' of: Preoperative patient education and carbohydrate loading. Epidural block for 72h postoperatively. Discontinuation of IV fluids from POD 1. Avoidance of sodium overload. Postoperative fluid management and nasogastric drainage. Antimicrobial and antithrombotic prophylaxis. Routine postoperative laxative. Avoidance of systematic analgesia. Gum chewing. Early food intake from POD 1. Oral nutritional supplements until discharge. Postoperative mobilisation from POD 1. Defined discharge criteria	Conventional care: Routine perioperative care performed at surgeon's discretion.	Colon surgery	CT	Total: 320 (Intervention: 159, Comparator: 161)	Median Age: Intervention: 69(range 26-92), Comparator: 68(range 29-94)	6 x Hospitals		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Pedziwlatr 2016,[99] Poland	Enhanced Recovery After Surgery Programme	ERP	ERAS programme includes pre-admission education and exercise, no bowel preparation, clear fluids up to 2h before surgery, laparoscopic surgery, early mobilisation, set criteria for discharge, and telephone calls following discharge	Historical Control Group: Group 1: laparoscopic resection with traditional perioperative care, Group 2: Open resection with traditional care	Laparoscopic colorectal surgery	UBA	Total: 99 (Intervention: 33, Comparator 1: 33, Comparator 2: 33)	Intervention: 66.2(11.7), Comparator 1: 64(11.4) Comparator 2: 65.8(10.9)	University hospital	x	x	x	x	x	5
Pellegrino 2013,[100] Belgium	Fast-Track Surgery	ERP	Information, assessment, counselling, no special diet or bowel preparation, premedication, reduced preoperative fasting, carbohydrate loading, surgical protocol, thrombosis prophylaxis, peri and post-operative I.V. fluid management, oral fluid and nutrition protocol, oxygen, early mobilisation, follow up visit 8 days post discharge	Conventional Care: feeding after bowel movements, NG tube removal on POD1, PCA, use of opiates	Colon surgery	UBA	243(Intervention; 124, Comparator: 119)	Total: 60.2(12.27) (Intervention: 58.5(11.1), Comparator: 61.6(13.2))	University hospital	x	x	x	x	x	5

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Poon 2011,[102] Hong Kong	Enhanced Recovery Program	ERP	Case manager, bowel preparation, postoperative nutrition and fluid protocol, catheter protocol and early mobilisation, discharge planning	Pre ERP: Patient management was directed by surgeon in-charge during the ward round. No nutrition, drain, catheter protocols or criteria for discharge	Laparoscopic colectomy	UBA	180(Intervention: 96, Comparator: 84)	Intervention: 71.4(10), Comparator: 69.6(13)	University hospital		x	x	x		3
Raue 2004,[104] Germany	Fast-track multimodal rehabilitation programme	ERP	Epidural analgesia, early oral feeding, enforced mobilisation. 3 day pathway	Standard-care: thoracic combined epidural, feeding POD2, use of opioids, mobilisation in bed POD1.	Laparoscopic sigmoidectomy	CT	Total: 52, Intervention: 23, Comparator: 29	Intervention: 63(range 32-76), Comparator: 65(38-86)	University hospital		x	x	x	x	4
Roulin 2013,[107] Switzerland	Enhanced Recovery Protocol	ERP	preoperative counselling, reduced preoperative fasting, preoperative carbohydrate loading, avoidance of premedication, optimized fluid balance, standardized postoperative analgesia, use of a no-drain policy, early nutrition and mobilisation	Standard care: no standardised information, fasting from midnight, no carbohydrate loading, premedication, no standardised post op analgesia, use of drains at surgeons discretion, no nutrition or mobilisation protocol	Colorectal surgery	UBA	100(Intervention: 50, Comparator: 50)	Intervention: 65(17.9), Comparator: 65(13.6)	University hospital	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Salvans 2013,[110] Spain	Multimodal rehabilitation programme	ERP	Multimodal rehabilitation programme includes preoperative education, liquids and solids up to 6h before surgery, pain management during surgery, diet resumed 6h post-surgery, and early mobilisation encouraged	Conventional perioperative care: oral communication by surgeon only, colon preparation, fasting night before surgery. Fluid therapy at discretion of anaesthesiologist, diet resumed at surgeons discretion	Colorectal surgery	UBA	Total: 365 (Intervention: 231, Comparator: 134)	Intervention: 68.8(12), 70.4(11)	University hospital		x	x	x		3
Sammour 2010,[111] New Zealand	Programme of ERAS	ERP	Structured nursing care pathways. ERAS pathway	Pre-ERAS pathway	Colonic resections	UBA	Total: 100, Intervention: 50, Comparator: 50	Intervention: 65.6(range 39-92), Comparator: 70.7 (range 40-85)	Surgical centre	x	x	x	x	x	5
Stephen 2003,[116] USA	Accelerated Clinical Care Pathway	ERP	Perioperative recovery programme	Pre-Pathway: NG removal following flatus, discharged after bowel movement	Open, large bowel resections	UBA	Total: 138, Intervention: 86, Comparator: 52	Intervention: 62(14), Comparator: 69(13)	General hospital	x	x	x	x	x	5
Teeuwen 2011,[121] Netherlands	Enhanced Recovery After Surgery	ERP	Preoperative education, carbohydrate loading, thoracic epidural anaesthesia, restricted fluid regimen. Nasogastric tubes removed after surgery I.V. fluid protocol, resumption of oral fluid resumed on day of surgery,	Conventional Care: traditional perioperative care according to surgeon's preference	Rectal surgery	UBA	123(Intervention: 41, Comparator: 82)	Intervention: 66.41(11.62), Comparator, 63.39(11.4)	University medical centre		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			normal diet as soon as tolerated. mobilisation from day of surgery, patient controlled analgesia, opioid analgesics as escape analgesia only												
Thanh 2016,[122] Canada	ERAS	ERP	Perioperative recovery programme	Pre ERAS	Colorectal surgery	UBA	Total: 1626, Intervention: 1295, Comparator: 331	Intervention: 61.1(14.8), Comparator: 61.6(13.8)	6 x Hospitals						0
Vignali 2016,[128] Italy	ERAS pathway	ERP	Preoperative counselling, bowel preparation, fluids 2h before surgery, standardised pain management, tube removal at end of surgery, standardised early mobilisation and set discharge criteria	Traditional care: No preoperative counselling, laxative, fasting from midnight day before surgery, no standardized fluid restriction, PCA, no systemic use of epidural or restriction of opioids, no nausea and vomiting prevention, drains at surgeon discretion, mobilisation POD1, no standardized discharge	Laparoscopic rectal resection	UBA	Total: 297 (Intervention: 162, Comparator: 135)	Intervention: 64.4 (range 26-92), Comparator: 65 (range 28-93)	University hospital		x	x	x		3
Wichmann 2007,[130] Germany	Fast-track Rehabilitation	ERP	No bowel prep, postoperative mobilisation and oral food intake	Conventional Care	Colorectal surgery	CT	Total: 40, Intervention: 20, Comparator: 20	Total 60.4 (2.05). Intervention 59.7 (1.5); Comparator 61.1 (2.6)	General hospital	x	x		x	x	4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Zargar-Shoshtari 2008,[137] New Zealand	Fast-Track Surgery	ERP	Information, social issues assessed, preoperative ward visit, carbohydrate loading, admitted on morning of surgery, no bowel preparation, limited intraoperative I.V. fluids, prophylactic nasogastric tubes not used, early mobilisation, catheter removal and nutrition, epidural infusion stopped POD2, opioid analgesic only used for breakthrough pain, discharge information, contacted by nursing staff 3/4 days post discharge. Outpatient clinic follow up within one week	Pre Fast-Track: conventional, non-structured perioperative care. Discharge at discretion of senior team members. No specified discharge criteria	Colonic surgery	UBA	100(Intervention: 50, Comparator: 50)	Intervention: 65.6(Range 39-93), Comparator: 70.7(Range 40-85)	Surgical centre	x	x	x	x	x	5
Zargar-Shoshtari 2009,[138] New Zealand	Fast-Track Surgery	ERP	Information, social issues assessed, preoperative ward visit, carbohydrate loading, admitted on morning of surgery, no bowel	Conventional Care: Admitted 1 d prior to their operation, no standardized protocols for anaesthesia, operation, or PO care	Colonic surgery	CT	52(Intervention: 26, Comparator: 26)	Median age Intervention: 66(Range 37-92), Comparator: 74(Range 45-88)	Surgical centre	x	x	x	x	x	5

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			preparation, limited intraoperative I.V. fluids, prophylactic nasogastric tubes not used, early mobilisation, catheter removal and nutrition, epidural infusion stopped POD2, opioid analgesic only used for breakthrough pain, discharge information, contacted by nursing staff 3/4 days post discharge. Outpatient clinic follow up within one week											
Lower limb arthroplasty															
Alvis 2017,[2] USA	anaesthesia Perioperative care service	ERP	Perioperative care service designed to complement ERAS pathway. Coordination of care from decision to operate until follow-up	Pre-Perioperative care service	Total knee and hip arthroplasty	UBA	Total: 234 (Intervention: 136, Comparator: 98)	Intervention: 61(12.4), Comparator: 62(10.5)	Veteran affairs hospital	x	x	x	x	x	5
Arana 2017,[5] USA	Outcomes manager-led inter-professional team	MDT working	Inter-professional team led by outcomes manager who oversees team. Clearly defined professional roles,	Pre-implementation of inter-professional team	Total knee and hip arthroplasty	UBA	Total: 603 (Intervention: 330, Comparator: 273)	Intervention: 66.9(8.6), Comparator: 69(9.6)	Hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			leadership support and onsite physician champion. Manager identifies gaps in care to enhance operational improvements												
Auyong 2015,[8] USA	ERAS	ERP	Perioperative recovery programme: education, identified care companion, short acting spinal or general anaesthesia, standardised I.V. fluids, 48h adductor canal block, early mobilisation, standardised analgesics	Standardized ERAS pathway including femoral nerve block: optional education, no specific care companion, no anti-emetics, long acting spinal or general anaesthetic, no standardized steroids, no standardized I.V. fluids, Intermittent femoral nerve block, no standardisation of analgesics, mobilisation POD1	Total knee arthroplasty	UBA	Total: 252, Intervention: 126, Comparator: 126	Intervention: 66.02 (10.02), Comparator: 68.44 (9.98)	Hospital/ medical centre	x	x	x	x		4
Barber 2017,[12] USA	Simplified Care Pathway	ERP	MDT organized to define, design and implement programme. . Primary drivers: early activity and avoidance of continuous urinary catheter	Pre-pathway	Total Knee Arthroplasty	UBA	Total: 5095, Intervention: 3417, Comparator: 1678	Total: 67.34(12.14)	16 x hospitals (ranging from critical access facility to trauma centres)		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Batsis 2008,[15] USA	Specialty Orthopaedic Surgery Units	Specialist Ward	General care nursing unit where patients receive all their postoperative care. Multidisciplinary staff with orthopaedic expertise	Admitted to non-orthopaedic nursing units	Total knee arthroplasty	CT	5534(Intervention: 5082, Comparator: 452)	Intervention: 68.3(10.75), Comparator: 67.9(11.5)	Hospital				x		1
Brunenberg 2005,[19] Netherlands	Joint recovery program	ERP	Pre-assessment screening approximately 6 weeks before operation including anamnesis and blood samples, physical examination and x-rays. Also, home situation and post discharge care needs were analysed. Patient education took place 1 to 2 weeks preoperatively. Group based rehabilitation after operation and supervision by nurses and physiotherapists for duration of admission	Usual Care	Joint replacement	UBA	Total: 160 (Intervention: 78, Comparator: 82)	Intervention: 63.96(10.7), Comparator: 64.83(12.81)	University hospital	x	x		x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Christelis 2015,[26] Australia	ERAS	ERP	Counselling, preadmission review, minimal fasting, carbohydrate loading, no premedication, pre-emptive analgesia, spinal anaesthesia, minimal intravenous morphine intraoperatively, I.V. fluid restriction, antiemetic's, multimodal oral analgesia, carbohydrate supplementation, early mobilisation	Existing practice	Hip or knee arthroplasty	UBA	Total: 709, Intervention: 297, Comparator: 412	Intervention: 67(10), Comparator: 68(11)	3 x Hospitals	x	x	x	x	x	5
Cullen 2012,[29] New Zealand	Incentive based	Incentive based	Surgery at a new site with a clinically-led care plan, with staff who are incentive based. The participating surgeons and anaesthetists were responsible for increasing surgical throughput. No junior staff.	NR	Hip and knee replacement	CT	Total: 335 (Intervention: 170, Comparator: 165)	Intervention: 64.2(range 25-92), Comparator: 66.18(range 36-85)	Hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Duplantier 2016,[31] USA	Hospitalist Comanagement Model	MDT working	Postoperative comanagement: students, residents, fellows, nurse practitioners and physician assistants help coordinate care.	Non-hospitalist management model	Total hip or knee arthroplasty	CT	2975(Intervention: 1656, Comparator: 1319)	Intervention: 64.3(11.5), Comparator: 64.4(11.5)	Teaching hospital				x		1
Galbraith 2017,[38] Ireland	Enhanced recovery programme	ERP	MDT assessment, education, admitted on day or surgery, orthopaedic ward, preoperative pain protocol, drains not used, early mobilisation and oral analgesia	Pre enhanced recovery programme: admission day before surgery, education, assessment, spinal or general anaesthesia, analgesics according to patient need, opioids commonly used, physiotherapy from POD1	Total hip or knee arthroplasty	UBA	Total: 310, Intervention: 165, Comparator: 145	Intervention: 66.1(10), Comparator: 69.61(10.62)	Acute public hospitals database	x	x	x	x		4
Glassou 2014,[41] Denmark	Fast-Track Program	ERP	preoperative information, spinal anaesthesia, local infiltration analgesia, plans for fluid therapy, small standard incisions, blood-sparing strategies, no drains, compression bandages, and cooling; of deep venous thrombosis prophylaxis starting 6–8 h postoperatively and continuing	National comparison cohort: all other orthopaedic departments. Fast-track treatment used, but not so systematically	Total hip or knee arthroplasty	CT	79098(Intervention: 17,284, Comparator: 61, 814)	2005-2007 cohort: Intervention: 69(10), Comparator: 69(10), 2008-2009 cohort: Intervention: 68(10), Comparator: 69(10), 2010-2011 cohort: Intervention: 69(10), Comparator: 69(9).	6 x ortho-paedic departments. Compared to national database	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			until discharge, multimodal opioid-sparing analgesia, mobilisation 2-4 h postoperatively												
Gwynne-Jones 2017,[43] New Zealand	Enhanced Recovery After Surgery	ERP	Early identification/treatment of preoperative anaemia, preoperative health questionnaires to patients/GPs, weekly preoperative education class, written information, streamlined preadmission process, day of surgery admission, standardized anaesthetic and analgesia guidelines, intraoperative local anaesthetic infiltration, perioperative blood management algorithm, day of surgery	Historical cohort pre-ERAS pathway	Hip or knee replacement	UBA	632(Intervention: 318, Comparator: 314)	Intervention: 68.3(11.8), Comparator: 66.8(11.8)	Hospital	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			mobilisation, nurse and physiotherapy led discharge criteria												
Hansen 2012,[44] Denmark	Preoperative screening (as part of fast-track programme)	PACP	Preoperative screening (which took place as part of 'motivational conversation' with a nurse) identified any risk factors, which were addressed by an appropriate intervention ranging from providing information to referral to dietician	Control group: no formal preoperative screening, no intervention during period between decision to operate and surgery	Hip and knee arthroplasty	UBA	Total: 132 (Intervention: 78, Comparator: 54)	Intervention: 68(11.0), Comparator: 69(9.0)	Hospital		x				1
Healy 2002,[45] USA	Clinical pathway and knee standardisation program	ERP	Multidisciplinary team based approach. Pathway begins when decision made to operate, continues throughout acute-care and includes rehabilitation and physical therapy. Standardisation program aims to reduce variation in implant selection and cost for hospital and uses a patient-type scoring system to evaluate expected	No clinical pathway or knee-implant standardisation program	Total knee arthroplasty	UBA	Total: 159 (Intervention: 103, Comparator: 56)	Intervention: 69.53 (range 46-91), Comparator: 70.66(range 45-88)	Clinic medical centre	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			demand that patients will place on their knee implants after surgery.												
Ho 2007,[48] USA	Critical pathways	ERP	Standardisation of surgical techniques and post-op management	Comparator: no uniform criteria for implant selection, vendor choice, surgical techniques or postoperative management protocols	Total knee replacement	CT	Total: 90, Intervention 1: 30, Intervention 2: 30, Comparator: 30	Intervention 1: 67(NR), Intervention 2: 66(NR), Comparator: 68(NR)	Teaching hospital			x	x		2
Krummenauer 2011,[60] Germany	Interdisciplinary Clinical Pathway	ERP	Patients invited to information session with surgeon 1 month before surgery. Pre-surgery education with physiotherapist about post-operative care. Hospitalisation day of surgery unless patient lives far away in which case hospitalisation day before surgery. Same team used throughout day for all aspects of operation. Post-surgical rehabilitation in patient room	Pre-pathway	Total knee arthroplasty	UBA	Total: 260 (Intervention: 128, Comparator: 132)	Median age: Intervention (without briefing): 69(range 46-85), Intervention (with briefing): 70(range 53-80), Comparator: 68(range 43-88)	University hospital	x		x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Larsen 2008,[61] Denmark	Accelerated perioperative care and rehabilitation	ERP	Perioperative recovery programme: education, hospitalization day of surgery, case management, ward integration, early mobilisation, nutrition, fluid management	Standard care: no information day, hospitalised day before surgery, different nurses in charge, rehab by physiotherapists, mobilisation on POD1	Hip Arthroplasty	UBA	Total 98 Intervention: 50, Comparator: 48	Intervention: 65(9.6), Comparator: 67(9.8)	Regional hospital	x			x		2
Larsen 2008,[62] Denmark	Accelerated perioperative care and rehabilitation	ERP	Perioperative care and rehabilitation programme: changes in multi-disciplinary organization, preoperative assessment and information, optimization of oral nutrition from increased protein and fluid consumption, early mobilisation	Pre-accelerated program: nutrition screening, standard pain relief and nausea control, mobilisation from POD1	Hip or knee arthroplasty	UBA	Total: 247, Intervention: 142, Comparator: 105	NR	Regional hospital		x	x	x		3
Lin 2002[68], Taiwan	Clinical pathway	ERP	Perioperative clinical pathway including nursing assessment, pain management, nutrition, activity, education and discharge planning	Pre-clinical pathway	Total knee arthroplasty	UBA	Total: 114 (Intervention: 61, Comparator: 53)	Intervention: 70(6.6), Comparator 67.7(5.7)	University hospital		x	x	x		3
Lin 2011,[67] Taiwan	Care Mapping	Case Manager	Continuous patient care including during enrolment, hospitalisation period and follow up service post-	Control group: cared for using a clinical pathway with no case managers	Total knee replacement	CT	Total: 83 (Intervention: 39, Comparator: 44)	Overall: 72.73(8.42)	University hospital		x	x	x	x	4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			discharge. Cared for by primary nurse using a case map. Responsibilities of case managers included: education, coordination, service monitoring and follow up												
Loftus 2014,[69] USA	Simplified pathway	ERP	Two key drivers: early activity and avoidance of continuous urinary catheters	Pre-pathway	Total knee arthroplasty	UBA	Total: 6154, Intervention: 2925, Comparator 3229	Intervention: 68.01(9.90), Comparator: 68.26(10.02)	16 Hospitals				x		1
Oldmeadow 2004,[88] Australia	Targeted postoperative care	PACP	Pre-op assessment to gauge risk of extended rehab, providing additional rehab for mid-risk patients	Pre-Pathway	Hip or knee arthroplasty	UBA	Total: 100, Intervention: 50, Comparator: 50	Intervention: 66.7(10.7), Comparator: 69.9(8.7)	University teaching hospital	x			x		2
Olsson 2014,[90]; 2016,[89] Sweden	Person-centred care	Care planning	Develop patient-clinician 'partnership' to produce individualised care plan	Conventional care: assessment, information	Total hip arthroplasty	UBA	Total: 266, Intervention: 128, Comparator: 138	Intervention: 68(12), Comparator: 66(13.9)	1 x County hospital, 1 x university hospital	x					1
Pape 2013,[95] Denmark	Inter-professional collaboration	MDT working	Daily inter-professional meetings with equal joint decision making between professions, task assignment and common goal	Before inter-professional meeting: Groups of nursing staff, with nurse coordinator who assigned tasks to group members. Nurse accompanied surgeon on	Hip and knee surgery	UBA	Total: 163 (Intervention: 88, Comparator: 75)	Intervention: 67(10), Comparator: 69(10)	Teaching hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			settings for patient care	unscheduled ward round and contributed towards joint management plan. This management plan used by other professionals to inform patient care											
Pearson 2000,[96] Australia	Clinical pathway management	ERP	Early discharge planning at preadmission clinic, 8 day postoperative length of stay, 4 days on acute ward, 4 day in convalescent unit. Structured home-based physiotherapy	Pre-pathway	Total knee arthroplasty	UBA	177(Intervention: 119, Comparator: 58)	71.11(7.6) Intervention: 71.4(8.2), Comparator: 70.5(6.5)	Teaching hospital	x		x		x	3
Raphael 2011,[103] Canada	Fast-Track Program	ERP	Preoperative patient education, postoperative multimodal analgesia with periarticular injections, early physiotherapy and rehabilitation, and discharge home with an outpatient rehabilitation program	Standard program: limited education, no LOS plan, minimal discharge planning, no standardized pre-emptive/postop multimodal analgesia, physiotherapy as tolerated	Total joint arthroplasty	UBA	200(Intervention: 100, Comparator: 100)	Intervention: 65(9), Comparator: 69(8)	University hospital		x	x	x	x	4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Renkawitz 2010,[105] Germany	Accelerated Clinical Pathway	ERP	Patient-controlled regional analgesia pumps, ultra-early/doubled physiotherapy and motor-driven continuous passive motion machine units	Standard accelerated clinical pathway	Total knee replacement	CT	143(Intervention: 67, Comparator: 76)	Intervention: 67(9), Comparator: 68.1(11.1)	University medical centre				x		1
Stowers 2016,[117] New Zealand	Enhanced Recovery Protocol	ERP	THA and TKA arthroplasty specific ERAS protocol	Traditional Perioperative Care: determined by surgeons/anaesthetists using existing protocols	Hip or knee arthroplasty	UBA	200(Intervention: 100, Comparator: 100)	Intervention: 66.7(9.2), Comparator: 65.4(12.5)	Surgery centre/ satellite hospital						
Talatzko 2014,[119] USA	Comprehensive facility-wide approach	ERP	All TKA and THA performed on same day of week. Required additional staffing. Introduction of a "Joint Camp": Preoperative education, specialist equipment, calf compression, early ambulation, postoperative education and training, group physical therapy sessions	Historical Control	Total hip arthroplasty/ Total Knee arthroplasty	UBA	Total: 1087(Intervention year 2008: 289, Intervention year 2009: 282, Intervention year 2009: 282, Comparator: 238)	Intervention year 2008: 67.14 (range 37-92), Intervention year 2009: 67.25 (range 31-93), Intervention year 2010: 67.23 (range 32-93); Comparator: 67.49(range 29-90)	Hospital	x		x	x		3
Thomas 2003,[123] Australia	Early discharge programme	ERP	Case management model of care using clinical pathways used by	Pre-Pathway	Hip/knee arthroplasty	UBA	Total: 246, Intervention: 215 Comparator: 31	Intervention: Average age knee arthroplasty:	General hospital	x	x		x	x	4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			physiotherapists working on an orthopaedic ward. Physiotherapy programme of care					69(10), Average age hip arthroplasty; 67(12), Comparator: Average age knee arthroplasty 68(NR), average age hip arthroplasty 67(NR)							
Vanhaecht 2005,[126] Belgium	Clinical pathway	ERP	Perioperative recovery programme	Pre-Pathway	Total knee arthroplasty	ITS	Total: 103, First version intervention: 32, Second version intervention: 45, Comparator: 26	First version intervention: 66.8(11.24), Second version intervention: 64.5(9.76), Comparator: 69.3(9.43)	University hospital		x	x	x		3
Walter 2007,[129] USA	Clinical pathways	ERP	Multidisciplinary perioperative pathway with daily goals	Pre-Pathway	Total knee or hip arthroplasty	UBA	Total: 1680, Intervention years: average 455/year, Comparator: 315	Mean ages reported according to surgical volume by surgeons: see Table 1.	Community based teaching hospital		x	x	x		3

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										PA	PT	DT	AT	AH	
Wilches 2017,[131] Spain	Fast track Recovery Technique	ERP	Extended preoperative information, multimodal pain management during and after surgery, early mobilisation	Conventional Recovery: Limited preoperative education, standard pre-anaesthesia visit, epidural anaesthesia with opiate with sedation, pain management includes opiate, POD1-2: bed rest	Primary total hip and knee replacement	UBA	Total: 200 (Intervention: 100, Comparator: 100)	Intervention: 69.24(9.64), Comparator: 73.07(8.33)	Hospital		x	x	x		3
Pelvic surgery															
Abou-Haidar 2014,[1] Canada	Enhanced recovery pathway	ERP	Patient met with nurse before surgery, information, medical optimisation, planned criteria-based discharge	Pre-pathway	Radical prostatectomy	UBA	Total: 199 Intervention: 99 Comparator: 100	Intervention: 61.8 (5.1), Comparator: 62.5 (6.31)	Teaching hospital	x	x	x	x	x	5
Baack Kukreja 2017,[10] USA	Enhanced recovery	ERP	Preoperative, counselling, assessment/Optimization, Carbohydrate loading, probiotics, bowel prep, prophylaxis, maintenance of normothermia, local anaesthesia, Pain management, prevention of N/V, no routine NG	Non-ER group	Radical cystectomy	UBA	Total: 200, Intervention: 79, Comparator: 121	Median age Intervention: 70.6 (Range 65.2-77.7), Comparator: 69.5 (Range 61.9-77.0)	University hospital	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			tubes, no bowel regimen												
Brodner 2001,[18] Germany	Multimodal perioperative management	ERP	Only post-op care differs between two groups: thoracic epidural analgesia, early mobilisation, oral nutrition	Comparator 1 and 2: Routine postoperative care, IV nutrition and mobilisation from POD1	Radical cystectomy	CT	Total: 45, Comparator 1: 15, Comparator 2: 15, Intervention: 15	Intervention: 62 (9.0), Comparator 1: 59 (13.5), Comparator 2: 63 (8.8)	University hospital				x		1
Cerruto 2014,[21] Italy	Tailored Enhanced Recovery Protocol	ERP	Reduction of postoperative nausea and vomiting, the implementation of postoperative pain control, early enteral feeding and mobilisation as tolerated soon after RC, and early hospital discharge.	Pre-ERP pathway	Radical cystectomy and intestinal urinary diversion with Vescica Ileale Padovana neobladder	UBA	22(Intervention: 9, Comparator: 13)	Intervention: 61.22(10.63), Comparator: 67.08(5.47)	University hospital				x		1
Collins 2016,[28] Sweden	ERP	ERP	Outpatient assessment, medical optimization, no bowel prep, carbohydrate	Before ERP	Robot-assisted radical cystectomy	UBA	Total: 221, Intervention 135, Comparator: 86	Intervention: 70 (63-74), Comparator: 66 (59-71)	University hospital	x	x	x	x	x	5

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			loading, reduced fasting, no long-acting sedatives, anaesthetic protocol, prophylaxis, fluid management, early nutrition and mobilisation, telephone follow up												
Nabhani 2016,[79] USA	ERAS	ERP	Preoperative education, carbohydrate loading, no bowel preparation, no epidural, opioid sparing anaesthesia, no NG tube, nausea management, pain/nutrition protocols, home intravenous hydration	Standard protocol	Radical Cystectomy	UBA	Total: 201(Intervention: 102, Comparator: 99)	Intervention: 68.8(NR), Comparator: 69.2(NR)	University hospital		x	x	x	x	4
Marx 2006,[74] Denmark	Accelerated rehabilitation	ERP	Fast-track, multi-modal rehabilitation: bowel prep, no sedatives, pain management protocol, anaesthesia protocol, PONV prophylaxis, antibiotic protocol, nutrition, laxative and mobilisation protocol	Conventional care: premedication, bowel prep, no PONV, antibiotics at surgeon discretion, epidural analgesia, use of opiates, no nutrition, laxative or mobilisation protocol	Surgery for ovarian malignancy	UBA	Total: 123, Intervention: 69, Comparator: 72	Median age intervention: 61(range 38-85), Median age control: 62(31-87)	University hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Nagata 2007,[80] Japan	Clinical pathway	ERP	Perioperative recovery programme	Non Clinical-Path	Transurethral resection of the prostate	UBA	Total: 216, Intervention: 148, Comparator: 68	Intervention: 75.8(range 58-86), Comparator: 76.3(range 58-91)	General hospital		x	x	x		3
Okamura 2013,[87] Japan	Clinical pathway	ERP	Varied across different sites	Pre-Pathway	Radical prostatectomy	UBA	Total: 2610, Intervention: 1256, Comparator: 1354	Intervention: 67.5(5.8), Comparator: 67.1(5.8)	Fifty hospitals	x	x	x	x		4
Persson 2015,[101] Sweden	ERAS	ERP	Perioperative recovery programme	Pre-ERAS Pathway	Open radical cystectomy	UBA	Total: 70, Intervention: 31, Comparator: 39	Intervention: 67(range 42-80), Comparator: 66(range 53-80)	University hospital	x	x	x	x	x	5
Rivas 2017,[106] Spain	Enhanced Recovery After Surgery	ERP	Preadmission counselling, fluid and carbohydrate loading, no prolonged fasting or bowel preparation, antibiotic prophylaxis, Thromboprophylaxis, Intraoperative protocol, postoperative: no nasogastric tube, no parenteral nutrition, early oral nutrition and mobilisation, chewing gum, avoidance of	Pre-ERAS	Laparoscopic radical cystectomy	UBA	47(Intervention: 19, Comparator: 28)	Median age Intervention: 64.22(11.058), Comparator: 65.82(10.39)	University hospital	x	x	x	x		4

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			opioid analgesia												
Saar 2012,[108] Germany	Fast-track Rehabilitation	ERP	Perioperative care plan. Early nutrition, early mobilisation. Omission of bowel preparation, preoperative fasting and nasogastric/abdominal drains post-surgery.	No Fast-Track: Admission 2 days prior to surgery, fasting from evening before surgery, bowel prep, drains, fluids as tolerated, mobilisation POD0	Robot-assisted laparoscopic cystectomy	CT	Total: 62: Intervention: 31, Comparator: 31	Intervention: 67.2(10.2)(Median 69), Comparator: 61.6(12.6) (Median 62)	Robotic centre (Homburg/ Saar)	x	x	x	x		4
Sugi 2017,[118] Japan	Enhanced Recovery After Surgery Protocol	ERP	Altered bowel prep protocol, Reduced fasting, restricted intraoperative I.V. fluid	Conventional care: Bowel preparation, fasting, liberal I.V. fluid protocol, analgesia on demand	Laparoscopic radical prostatectomy	UBA	198(Intervention: 75, Comparator: 123)	Median age Intervention: 68(Range 49-75), Comparator: 69(Range 45-76)	University hospital		x				1
Thoracic surgery															
Hennon 2011,[46] USA	Acuity adaptable patient care unit	Specialist Ward	27 large rooms adaptable to patient acuity to improve post-op care	Traditional care pre-care unit	Major pulmonary resection	UBA	Total: 488, Intervention: 319, Comparator 169	Intervention: 63.2(NR), Comparator: 64.4(NR)	University hospital				x		1
Marcantuono 2015,[71] USA	Fast track protocol	ERP	Fast-track trans catheter aortic valve replacement protocols used at two sites	Patients who were ineligible for fast track treatment	Trans femoral trans catheter aortic valve replacement	CT	Total: 99 (Intervention: 39, Comparator: 60)	Intervention: 84.59(5.72), Comparator: 83(4.29)	2 x University hospitals		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
Maruyama 2006,[73] Japan	Clinical pathway	ERP	Post-op recovery pathway: chest tube, oxygen support, antibiotic, nutrition/ambulation/catheter/ I.V. infusion protocols	Pre-Pathway	Laparoscopic pulmonary resection	UBA	Total: 218, Intervention: 113, Comparator: 105	Intervention: Median age 63(range 17-84), Comparator: Median age 64(range 15-83)	Cancer centre				x		1
Paci 2017,[94] Canada	ERP	ERP	Enhanced recovery programme includes standardised preoperative education, standardised drain management and nutrition, and early mobilisation	Conventional care based on surgeon preference	Lung resection	UBA	Total: 133 (Intervention: 75, Comparator: 58)	Intervention: 65(13), Comparator: 62(12)	University hospital		x	x	x		3
Salati 2012,[109] Italy	Fast-tracking program	ERP	Multiple clinical protocols: Operative protocol (air leak Comparator), fissure less lobectomy, single chest tube. Standardized pathways of care, clinical protocols for the chest tube management, patient counselling	Pre Fast-Track program	Pulmonary lobectomies	UBA	Total: 914, Intervention: 236, Comparator: 678	Intervention 68.2(9.4), Comparator: 67(10.1)	University hospital						NR
Schwarzbach 2010,[113] Germany	Clinical Pathway	ERP	Interdisciplinary, key elements of enhanced recovery schemes, no routine postoperative monitoring within	Pre-clinical pathway	Video-assisted thorascopic surgery	UBA	111(Intervention: 34, Comparator: 77)	Median age Intervention: 66, Comparator: 60	University hospital		x	x	x		3

Study (First Author, Date, Country)	Intervention Name	Broad Intervention Category	Brief description or key features of intervention	Comparator Name and Brief Description	Procedure	Study Design	Total Sample Size (Intervention / Comparator)	Mean Age (SD)	Setting	Treatment Stage/s at Which Intervention Occurs					No. of stages
										PA	PT	DT	AT	AH	
			ICU/intermediate care units, drainage protocols, pain management, early nutrition												
Shargall 2016,[114] Canada	Integrated comprehensive care program: home care initiative	Person centred care	Discharge plan based on prepared care pathway with a nurse coordinator. Assessment of patient needs after surgery and created a discharge plan with patient and family. Patients discharged to home and contacted by home care team within 24 hours, and visit plan developed as needed	Historical control: not routinely referred to post discharge home program, unless determined by nursing staff before discharge or referrals from primary care post-discharge. Discharge planning not automatically included in care plan. Home care only after referral	Thoracic surgery	UBA	Total: 686 (Intervention: 331, Comparator: 355)	Intervention: 65.57(0.711), Comparator: 63.81(0.783)	University hospital				x	x	2

Yueh 2003,[135] USA	Critical Pathways	ERP	Nasogastric tube feedings started postop day 1. Drains kept on high wall suction for 48 hours then removed on post op day 3. Patients discharged on day 6 before resumption of an oral diet	No Pathway	Total laryngectomy	CBA	Total: 158, Intervention: 92, Comparator: 66	Intervention: 63.9 (NR) Comparator: NR	Teaching hospital				x		1
Upper abdominal surgery															
Aviles 2017,[9] USA	Enhanced Recovery After Surgery	ERP	Preoperative counselling, pain relief, surgical technique, nutrition, mobilisation, catheter removal, follow up clinic	Pre-ERAS pathway	Pancreaticoduodenectomy	UBA	Total: 180 Intervention: 40, Comparator: 140	Intervention: 68.5(range 58.5-74.5), Comparator: 66(range 58-72)	General hospital	x	x	x	x	x	5
Balzano 2008,[11] Italy	Fast-track recovery programme	ERP	Earlier oral feeding, standardized postoperative mobilisation	Traditional pathway	Pancreaticoduod-enectomy	UBA	Total: 504 Intervention: 252 Comparator: 252	Intervention: 64.3 (Range 33-88), Comparator: 62.9 (Range 26-84)	Research hospital				x		1
Blind 2014,[16] Sweden	Fast-Track Program	ERP	Information, carbohydrate loading, fluid and drain management, antiemetic's, no abdominal drains, recovery ward, no postoperative nasogastric tubes, patient controlled analgesia, early oral fluids and mobilisation, resume normal diet POD1, discharge day 5,	Control: Pre Fast-track	Liver resection	UBA	126(Intervention: 64, Comparator: 62)	Median age intervention: 65(range 35-81), Comparator: 68(range 26-82)	University hospital		x	x	x	x	4

			telephone contact by project nurse for 3 days after discharge													
Braga 2014,[17] Italy	ERAS	ERP	Preoperative counselling, no bowel prep, reduced fasting, no premedication, restrictive I.V. fluids, removal of NG tubes end of surgery, prophylaxis	Standard preoperative care: oral bowel prep, overnight fasting, short-activing sedatives, no restrictive I.V. fluid policy, no prophylaxis, NG tube removal POD1	Pancreaticoduodenectomy	UBA	Total: 230, Intervention: 115, Comparator: 115	Intervention: 69 (61-74), Comparator 69 (61-74)	University hospital	x	x	x	x		4
Cunningham 2016,[30] USA	Omitting an intensive care unit stay	ERP	Omitting an intensive care unit (ICU) stay	ICU group	Robotic pancreaticduodenectomy	UBA	Total: 96(Intervention: 47, Comparator: 49)	Intervention: 66.11(9.75), Comparator: 65.56(12.11)	University of Pittsburgh Medical Centre				x		1
Joliat 2015,[53] Switzerland	ERAS	ERP	Preoperative counselling and education, clear fluids until 2h before surgery, no premedication, no routine oral bowel preparation, perianaestomic drains used routinely, nasogastric tube not used routinely, free oral drinks 4h after surgery, free fluids on day one, light meals POD 2, normal diet POD 3., mobilisation at least 2h on day of surgery	Pre-ERAS: No preop counselling and education, fasting from 6h before surgery, premedication at discretion of anaesthetist, no routine bowel prep or prophylaxis, Somatostatin, nasogastric tube use and drain removal at discretion of surgeon, No I.V. policy, no routine use of antacids, glycaemic control or laxatives, no mobilisation protocol	Pancreaticoduodenectomy	UBA	Total; 161 (Intervention: 74, Comparator: 87)	Intervention: 67.5(range 57-74), Comparator: 67(range 55-75)	University hospital	x	x	x	x		4

Joliat 2016,[52] Switzerland	Enhanced Recovery Program	ERP	Counselling, written information, fluids until 2 hours before surgery, carbohydrate loading, no premedication, PONV prophylaxis, intraoperative I.V. fluid management, postoperative analgesia protocol, no routine abdominal drainage, urinary catheter removal POD3, Nutrition and laxative protocol, early mobilisation	Pre-ERAS: No counselling/education, Fasting, no carbohydrate loading, premedication at anaesthesiologist discretion, no routine bowel prep or PONV prophylaxis, no postop care protocol	Liver surgery	UBA	174(Intervention: 74, Comparator: 100)	Median age Intervention: 60.5(IQR 50-68.25), Comparator: 64(IQR 57.25-69.75)	University hospital	x	x	x	x		4
Kagedan 2017,[54] Canada	ERP	ERP	Multidisciplinary clinical pathway focused on postoperative management. Includes education, pain management, nutrition, activity and discharge planning	Historical control	Pancreatic surgery	UBA	Total: 195 (Intervention: 121, Comparator: 74)	Median age: Intervention: 65(IQR: 56-74), Comparator: 65.5(IQR: 58-74)	University hospital				x		1

Kaibori 2017,[55] Japan	Enhanced Recovery After Surgery	ERP	Branched chain amino acids one month before surgery, normal oral nutrition, no pre-anaesthetic medication or bowel preparation, carbohydrate loading, short acting anaesthetic agent, fluid management and early nutrition/mobilisation, catheter management, outpatient follow up	Pre-ERAS pathway: fasting from midnight, bowel preparation, drains, oral intake from POD2, mobilisation from POD3, catheter removal and I.V. discontinuation on POD4-6	Liver resection	UBA	274(Intervention: 144, Comparator: 130)	Median age Intervention: 71(range [10th-90th percentile]: 60-81), Comparator: 69(range [10th-90th percentile]: 61-77)	University hospital	x	x	x	x		4
Kennedy 2007,[57] USA	Critical Pathway	ERP	Preoperative education and heparin, thromboembolic deterrent stockings and sequential compression devices, night of operation spent in ICU, early mobilisation, clear liquid diet on POD 2, regular diet on POD 3, switch all medications to oral route on POD 4, discharge home on POD 6 or 7 and arrange follow-up appointment for 4 weeks after discharge	Pre-pathway	Pancreaticoduodenectomy	UBA	Total: 135 (Intervention: 91, Comparator: 44)	Intervention: 63.9(1.3), Comparator: 61.3(2)	University hospital	x	x	x	x	x	5
Kim 2014,[58] Korea	Critical Pathway	ERP	Preoperative bowel preparation, nothing by mouth after lunch, patient controlled	Pre-clinical pathway	Pancreaticoduodenectomy	UBA	Total: 273 (Intervention: 88, Comparator: 185)	Intervention: 60.3(10.5), Comparator: 61.8(11.1)	University hospital		x	x	x	x	4

			analgesia on day of operation, postoperative early mobilisation, standardised postoperative nutrition, set date for discharge and outpatient follow up 2-3 weeks later.													
Kobayashi 2014,[59] Japan	Fast-track management	ERP	Counselling, nutritional supplements, no bowel preparation, surgical technique, nasogastric tube, fluid management	Conventional perioperative management: fasting from lunch day before surgery, mechanical bowel preparation, fasted until POD7, drain removal at surgeons discretion	Pancreaticoduodenectomy	UBA	Total: 190, Intervention: 100, Comparator: 90	Intervention: 67.5(10.7), Comparator: 65.4(10.8)	University hospital	x	x	x			3
Madani 2015,[70] Canada	Enhanced recovery pathway	ERP	Perioperative recovery programme	Pre-pathway: managed according to surgeon preference	Open pulmonary lobectomy	UBA	Total:134, Intervention: 107, Comparator: 127	Intervention: 67(10), Comparator: 64(11)	Academic hospital	x		x	x		3
Morales-Soriano 2015,[78] Spain	Enhanced Recovery After Surgery Programme	ERP	Admission on day of surgery, fasting, fluid management, no bowel preparation, antibiotic prophylaxis, pain management, respiratory therapy, drain management nasogastric tube removal, nutrition protocol, early mobilisation	Historical control: Standard postoperative management	Pancreaticoduodenectomy	UBA	85(Intervention: 41, Comparator: 44)	Intervention: 61.3(range 44-80), Control: 66.7(range 41-84)	hospital		x	x	x		3

Nikfarjam 2013,[83] Australia	Fast Track Recovery Program	ERP	Pre-surgery: nutritional supplementation, bowl prep, education, fasting. Inter-operative: feeding tubes not routinely used, Post op: intensive care 12-24 hours, analgesia, nasogastric tube removal, liquid diet day 2, urinary catheter removal day 4, right and left drain removal day 5	Pre-Fast track: 6h fasting prior to surgery, NG tube based on surgeon preference, drains, postop management according to surgeon preference, mobilisation as tolerated	Pancreaticoduodenectomy	UBA	Total: 41, Intervention: 21, Comparator: 20	Total mean: 65(range 15-81), Intervention: 62(range 15-81), Control 68(45-81)	University hospital	x	x	x	x		4
Nussbaum 2015,[84] USA	Standardised care plan	ERP	Perioperative recovery programme: placement of FJT, NG tube and I.V. fluid protocols, Physical therapy and nutrition.	Pre-care plan	Pancreaticoduodenectomy	UBA	Total: 242, Intervention: 100, Comparator: 142	Intervention: 65.5(10.1), Comparator: 62.1(11.5)	University medical centre	x	x	x	x		4
Ovaere 2018,[93] Belgium	Clinical pathway	ERP	Pre-operative patient education. Day of surgery: carbohydrate rich drinks, CP anaesthesia protocol, nasogastric tube removal before end of surgery, sitting upright in chair in evening. POD 1: Central venous catheter removal, very light diet plus energy drinks, physiotherapy. POD 2: Wound care, regular diet	Traditional Management: No preoperative nutrition, timing of surgery not specified, no anaesthesia protocol, nasogastric tube removal, mobilisation POD1, Oral intake as tolerated, drain removal and planning on discharge not specified	Liver surgery	UBA	Total: 229 (Intervention: 74, Comparator: 155)	Median age: Overall 64(IQR 55-74). Intervention 63.5(IQR 55-72), Comparator: 65(IQR 54-74)	Hospital		x	x	x	x	4

			plus energy drinks, consider drain removal and peripheral venous catheter removal. POD 3 - 5: physiotherapy and regular diet. Discharge criteria: regular diet and pain management. Follow up: GP visit 5-7 days post operatively, surgeons office visit 2-3 weeks post operatively												
Pecorelli 2017,[98] Italy	ERP	ERP	Enhanced recovery pathway includes preoperative counselling, no bowel preparation, and clear fluids until 2h before surgery, multimodal prophylaxis, postoperative nutrition plan and mobilisation.		Pancreatectomy	CT	Total: 200 (Intervention: 100, Comparator: 100)	Intervention: 62.4(13.4), Comparator: 60.4(13.8)	University hospital	x	x	x	x		4
Savikko 2015,[112] Finland	Enhanced Recovery Protocol	ERP	opioid-sparing pain treatment, early mobilisation and oral feeding, restricted use of abdominal drains and catheters	Pre-ERP protocol	Open and laparoscopic liver surgery	UBA	234(Intervention: 134, Comparator: 100)	Median age Intervention: 63(Range 26-96), Comparator: 65(Range 18-84)	University hospital				x		1
Van Dam 2008,[124] Netherlands/ Scotland	Multimodal Enhanced Recovery programme	ERP	ERAS pathway (4 days)	Traditional Pathway	Liver resection	UBA	Total: 161, Intervention: 61, Comparator: 100	Intervention: 62(range 24-82), Comparator: 60(rang e 20-81)	University hospital/ teaching hospital		x	x	x		3

van der Kolk 2017,[125] Netherlands	Clinical Pathway	ERP	Restrictive intra-operative fluid, strict pain control, early mobilisation, early drain and tube removal and early enteral feeding.	Pre-Pathway	Pancreaticoduodenectomy procedures	UBA	147(Intervention: 95, Comparator: 52)	Median age Intervention: 66(IQR 57-72), Comparator: 66(IQR: 58-72)	University medical centre			x	x		2
Vanounou 2007,[127] USA	Clinical pathway	ERP	Preoperative planning, prophylaxis, perioperative pain management, standardised removal of tubes and drains, psychosocial counselling, geriatric consultation, early rehabilitation	Pre-Pathway	Pancreaticoduodenectomy	UBA	Total: 209 (Intervention: 145, Comparator: 64)	Median age: Intervention: 64(NR), Comparator: 64(NR)	University hospital		x	x	x		3
Williamsson 2015,[132] Sweden	Fast Track Protocol	ERP	Information, preoperative nutrition and antithrombotic prophylaxis, fasting from midnight, nutrition/fluid/mobilisation protocol	Pre Fast-Track Protocol: antimicrobial prophylaxis, thoracic epidural/PCA, drains, NG tube, drain removal at surgeons discretion	Pancreatico-duodenectomy	UBA	Total: 100, Intervention: 50, Comparator: 50	Intervention median age: 69(range 15-80), Comparator median age: 67(range 25-81)	University hospital	x	x	x	x		4
Yui 2014,[136] Japan	Clinical Pathway	ERP	Perioperative clinical pathway: early drain and NG tube removal, Oral food on POD1	Pre-Pathway: perioperative management at discretion of the attending surgeon	Open distal pancreatectectomy	UBA	Total: 109, Intervention: 57, Comparator: 52	Intervention median age: 66(range 33-83), Comparator median age: 65(range 24-82)	University hospital		x	x	x		3
Li 2012,[66]; Lee 2013,[63] Canada	Enhanced recovery pathway	ERP	Preoperative medical education. Smoking cessation counselling and respiratory muscle strengthening. Intraoperative prophylactic	Traditional care: Medical evaluation, medical and anaesthesia consultation at discretion of surgeon, fluid management at	Oesophagectomy	UBA	Total: 106, Intervention: 59, Comparator: 47	Intervention: 64(10), Comparator: 65(10)	University-affiliated centre	x	x	x	x		4

			antiemetic’s for PONV, epidural catheter, extubation in operating room. Minimally invasive approach encouraged and tailored surgical approach according to patient's status. Avoid blood loss. Nil by mouth. Post-surgery early ambulation. Nil by mouth until POD 3 sips of water and POD 4 begin meals. Aim for discharge by POD 7	discretion of anaesthetist, tailored surgical approach based upon patient’s needs, Thoracic epidural analgesia, tube removal only after solid diet started, discharge at surgeons discretion										
Various surgeries															

Pearson 2001,[97] USA	Critical pathways intervention	ERP	Multidisciplinary teams developed critical care pathways for different operations	Pre-pathway	Coronary artery bypass graft surgery, total knee replacement (other pathways ineligible age)	CBA	Total: 2560, Intervention: 1223, Comparator: 1337	Intervention: 67.7(10), Comparator: 64.6(10)	Teaching hospital						NR
Vascular surgery															
Aragon 2002,[4] USA	Critical Pathway	ERP	Preoperative assessment and education, immediate postoperative clinical pathway, standardised postoperative recovery including early mobilisation and nutrition, discharge criteria	Pre-Critical Pathway	Carotid endarterectomy	UBA	Total: 717 (Intervention: 588, Comparator: 129)	Overall: 69.84(8.6)	Hospital		x		x		2

ABG=Coronary Artery Bypass Graft; CBA=Controlled Before and After Trial; CT=Controlled Trial, ERAS=Enhanced Recovery After Surgery; ERP=Enhanced Recovery Program/Protocol; IQR=Interquartile Range; I.V.=Intravenous; LOS=Length of Stay; NG=Nasogastric; NR=Not Reported; PO=Post-Operative; POD=Post-Operative Day; RCT=Randomised Controlled Trial; THA=Total Hip Arthroplasty; TKA=Total Knee Arthroplasty; UBA=Uncontrolled Before And After Trial

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