

Supplementary materials 4: Tables of results for evidence from all prioritised studies in the quantitative review.

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Table 1. Data for all effectiveness and patient-reported outcomes for the studies trialling a prehabilitation intervention vs usual care, to improve recovery after abdominal surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study, Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Kapritsou 2020, ¹ RCT	LOS (days)	44	6	0.01	41	9	4			<i>d</i> = -1.08 (-1.54 to -0.62)	< 0.001
Kapritsou 2020, ¹ RCT	Number of patients with complications (n)	44	8		41	15				OR: 0.39 (0.14 to 1.04)	0.06
Takagi 2019, ² RCT	LOS (days)	37	20.1	5.4	37	26.9	13.5			<i>d</i> = -0.66 (-1.13 to -0.19)	0.01
Takagi 2019, ² RCT	Mortality (n)	37	0		37	0					
Takagi 2019, ² RCT	30-day readmission (n)	37	0		37	0					
Takagi 2019, ² RCT	QoL Japanese version of the QoR-40	37	184	12.4	37	177	14.5			<i>d</i> = 0.52 (0.06 to 0.98)	0.03

Standardised (Cohen's *d*) and non-standardised mean differences with 95% confidence intervals were calculated from means and SDs (imputed where necessary). Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). P-values are from independent samples t-tests. CI=Confidence interval; n=sample size; LOS=Length of stay; OR=Odds ratio; QoL=Quality of life; QoR-40=Quality of recovery after anaesthesia; SD=Standard deviation

Table 2. Data for clinical outcomes for each study trialling an ERP intervention vs usual care, to improve recovery following colorectal surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study/ Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Forsmo 2016, ³ RCT	Postop hospital stay (PHS) (days)	61	5 (median)	2-12 (IQR)	61	9 (median)	5-24 (IQR)				
Forsmo 2016, ³ RCT	Total postop hospital stay (PHS + readmissions <30 days discharge) (days)	61	6 (median)	2-21 (IQR)	61	9 (median)	5-45 (IQR)				
Forsmo 2016, ³ RCT	Overall morbidity (n)	61	29		61	37			OR: 0.59 (0.29 to 1.21)	0.15	
Forsmo 2016, ³ RCT	Readmissions < 30 days (n)	61	13		61	11			OR: 1.23 (0.5 to 3.01)	0.65	
Forsmo 2016, ³ RCT	Re-operation (n)	61	2		61	1			OR: 2.03 (.18 to 23.04)	0.56	
Frontera 2018, ⁴ RCT	LOS (days)	36	6.9 (median)		36	7.9 (median)					
Frontera 2018, ⁴ RCT	Morbidity (%)	36	8		36	11			OR: 0.7 (0.14 to 3.46)	0.66	
Khoo 2007, ⁵ RCT	Postop LOS (days)	35	5 (median)	3 to 37 (range)	35	7 (median)	4 to 63 (range)				
Khoo 2007, ⁵ RCT	Postop stay including readmissions (days)	35	5 (median)	3 to 37 (range)	35	7 (median)	4 to 63 (range)				
Khoo 2007, ⁵ RCT	GP advice sought: outcome = advice only (n)	35	4		35	7			OR: 0.48 (0.13 to 1.82)	0.27	
Khoo 2007, ⁵ RCT	GP advice sought: outcome = prescription given	35	4		35	3			OR: 1.29 (0.27 to 6.26)	0.75	

Study/ Design	Outcome (units) (n)	Intervention			Comparator			Intervention	Comparator	d or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Khoo 2007, ⁵ RCT	GP advice sought: outcome = readmitted (n)	35	3		35	3				OR: 1.0 (0.19 to 5.33)	1.0
Khoo 2007, ⁵ RCT	Patient called ward for advice (n)	35	4		35	4				OR: 1.0 (0.23 to 4.36)	1.0
Khoo 2007, ⁵ RCT	Mortality (n)	35	0		35	2					0.15
Khoo 2007, ⁵ RCT	Total number of complications (n)	35	9		35	18				OR: .33 (0.12 to .89)	0.03
Lee 2011, ⁶ RCT	Postop LOS (days)	45	7 (median)	6 to 8 (range)	54	8 (median)	7 to 9 (range)				
Lee 2011, ⁶ RCT	Total LOS (days)	45	9 (median)	8 to 10 (range)	54	10 (median)	9 to 11 (range)				
Lee 2011, ⁶ RCT	Total complications (n)	45	6		54	14				OR: 0.44 (0.15 to 1.26)	0.12
Lee 2013, ⁶ RCT	Postop LOS	52	7.5 (median)	7 to 11 (IQR)	46	8 (median)	7 to 10 (IQR)	8.3 (2.30)	8.5 (3.05)	d= -0.06 (-0.46 to 0.33)	0.76
Lee 2013, ⁷ RCT	Deaths within 1 month (n)	52	1		46	0				OR: 0.44 (0.15 to 1.26)	0.02
Lee 2013, ⁷ RCT	Readmissions within 1 month (n)	52	0		46	0					
Lee 2013, ⁷ RCT	Total complications (n)	52	22		46	11				OR: 2.33 (0.97 to 5.58)	0.05
Pappalardo 2016, ⁸ RCT	Dischargeable day: POD 4	25	17		25	0					
Pappalardo 2016, ⁸ RCT	Dischargeable day: POD 5	25	5		25	5					
Pappalardo 2016, ⁸ RCT	Dischargeable day: POD 6	25	3		25	8					

Study/ Design	Outcome (units)	Intervention			Comparator			Intervention Imputed Mean (SD)	Comparator Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Pappalardo 2016, ⁸ RCT	Dischargeable day: POD 7 or more	25	0		25	7					
Pappalardo 2016, ⁸ RCT	Mortality <30 days (%)	25	0		25	0					
Pappalardo 2016, ⁸ RCT	Anastomic leakage (n)	25	3		25	2				OR: 1.57 (0.24 to 10.3)	0.64
Pappalardo 2016, ⁸ RCT	Postop nausea (n)	25	1		25	4				OR: .22 (0.02 to 2.11)	0.16
Pappalardo 2016, ⁸ RCT	Total complications (n)	25	4		25	6				OR: 0.6 (0.15 to 2.47)	0.48
Vlug 2011 Laparoscop y, ⁹ RCT	Total LOS (days)	100	5 (median)	4 to 8 (IQR)	109	6 (median)	4.5 to 9.5 (IQR)	5.7 (3.0)	6.7 (3.8)	<i>d</i> = -0.29 (-0.57 to -0.02)	0.04
Vlug 2011 Laparoscop y, ⁹ RCT	Postop LOS (days)	100	5 (median)	4 to 7 (IQR)	109	6 (median)	4 to 8.5 (IQR)	5.3 (2.3)	6.2 (3.4)	<i>d</i> = -0.29 (-0.56 to -0.02)	<0.001
Vlug 2011 Laparoscop y, ⁹ RCT	Reoperation rate (%)	100	10		109	10.1				OR: 0.99 (0.4 to 2.44)	0.98
Vlug 2011 Laparoscop y, ⁹ RCT	Readmission rate (%)	100	6		109	6.4				OR: 0.93 (0.3 to 2.88)	0.91
Vlug 2011 Laparoscop y, ⁹ RCT	Patients with major complications (%)	100	15		109	11				OR: 1.43 (0.63 to 3.22)	0.39
Vlug 2011 Laparoscop y, ⁹ RCT	Mortality (%)	100	2		109	1.8				OR: 1.11 (0.15 to 8.13)	0.92
Vlug 2011 Open, ⁹ RCT	Total LOS (days)	93	7 (median)	5 to 11 (IQR)	98	7 (median)	6 to 13 (IQR)	7.7 (4.5)	8.7 (5.2)	<i>d</i> = -0.20 (-.49 to .08)	0.16
Vlug 2011 Open, ⁹ RCT	Postop LOS (days)	93	6 (median)	4.5 to 10 (IQR)	98	7 (median)	6 to 10.5 (IQR)	6.8 (4.1)	7.8 (3.4)	<i>d</i> = -0.26 (-0.55 to -0.02)	0.07
Vlug 2011 Open, ⁹ RCT	Reoperation rate (%)	93	14		98	18.4				OR: 0.72 (0.33 to 1.57)	0.41

Study/ Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Vlug 2011 Open, ⁹ RCT	Readmission rate (%)	93	7.5		98	7.1				OR: 1.06 (0.36 to 3.16)	0.92
Vlug 2011 Open, ⁹ RCT	Patients with major complications (%)	93	20.4		98	21.4				OR: 0.94 (0.47 to 1.89)	0.87
Vlug 2011 Open, ⁹ RCT	Mortality (%)	93	4.3		98	2.0				OR: 2.2 (0.39 to 12.46)	0.36

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). CI=Confidence interval; LOS=Length of stay; SD=Standard deviation; IQR=Interquartile range; OR=Odds Ratio; POD= Post-operative; SD=Standard deviation; Postop=Post-operative; n=sample size

Table 3. Data for patient-reported outcomes for each study trialling an ERP intervention vs Usual care, to improve recovery following colorectal surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study/ Design	Outcome (units)	Intervention			Comparator			Intervention Imputed Mean (SD)	Comparator Imputed Mean (SD)	<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Forsmo 2016, ³ RCT	QoL	61	0.78		153	0.78					
Khoo 2007, ⁵ RCT	Patient felt they would benefit from longer stay (n)	35	3		35	24					
Lee 2011, ⁶ RCT	Pain (VAS score)	46	1.2	1.1	54	1.1	1.3			<i>d</i> = 0.08 (-0.31 to .048)	0.68
Lee 2013, ⁷ RCT	Pain (VAS score)	46	2.9	2.3	52	2.6	1.9			<i>d</i> = -0.14 (-0.54 to .25)	0.48
Lee 2013, ⁷ RCT	QoL (Korean version SF-36 PCS)	46	38.65	4.73	52	38.65	3.43			<i>d</i> = 0 (-0.4 to 0.4)	1.00
Lee 2013, ⁷ RCT	QoL (Korean version SF-36 MCS)	46	48.85	5.37	52	45.58	4.24			<i>d</i> = -0.06 (-0.45 to 0.34)	0.78
Pappalardo 2016, ⁸ RCT	EORTC QLC-CR 38: score excellent/ good (n)	25	14		25	12					
Pappalardo 2016, ⁸ RCT	EORTC QLC-CR 38: Score moderately good (n)	25	8		25	9					
Pappalardo 2016, ⁸ RCT	EORTC QLC-CR 38: Score acceptable (n)	25	2		25	3					
Pappalardo 2016, ⁸ RCT	EORTC QLC-CR 38: Score poor (n)	25	1		25	1					
Vlug 2011, Laparoscop	Days to fulfil discharge criteria:	100	4 (median)	3 to 6 (IQR)	109	5.5 (median)	4 to 8.5 (IQR)	4.3 (2.3)	6.0 (3.4)	<i>d</i> = -0.58 (-0.85 to -0.3)	<0.001

Study/ Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
y, ⁹ RCT	Acceptance of discharge										
Vlug 2011 Open, ⁹ RCT	Days to fulfil discharge criteria: Acceptance of discharge	93	5.5 (median)	4 to 9 (IQR)	98	7 (median)	5 to 12 (IQR)	6.2 (3.8)	8.0 (5.3)	<i>d</i> = -0.4 (-0.68 to -0.11)	0.01

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs, imputed where necessary. P-values are from independent samples t-tests; CI=confidence interval;IQR=Interquartile Range;EORTC=European Organisation for Research and Treatment of Cancer; LASA=Longitudinal Ageing Study Amsterdam; n=sample size; MCS=Mental component score; PCS=Physical component score; POD=Post-operative Day; QoL=Quality of Life; SD=Standard Error; SF36=Short Form 36; VAS=Visual Analogue Scale;

Table 4. Data for clinical outcomes for each study trialling a Prehabilitation intervention to improve recovery following colorectal surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study/ Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Prehabilitation vs Usual Care											
Bousquet-Dion 2018, ¹⁰ RCT	Length of first hospital stay (days)	41	3 (median)	3 to 7 (IQR)	31	3 (median)	2 to 4 (IQR)	3.67 (1.54)	3 (1.55)	<i>d</i> = 0.43 (-0.04 to 0.91)	0.07
Bousquet-Dion 2018, ¹⁰ RCT	Length of first hospital stay plus readmission (days)	37	3 (median)	3 to 5.5 (IQR)	26	3	2 to 4 (IQR)	4.33 (3.07)	3 (1.55)	<i>d</i> = 0.52 (0.01 to 1.03)	0.05
Bousquet-Dion 2018, ¹⁰ RCT	Patients with at least one 30-day complication (n)	37	14		26	8					0.57
Bousquet-Dion 2018, ¹⁰ RCT	Number of visits to ED with 30 days postop (n)	41	7		31	7					0.56
Bousquet-Dion 2018, ¹⁰ RCT	Number of patients with readmission within 30 days postop (n)	41	5		31	2					0.42
Bousquet-Dion 2018, ¹⁰ RCT	Grade of most severe complication - within 30 days: Grade I (n)	37	9		26	4					0.39
Bousquet-Dion 2018, ¹⁰ RCT	Grade of most severe complication - within 30 days: Grade II (n)	37	3		26	4					0.37

Study/ Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Bousquet-Dion 2018, ¹⁰ RCT	Grade of most severe complication - within 30 days: Grade III	37	2		26	0					0.23
Carli 2010, ¹¹ RCT	Postop LOS (days)	21	7.4	6.5 (SE)	53	6.6	3.6 (SE)	7.4 (48.2)	6.6 (26.2)	<i>d</i> = 0.02 (-0.36 to 0.40)	0.93
Carli 2010 ¹¹ RCT	Patients with a complication (any grade) (%)	21	39		53	33					0.63
Dronkers 2010, ¹² RCT	Postop LOS (days)	21	16.2	11.5	20	21.6	23.7			<i>d</i> = -0.29 (-0.91 to 0.32)	0.36
Dronkers 2010, ¹² RCT	Patients with postop complications (%)	21	45		20	38				OR: 1.33 (0.38 to 4.64)	0.65
Prehabilitation vs Rehabilitation											
Carli 2020, ¹³ RCT	LOS (days)	55	4 (median)	3 to 8 (IQR)	55	4 (median)	3 to 8 (IQR)	5 (3.81)	5 (3.81)	<i>d</i> = 0 (-0.37 to 0.37)	1.00
Carli 2020, ¹³ RCT	Readmissions (n)	55	2		55	5				OR: 0.38 (0.07 to 2.03)	0.24
Carli 2020, ¹³ RCT	ED visits within 30 days (n)	55	6		55	3				OR: 2.12 (0.5 to 8.96)	0.30
Gillis 2014, ¹⁴ RCT	LOS (primary hospitalisation, days)	38	4 (median)	3 to 5 (IQR)	39	4 (median)	3 to 7 (IQR)	4.0 (1.5)	4.7 (3.1)	<i>d</i> = -0.27 (-0.72 to 0.17)	0.21
Gillis 2014, ¹⁴ RCT	Total stay, including readmissions (days)	38	4 (median)	3 to 6 (IQR)	39	5 (median)	3 to 9 (IQR)	4.3 (2.3)	5.7 (4.6)	<i>d</i> = -0.37 (-0.82 to 0.09)	0.10

Study/ Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Gillis 2014, ¹⁴ RCT	30-day emergency department visits (n)	38	6		39	9				OR: 0.63 (0.2 to 1.97)	0.42
Gillis 2014, ¹⁴ RCT	Readmissions <30 days (%)	38	15.8		39	12.9				OR: 1.28 (0.35 to 4.59)	0.71
Gillis 2014, ¹⁴ RCT	Patients with complications <30 days (%)	38	32		39	44				OR: 0.6 (0.24 to 1.52)	0.28

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). CI=Confidence interval; ED=Emergency department; IQR=Interquartile range; LOS=Length of stay; n=sample; OR=Odds Ratio; POD=Post-operative day; SD=Standard deviation; SE=Standard Error; Postop=Postoperative; Rehab = Rehabilitation; n=sample size

Table 5. Data for patient-reported outcomes for each study trialling a Prehabilitation intervention to improve recovery following colorectal surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Prehabilitation vs Usual Care											
Bousquet-Dion 2018, ¹⁰ RCT	CHAMPS (total energy expenditure in kcal/kg/week)	37	44.47	38.6	26	36.57	48.89			<i>d</i> = 0.18 (-0.32 to 0.69)	0.48
Bousquet-Dion 2018, ¹⁰ RCT	CHAMPS (energy spent on light physical activities (METS 1-3))	37	12.1	12.5	26	16.87	23.75			<i>d</i> = -0.27 (-0.77 to 0.24)	0.30
Bousquet-Dion 2018, ¹⁰ RCT	CHAMPS (energy spent on physical moderate to vigorous activities (METS >3))	37	27.9	26.8	26	13.73	21.26			<i>d</i> = 0.57 (0.06 to 1.09)	0.03
Carli 2010, ¹¹ RCT	HADS Depression (raw score)	58	3.2	0.4 (SE)	54	3.4	0.5 (SE)	3.2 (3.0)	3.4 (3.7)	<i>d</i> = -0.06 (-0.43 to 0.31)	0.88
Carli 2010, ¹¹ RCT	Physical activity (hours/week)	45	8.3	6.2	42	6	4.8			<i>d</i> = 0.42 (-0.01 to 0.84)	0.06
Dronkers 2010, ¹² RCT	EORTC QoL Questionnaire: global health (raw score)	20	72.0	19.0	19	68.0	18.0			<i>d</i> = 0.22 (-0.41 to 0.85)	0.50
Dronkers 2010, ¹² RCT	EORTC QoL Questionnaire: function (raw score)	20	413.0	64.0	19	425.0	67.0			<i>d</i> = -0.18 (-0.81 to 0.45)	0.57

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Dronkers 2010, ¹² RCT	EORTC QoL Questionnaire: symptoms (raw score)	20	119.0	98.0	19	155.0	117.0			<i>d</i> = -0.33 (-0.97 to 0.3)	0.30
Prehabilitation vs Rehabilitation											
Carli 2020, ¹³ RCT	SF-36 Physical component	38	49.7	20.2	30	51.1	14.7			<i>d</i> = 0.08 (-0.4 to 0.56)	0.75
Carli 2020, ¹³ RCT	SF-36 – Mental component	38	55.3	22.6	30	63.6	15.3			<i>d</i> = 0.42 (-0.06 to 0.9)	0.09
Carli 2020, ¹³ RCT	HADS – Anxiety	37	5 (median)	2 to 7 (range)	31	4 (median)	1 to 8 (range)	4.7 (3.9)	4.3 (5.4)	<i>d</i> = 0.07 (-0.41 to 0.55)	0.77
Carli 2020, ¹³ RCT	HADS – Depression	37	4 (median)	2 to 5 (range)	31	4 (median)	1 to 7 (range)	3.7 (2.3)	4 (4.7)	<i>d</i> = -0.09 (-0.57 to 0.38)	0.70
Carli 2020, ¹³ RCT	CHAMPS – light energy expenditure	38	20 (median)	5 to 37.5 (range)	30	16.9 (median)	5 to 35 (range)	21.0 (25)	19.0 (23.4)	<i>d</i> = -0.08 (-0.56 to 0.4)	0.75
Carli 2020, ¹³ RCT	CHAMPS - mod-vigorous energy expenditure	38	12 (median)	0 to 31.3 (range)	30	13.5 (median)	0 to 36 (range)	14.4 (24.1)	16.5 (28.0)	<i>d</i> = -0.08 (-0.56 to 0.4)	0.75
Gillis 2014, ¹⁴ RCT	CHAMPS (kcal/kg per week)	38	47.7	52.2	39	35.7	63.8			<i>d</i> = 0.21 (-0.24 to 0.65)	0.37
Gillis 2014, ¹⁴ RCT	SF-36 Physical function	38	74.3	26.1	39	72.3	24.2			<i>d</i> = 0.08 (-0.37 to 0.53)	0.73
Gillis 2014, ¹⁴ RCT	SF-36 Role physical	38	40.7	45.6	39	35.0	44.6			<i>d</i> = 0.13 (-0.32 to 0.57)	0.58
Gillis	SF-36 Bodily	38	74.2	24.7	39	73.2	26.7			<i>d</i> = 0.04	0.87

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
2014, ¹⁴ RCT	pain									(-0.41 to 0.49)	
Gillis 2014, ¹⁴ RCT	SF-36 general health	38	65.7	22.9	39	68.2	19.5			<i>d</i> = -0.12 (-0.56 to 0.33)	0.61
Gillis 2014, ¹⁴ RCT	SF-36 vitality	38	61.0	21.8	39	62.6	17.7			<i>d</i> = -0.08 (-0.53 to 0.37)	0.72
Gillis 2014, ¹⁴ RCT	SF-36 social functioning	38	75.6	23.3	39	72.4	27.3			<i>d</i> = 0.13 (-0.32 to 0.57)	0.58
Gillis 2014, ¹⁴ RCT	SF-36 role emotional	38	69.4	38.6	39	52.9	47.5			<i>d</i> = 0.38 (-0.07 to 0.83)	0.10
Gillis 2014, ¹⁴ RCT	SF-36 mental health	38	79.0	16.1	39	72.4	20.9			<i>d</i> = 0.35 (-0.1 to 0.8)	0.13
Gillis 2014, ¹⁴ RCT	HADS Anxiety	38	4.3	3.4	39	5.1	4.7			<i>d</i> = -0.19 (-0.64 to 0.25)	0.40
Gillis 2014, ¹⁴ RCT	HADS Depression	38	3.2	3.2	39	3.7	4.3			<i>d</i> = -0.13 (-0.58 to 0.32)	0.57

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs, imputed where necessary. P-values are from independent samples t-tests. CI=Confidence interval; CHAMPS=Community Healthy Activities Model Programme for Seniors; EORTC=European Organisation for Research and Treatment of Cancer; HADS=Hospital Anxiety and Depression Scale; IQR=Interquartile Range; METS=Metabolic equivalents in exercise testing; n=sample size; POD=Post-operative Day; QoL=Quality of Life; SD=Standard deviation; SE=Standard error; SF-36=Short Form 36; VAS=Visual Analogue Scale

Table 6. Data for clinical outcomes for each study trialling an ERP intervention vs Usual care, to improve recovery following lower limb arthroplasty. Reported values are presented (mean and standard deviation (SD) unless indicated).

Study, Design	Outcome (units)	Intervention			Comparator			Intervention Imputed Mean (SD)	Comparator Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Borgwardt 2009, ¹⁵ RCT	LOS (days)	17	1 (median)	1 to 3 (range)	23	6 (median)	4 to 7 (range)				
Borgwardt 2009, ¹⁵ RCT	Rehospitalisation within 3 months (n)	17	0		23	0					
Borgwardt 2009, ¹⁵ RCT	Phone contact with a GP (n)	17	4		23	2			OR: 3.23 (0.52 to 20.2)	0.19	
Borgwardt 2009, ¹⁵ RCT	Contact with a nurse (n)	17	4		23	6			OR: 0.87 (0.2 to 3.74)	0.85	
Fransen 2018, ¹⁶ RCT	LOS (days)	25	3.7	1.8	24	4.7	1.3		<i>d</i> = -0.63 (-1.21 to -0.06)	0.03	
Garriga (Hip) 2019, ¹⁷ ITS	LOS (days)	432162	3.6		432162	5.6					
Garriga (Hip) 2019, ¹⁷ ITS	Complications post op at 6 months (%)	385201	1.70		385201	4.1			OR: 0.4 (0.39 to 0.42)	<0.001	
Garriga (Hip) 2019, ¹⁷ ITS	Revision rate (surgery) (%)	160624	3.8		160624	7.6			OR: 0.48 (0.47 to 0.5)	<0.001	
Garriga (Knee) 2019, ¹⁸ ITS	LOS (days)	479353	3.7		479353	5.8					
Garriga (Knee) 2019, ¹⁸ ITS	Complications post op at 6 months (%)	426059	1.70		426059	4.1			OR: 0.4 (0.39 to 0.42)	<0.001	
Garriga (Knee) 2019, ¹⁸ ITS	Revision rate (surgery) (%)	176655	4.8		176655	4.8			OR: 1 (0.97 to 1.03)	1.00	
Higgins 2020, ¹⁹ UBA	LOS (days)	473	4 (median)	3 to 6 (IQR)	783	5 (median)	3 to 6 (IQR)	4.3 (2.2)	4.7 (2.2)	<i>d</i> = -0.18 (-0.3 to -0.07)	<0.001
Higgins 2020, ¹⁹ UBA	Readmission to hospital within 30 days (n)	473	19		783	37			OR: 0.84 (0.48 to 1.49)	0.56	

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Higgins 2020, ¹⁹ UBA	Returning to operating room within 60 days	473	11		783	41				OR: 0.43 (0.22 to 0.85)	0.01
Higgins 2020, ¹⁹ UBA	Complications within 60 days of TKA - overall	473	32		783	71				OR: 0.73 (0.47 to 1.12)	0.15
Larsen 2008, ^{20,21} RCT	Total LOS (days)	45	4.9	2.4	42	7.8	2.1			<i>d</i> = -1.28 (-1.75 to -0.82)	<0.001
Larsen 2008, ^{20,21} RCT	Readmissions (n)	45	2		41	1				OR: 1.86 (0.16 to 21.32)	0.61
Maempel 2015, ²² UBA	LOS (days)	84	3	2 to 14 (median)	81 (range)	4 (median)	2 to 16 (range)				
Maempel 2015, ²² UBA	Number of patients developing postoperative complications (within 6 months) (n)	84	3		81	6				OR: 0.46 (0.11 to 1.92)	0.28
Maempel 2015, ²² UBA	Manipulation under anaesthesia within 1 year (n)	84	5		81	1				OR: 5.06 (0.58 to 44.32)	0.11
Maempel 2015, ²² UBA	Number of blood transfusions (n)	84	4		81	4				OR: 0.96 (0.23 to 3.99)	0.96
Maempel 2016, ²³ UBA	Dislocation: 1 year follow up (n)	611	5		582	6				OR: 0.79 (0.24 to 2.61)	0.70
Maempel 2016, ²³ UBA	Death: 1 year follow up (n)	522	3		605	9				OR: 0.38 (0.1 to 1.42)	0.14
McDonald 2012, ²⁴ Cohort	LOS (days)	1081	4 (median)	2 (IQR)	735	6 (median)	3 (IQR)	4 (1.48)	6 (2.23)	<i>d</i> = -1.1 (-1.2 to -1)	<0.001
McDonald 2012, ²⁴ Cohort	Complications – DVT (n)	1081	4		735	1				OR: 2.73 (0.3 to 24.44)	0.35

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
McDonald 2012, ²⁴ Cohort	Complications – PE (n)	1081	5		735	2				OR: 1.7 (0.33 to 8.8)	0.52
McDonald 2012, ²⁴ Cohort	Complications – Infection (n)	1081	18		735	13				OR: 0.94 (0.46 to 1.93)	0.87
McDonald 2012, ²⁴ Cohort	Number of deaths within 90 days post-op (n)	1081	2		735	1				OR: 1.36 (0.12 to 15.03)	0.80
McDonnall 2019, ²⁵ RCT	LOS (days)	103	5.29	7.42	134	6.29	7.42			<i>d</i> = -0.13 (-0.39 to 0.12)	0.30
McDonnall 2019, ²⁵ RCT	Incidence of complications within 28 days (n)	91	6		118	2				OR: 4.09 (0.81 to 20.78)	0.07
McDonnall 2019, ²⁵ RCT	Readmission within 28 days (n)	91	3		118	3				OR: 1.31 (0.26 to 6.63)	0.75
Pour 2007, ²⁶ RCT	LOS (days)	46	3.5	2 to 5 (range)	48	4.2	3 to 8 (range)				
Pour 2007, ²⁶ RCT	Short term complications (n)	46	0		48	0					
Reilly 2005, ²⁷ RCT	LOS (days)	21	1.5	1 to 5 (range)	20	4.3	1 to 6 (range)				
Reilly 2005, ²⁷ RCT	Number of GP visits post discharge (n)	21	3		20	5				OR: 0.5 (0.1 to 2.44)	0.39
Reilly 2005, ²⁷ RCT	Patients who developed complications post discharge (n)	21	3		20	1				OR: 3.17 (0.3 to 33.31)	0.32
Reilly 2005, ²⁷ RCT	Major complications (n)	21	2		20	1				OR: 0.95 (0.06 to 16.29)	0.97

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Siggeirsdottir 2005, ²⁸ RCT	LOS (days)	27	6.4	2.4	23	10	3.5			<i>d</i> = -1.22 (-1.83 to -0.61)	< 0.001
Siggeirsdottir 2005, ²⁸ RCT	Readmissions (n)	27	0		23	1				OR: 0.25 (0.07 to 0.88)	0.03
Siggeirsdottir 2005, ²⁸ RCT	Total complications (n)	27	5		23	11				OR: 0.25 (0.07 to 0.88)	0.03
Hunt 2009, ²⁹ ;Salmon 2012, ³⁰ CT	Postoperative LOS (days)	125	6 (median)	3 to 20 (range)	316	3 (median)	1 to 49 (range)	8.75 (3.30)	14 (8.33)	<i>d</i> = 0.72 (0.51 to 0.93)	< 0.001
Hunt 2009, ²⁹ CT	Mortality (n)	125	0		316	1					0.11

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). LOS=Length of stay; SD=Standard deviation; CI=Confidence interval; OR=Odds Ratio; n=sample size; ITS=Interrupted time series; UBA=Uncontrolled before-and-after; CT=Controlled trial; DVT=Deep vein thrombosis

Table 7. Data for patient-reported outcomes for each study trialling an ERP intervention vs Usual care, to improve recovery following lower limb arthroplasty. Reported values are presented (mean and standard deviation (SD) unless indicated).

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Borgwardt 2009, ¹⁵ RCT	Pain at mobilisation (VAS 1 to 10)	17	1 (median)	0 to 2.5 (range)	23	5 (median)	0 to 7.5 (range)				
Borgwardt 2009, ¹⁵ RCT	Number who were confident or very confident at discharge? (n)	17	13		23	18				OR: 0.9 (0.2 to 4.03)	0.89
Borgwardt 2009, ¹⁵ RCT	Number very satisfied with operation and perioperative period (n)	17	11		23	14				OR: 1.18 (0.32 to 4.33)	0.80
Fransen 2008, ¹⁶ RCT	Pain – 6 days p.o (mean change scores)	25	18	14	24	34	24			<i>d</i> = -0.82 (-1.4 to -0.23)	0.01
Fransen 2008, ¹⁶ RCT	Pain – rest (mean change scores)	25	-15	27.7	24	-18.5	35.3			<i>d</i> = 0.11 (-0.45 to 0.67)	0.70
Fransen 2008, ¹⁶ RCT	Pain – movement (mean change scores)	25	-38.6	30.8	24	-46.1	24.4			<i>d</i> = 0.27 (-0.29 to 0.83)	0.35

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Fransen 2008, ¹⁶ RCT	SF-12 – mental (mean change scores)	25	0.6	8	24	0	4.6			<i>d</i> = 0.09 (-0.47 to 0.65)	0.75
Fransen 2008, ¹⁶ RCT	SF-12 – physical (mean change scores)	25	-0.2	4.5	24	-0.2	4.6			<i>d</i> = 0 (-0.56 to 0.56)	1.00
Fransen 2008, ¹⁶ RCT	KOOS – symptom score (mean change scores)	25	10.9	26.1	24	16.9	18			<i>d</i> = -0.27 (-0.83 to 0.3)	0.36
Fransen 2008, ¹⁶ RCT	KOOS – pain score (mean change scores)	25	15.2	19.1	24	18.7	19.4			<i>d</i> = -0.18 (-0.74 to 0.38)	0.53
Fransen 2008, ¹⁶ RCT	KOOS – ADL score (mean change scores)	25	13.7	22.3	24	18.1	21.9			<i>d</i> = -0.2 (-0.76 to 0.36)	0.49
Fransen 2008, ¹⁶ RCT	KOOS – sport and recreation score (mean change scores)	25	-1.0	21.4	24	0	17.8			<i>d</i> = -0.05 (-0.61 to 0.51)	0.86

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Fransen 2008, ¹⁶ RCT	KOOS – Qol score (mean change scores)	25	19.5	26.3	24	15.4	20.3			<i>d</i> = 0.17 (-0.39 to 0.74)	0.55
Garriga (Hip) 2019, ¹⁷ ITS	OHS (increase from baseline score) %	226796	22.9		226796	17.7					
Garriga (Knee) 2019, ¹⁸ ITS	OKS (increase from baseline score) %	251546	17.1		251546	5.1					
Higgins 2020, ¹⁹ UBA	OKS	473	37.7	7.2	783	34.3	9.9				
Higgins 2020, ¹⁹ UBA	EQ-5D	473	0.76 (median)	0.62 to 1.0 (IQR)	783	0.76 (median)	0.62 to 1.0 (IQR)				
Higgins 2020, ¹⁹ UBA	EQ-5D VAS	473	83.12	16.1	783	72.1	19.2				
Larsen 2008, ^{20,21} RCT	Patients well at 3 months (n)	45	28		42	15				OR: 2.96 (1.24 to 7.1)	0.01
Larsen 2008, ^{20,21} RCT	EQ-5D (index score) (n)	45	0.87	0.15	42	0.79	0.2			<i>d</i> = 0.45 (0.03 to 0.88)	0.04
Maempel 2015, ²² UBA	Change in AKSK functioning (raw score)	83	52.8 (median)	-3 to 86.6 (range)	78	57 (median)	-25.4 to 85 (range)				
Maempel 2015, ²² UBA	Change in AKSF	45	5.9	21.6	55	6.9	18.2			<i>d</i> = -0.05 (-0.44 to 0.34)	0.80

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
	functioning: Mean improvement (raw score)										
Maempel 2016, ²³ UBA	Harris Hip Score (raw score)	483	94 (median)	86 to 99 (range)	548	94 (median)	86 to 99 (range)	93.3 (9.7)	93.0 (9.7)	<i>d</i> = 0.03 (-0.09 to 0.16)	0.58
McDonald 2012, ²⁴ UBA	Oxford Knee Score	1081	27 (median)	11 (IQR)	735	27 (median)	11 (IQR)	27 (8.17)	27 (8.17)	<i>d</i> = 0 (-0.09 to 0.09)	1.00
McDonall 2019, ²⁵ RCT	Pain (NRS)	103	6.05	0.33 (SEM)	134	7.05	0.28 (SEM)	6.05 (3.35)	7.05 (3.24)	<i>d</i> = -0.3 (-0.56 to -0.05)	0.02
McDonall 2012, ²⁵ RCT	Oxford Knee Score	91	19.9	31.64	118	21.3	31.64			<i>d</i> = -0.04 (-0.32 to 0.23)	0.75
McDonall 2019, ²⁵ RCT	Overall satisfaction	91	9.3	4.83	118	8.6	4.83			<i>d</i> = 0.15 (-0.13 to 0.42)	0.30
McDonall 2019, ²⁵ RCT	Net Promotor Score - Likelihood to recommend health care	91	9.27	3.47	118	8.67	3.47			<i>d</i> = 0.17 (-0.1 to 0.45)	0.22
Pour 2007, ²⁶ RCT	LASA PAQ: Energy (raw score)	46	8	5 to 10 (range)	48	7	2 to 9.8 (range)				
Pour 2007, ²⁶ RCT	LASA PAQ: Daily activity (raw score)	46	8.3	3 to 10 (range)	48	7	3 to 10 (range)				
Pour 2007, ²⁶ RCT	LASA PAQ: Quality of Life (raw score)	46	8.4	3 to 10 (range)	48	7.5	3 to 10 (range)				
Pour 2007, ²⁶ RCT	Harris Hip score (raw score)	46	87.6	51.4 to 100 (range)	48	86.2	55.7 to 95.7 (range)				

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Pour 2007, ²⁶ RCT	SF-36: Physical health (raw score)	46	71.2	35.6 to 95.9 (range)	48	63.6	24.2 to 95.9 (range)				
Pour 2007, ²⁶ RCT	SF-36: Mental health (raw score)	46	80.8	41.6 to 98 (range)	48	72.3	24.6 to 95.2 (range)				
Pour 2007, ²⁶ RCT	WOMAC (raw score)	46	12.4	0 to 51 (range)	48	13.5	0 to 32 (range)				
Pour 2007, ²⁶ RCT	Lower extremity functional score (raw score)	46	9.8	6 to 12 (range)	48	9.2	7 to 11 (range)				
Reilly 2005, ²⁷ RCT	Oxford Knee Assessment (raw score)	21	43.7	3.7	20	42.2	7.1			<i>d</i> = 0.27 (-0.35 to 0.88)	0.40
Reilly 2005, ²⁷ RCT	AKSS Objective (raw score)	21	88.4	10.4	20	89.4	17.5			<i>d</i> = -0.07 (-0.68 to 0.54)	0.82
Reilly 2005, ²⁷ RCT	AKSS Functional (raw score)	21	90.9	11.7	20	90.0	13.3			<i>d</i> = 0.07 (-0.54 to 0.68)	0.82
Siggeirsdottir 2005, ²⁸ RCT	Oxford Hip Score (raw score - 2 months)	27	19	6.3	21	24	9			<i>d</i> = -0.66 (-1.24 to -0.07)	0.03
Siggeirsdottir 2005, ²⁸ RCT	Oxford Hip Score (6 months)	27	14	4.3	20	21	7.2			<i>d</i> = -1.23 (-1.86 to -0.6)	<0.001
Siggeirsdottir 2005, ²⁸ RCT	Harris Hip Score (raw score)	27	76 (median)	56 to 93 (range)	27	71 (median)	31 to 83 (range)				

Study, Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	d or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Salmon 2013, ³⁰ CT (Liverpool)	EoHAQ – Care problems = 0 (%)	316	65.2		125	46.4				OR: 2.16 (1.42 to 3.3)	< 0.001
Salmon 2013, ³⁰ CT (Liverpool)	EoHAQ – Care problems >1 (%)	316	34.8		125	53.6				OR: 0.46 (0.3 to 0.7)	< 0.001
Salmon 2013, ³⁰ CT (Liverpool)	EoHAQ: Recovery Problems = 0 (%)	316	13		125	11.2				OR: 1.18 (0.62 to 2.26)	0.61
Salmon 2013, ³⁰ CT (Liverpool)	EoHAQ: Recovery Problems = > 1 (%)	316	87		125	88.8				OR: 0.84 (0.44 to 1.61)	0.61
Salmon 2013, ³⁰ CT (SWEOC)	EoHAQ: Care problems = 0 (%)	316	65.2		119	38.7				OR: 2.97 (1.92 to 4.59)	< 0.001
Salmon 2013, ³⁰ CT (SWEOC)	EoHAQ – Care problems >1 (%)	316	34.8		119	61.3				OR: 0.34 (0.22 to 0.52)	< 0.001
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWEOC)	EoHAQ: Recovery Problems = 0 (%)	316	13		119	13.4				OR: 0.97 (0.52 to 1.8)	0.91
Salmon 2013, ³⁰ CT (SWEOC)	EoHAQ: Recovery Problems >1 (%)	316	87		119	86.6				OR: 1.04 (0.56 to 1.93)	0.91

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Hunt 2009, ²⁹ , Salmon 2013, ³⁰ CT (Liverpool)	OHS (raw score)	316	26.5	25.7 to 27.3 (95% CI)	87	31.6	29.6 to 33.5 (95% CI)	26.5 (7.2)	31.6 (9.1)	<i>d</i> = -0.66 (-0.91 to -0.42)	<0.001
Hunt 2009, ²⁹ , Salmon 2013, ³⁰ CT (Liverpool)	WOMAC Pain (raw score)	316	4.4	4.0 to 4.8 (95% CI)	87	5.3	4.3 to 6.3 (95% CI)	4.4 (3.6)	5.3 (4.7)	<i>d</i> = -0.23 (-0.47 to 0.01)	0.06
Hunt 2009, ²⁹ , Salmon 2013, ³⁰ CT (Liverpool)	WOMAC Stiffness (raw score)	316	2.7	2.5 to 2.9 (95% CI)	87	3	2.6 to 3.4 (95% CI)	2.7 (1.8)	3 (1.9)	<i>d</i> = -0.16 (-0.4 to 0.07)	0.17
Hunt 2009, ²⁹ , Salmon 2013, ³⁰ CT (Liverpool)	WOMAC Function (raw score)	316	23.5	21.9 to 25.1 (95% CI)	87	24	21.4 to 26.6 (95% CI)	23.5 (14.5)	24 (12.2)	<i>d</i> = -0.04 (-0.27 to 0.2)	0.77
Hunt 2009, ²⁹ , Salmon 2013, ³⁰ CT (Liverpool)	SF-12 Physical subscale (raw score)	316	38	36.8 to 39.2 (95% CI)	87	36.2	34.4 to 38 (95% CI)	38 (10.8)	36.2 (8.4)	<i>d</i> = 0.17 (-0.06 to 0.41)	0.15
Hunt 2009, ²⁹ , Salmon 2013, ³⁰ CT (Liverpool)	SF-12 Mental Subscale (raw score)	316	49.9	48.7 to 51.1 (95% CI)	87	49.5	47.1 to 51.9 (95% CI)	49.9 (10.8)	49.5 (11.3)	<i>d</i> = 0.04 (-0.2 to 0.27)	0.76
Hunt 2009, ²⁹ , Salmon 2013, ³⁰ CT (Liverpool)	EuroQol Index (raw score)	316	0.72	0.7 to 0.74 (95% CI)	87	0.7	0.66 to 0.74 (95% CI)	0.7 (0.2)	0.7 (0.2)	<i>d</i> = 0.11 (-0.13 to 0.35)	0.37

Study, Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (Liverpool)	EuroQol VAS (raw score)	316	72	25.7 to 27.3 (95% CI)	119	29.8	28.2 to 31.4 (95% CI)	72 (16.3)	29.8 (8.8)	<i>d</i> = -0.43 (-0.64 to -0.22)	<0.001
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWLEOC)	OHS (raw score)	316	26.5	25.7 to 27.3 (95% CI)	119	29.8	28.2 to 31.4 (95% CI)	26.5 (7.2)	29.8 (8.8)	<i>d</i> = -0.43 (-0.64 to -0.22)	<0.001
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWLEOC)	WOMAC Pain (raw score)	316	4.4	4 to 4.8 (95% CI)	119	4.7	3.9 to 5.5 (95% CI)	4.4 (3.6)	4.7 (4.4)	<i>d</i> = -0.08 (-0.29 to 0.13)	0.41
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWLEOC)	WOMAC Stiffness (raw score)	316	2.7	2.5 to 2.9 (95% CI)	119	2.4	2.2 to 2.6 (95% CI)	2.7 (1.8)	2.4 (1.1)	<i>d</i> = 0.18 (-0.03 to 0.39)	0.09
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWLEOC)	WOMAC Function (raw score)	316	23.5	21.9 to 25.1 (95% CI)	119	20.3	18.1 to 22.5 (95% CI)	23.5 (14.5)	20.3 (12.1)	<i>d</i> = 0.23 (0.02 to 0.44)	0.03
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWLEOC)	SF-12 Physical subscale (raw score)	316	38	36.8 to 39.2 (95% CI)	119	36.6	35 to 38.2 (95% CI)	38 (10.8)	36.6 (8.8)	<i>d</i> = 0.14 (-0.08 to 0.35)	0.20
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWLEOC)	SF-12 Mental subscale (raw score)	316	49.9	48.7 to 51.1 (95% CI)	119	50.3	48.3 to 52.3 (95% CI)	49.9 (10.8)	50.3 (11)	<i>d</i> = -0.04 (-0.25 to 0.17)	0.73

Study, Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWLEOC)	EuroQol Index (raw score)	316	0.72	0.7 to 0.74 (95% CI)	119	0.74	0.7 to 0.78 (95% CI)	0.7 (0.2)	0.7 (0.2)	<i>d</i> = -0.1 (-0.31 to 0.11)	0.33
Hunt 2009, ²⁹ Salmon 2013, ³⁰ CT (SWLEOC)	EuroQol VAS (raw score)	316	72	70.2 to 73.8 (95% CI)	119	73.9	71.1 to 76.7 (95% CI)	72 (16.3)	73.9 (15.4)	<i>d</i> = -0.12 (-0.33 to 0.09)	0.27

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs, imputed where necessary. P-values are from independent samples t-tests. HADS=Hospital Anxiety and Depression Scale; VAS=Visual Analogue Scale; AKSS=American Knee Society Score; WOMAC=Western Ontario and McMaster Universities Osteoarthritis Index; SF-36=Short Form 36; LASA PAQ=Longitudinal Ageing Study Amsterdam Physical Activity Questionnaire; n=sample size; p.o = post-operative; KOOS = Knee injury and Osteo-arthritis Outcome Score; ADL= Activities of Daily Living; NRS=Numerical Rating Scale; OHS=Oxford Hip Score; SWLEOC=South West London Elective Orthopaedic Centre; SD=standard deviation; CI=Confidence interval; SF-12=Short form 12;

Table 8. Data for clinical outcomes for each study trialling a Prehabilitation intervention vs Usual care, to improve recovery following lower limb arthroplasty. Reported values are presented (mean and standard deviation (SD) unless indicated).

Study, Design	Outcome (units)	Intervention			Comparator			<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance		
Beaupre 2004, ³¹ RCT	LOS (days)	55	6.7	2.2	60	7.3	2.5	<i>d</i> = -0.25 (-0.62 to 0.11)	0.18
Cavill 2016, ³² RCT	LOS (days)	29	6.9	2.7	30	6.9	2.7	<i>d</i> = 0 (-0.51 to 0.51)	1.0
Hoozeboom 2012, ³³ RCT	LOS (days)	10	6 (median)	5 to 22 (range)	11	6 (median)	4 to 7 (range)		
Hoozeboom 2012, ³³ RCT	Total complications (n)	10	2		11	0			0.12
McGregor 2004, ³⁴ RCT	LOS (days)	19	15		20	18			
Soeters 2018 ³⁵ , RCT	LOS (days)	63	2.6	0.80	63	2.4	0.9	<i>d</i> = -0.23 (-0.59 to 0.12)	0.19
Soeters 2018 ³⁵ , RCT	Readiness for discharge (days)	63	2.7	1.3	63	1.6	1.3	<i>d</i> = -0.85 (-1.21 to -0.48)	<0.001
Williamson 2007, ³⁶ RCT	LOS (days)	60	6.49	1.99	61	6.6	2.62	<i>d</i> = -0.04 (-0.40 to 0.31)	0.80

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). LOS=Length of stay; SD=Standard deviation; CI=Confidence interval; OR=Odds Ratio; n=sample size; RCT=Randomised controlled trial

Table 9. Data for patient-reported outcomes for each study trialling a Prehabilitation intervention vs Usual care, to improve recovery from lower limb arthroplasty. Mean and standard deviation (SD) are presented throughout.

Study, Design	Outcome (units)	Intervention			Comparator			Imputed mean (SD)	Imputed mean (SD)	<i>d</i> (95% CI)	p
		n	Mean	SD	n	Mean	SD				
Beaupre 2004, ³¹ RCT	WOMAC - Pain	51	74	18	58	73	14			<i>d</i> = 0.06 (-0.31 to 0.44)	0.75
Beaupre 2004, ³¹ RCT	WOMAC - Stiffness	51	62	17	58	61	18			<i>d</i> = 0.06 (-0.32 to 0.43)	0.77
Beaupre 2004, ³¹ RCT	WOMAC – Function	51	73	17	58	73	15			<i>d</i> = 0 (-0.38 to 0.38)	1.0
Beaupre 2004, ³¹ RCT	SF-36 – Physical Function	51	43	20	58	49	22			<i>d</i> = -0.28 (-0.66 to 0.09)	0.14
Beaupre 2004, ³¹ RCT	SF-36 – Physical Role	51	26	35	58	28	37			<i>d</i> = -0.06 (-0.43 to 0.32)	0.77
Beaupre 2004, ³¹ RCT	SF-36 – Bodily pain	51	55	21	58	56	18			<i>d</i> = -0.05 (-0.43 to 0.32)	0.79
Beaupre 2004, ³¹ RCT	SF-36 – General Health	51	75	15	58	75	15			<i>d</i> = 0 (-0.38 to 0.38)	1.0
Beaupre 2004, ³¹ RCT	SF-36 – Mental Health	51	-78	17	58	-79	16			<i>d</i> = 0.06 (-0.32 to 0.44)	0.75
Beaupre 2004, ³¹ RCT	SF-36 – Vitality	51	57	19	58	60	18			<i>d</i> = -0.16 (-0.54 to 0.21)	0.40
Beaupre 2004, ³¹ RCT	SF-36 – Social Function	51	70	21	58	75	24			<i>d</i> = -0.22 (-0.6 to 0.16)	0.25
Beaupre 2004, ³¹ RCT	SF-36 – Emotional Role	51	-70	42	58	-73	39			<i>d</i> = 0.07 (-0.3 to 0.45)	0.70
Beaupre 2004, ³¹ RCT	SF-36 – Physical Component	51	35	9	58	35	8			<i>d</i> = 0 (-0.38 to 0.38)	1.0
Beaupre 2004, ³¹ RCT	SF-36 – Mental Component	51	-54	10	58	-55	11			<i>d</i> = 0.09 (-0.28 to 0.47)	0.62
Cavill 2016, ³² RCT	EQ-5D VAS (TKA/THA combined)	29	70.3	22	30	70.5	15.7			<i>d</i> = -0.01 (-0.52 to 0.5)	0.97
Cavill 2016, ³² RCT	EQ-5D Utility (TKA/THA combined)	29	0.64	0.26	30	0.68	0.17			<i>d</i> = -0.18 (-0.69 to 0.33)	0.49

Study, Design	Outcome (units)	Intervention			Comparator			Intervention Imputed mean (SD)	Comparator Imputed mean (SD)	<i>d</i> (95% CI)	p
		n	Mean	SD	n	Mean	SD				
Hoogeboom 2012, ³³ RCT	LASA PAQ (kcal/minutes/kg)	10	0.04	0.01	10	0.04	0.01			<i>d</i> = 0 (-0.88 to 0.88)	1.0
Hoogeboom 2012, ³³ RCT	Pain - VAS	10	37.7	18	10	49.3	24.7				
Hoogeboom 2012, ³³ RCT	HOOS – Pain	10	55.3	12.0	10	49.3	17.0				
Hoogeboom 2012, ³³ RCT	HOOS – Symptoms	10	56.5	14.2	10	59.0	15.6				
Hoogeboom 2012, ³³ RCT	HOOS – Function daily activities	10	51.1	10.5	10	59.0	15.6				
Hoogeboom 2012, ³³ RCT	HOOS – Function sport and recreation	10	25.0	14.4	10	32.5	20.2				
Hoogeboom 2012, ³³ RCT	HOOS – Quality of Life	10	36.3	15.8	10	43.3	15.4				
McGregor 2004, ³⁴ RCT	Pain (VAS 1-10)	19	7.8	1.5	20	7.6	2			<i>d</i> = 0.11 (-0.52 to 0.74)	0.73
McGregor 2004, ³⁴ RCT	WOMAC Pain (raw score)	19	10.2	2.7	20	10.3	4.1			<i>d</i> = -0.03 (-0.66 to 0.60)	0.93
McGregor 2004, ³⁴ RCT	WOMAC Stiffness (raw score)	19	4.3	1.3	20	4.1	1.7			<i>d</i> = 0.13 (-0.50 to 0.76)	0.68
McGregor 2004, ³⁴ RCT	WOMAC Function (raw score)	19	35.8	12	20	41	10			<i>d</i> = -0.47 (-1.11 to 0.17)	0.15
McGregor 2004, ³⁴ RCT	Harris Hip score (raw score)	19	45.4	11.5	20	43.2	16.2			<i>d</i> = 0.16 (-0.47 to .78)	0.62
McGregor 2004, ³⁴ RCT	Barthel ADL (raw score)	19	19.2	1.3	20	19	1.3			<i>d</i> = 0.15 (-0.48 to 0.78)	0.63
Soeters 2018, ³⁵ RCT	WOMAC – Pain score	63	1	1 to 2 (95%)	63	2.6	2 to 4 (95% CI)	1 (0.76)	3 (1.52)	<i>d</i> = -1.66 (-2.07 to -1.26)	<0.001

Study, Design	Outcome (units)	Intervention			Comparator			Intervention Imputed mean (SD)	Comparator Imputed mean (SD)	<i>d</i> (95% CI)	p
		n	Mean	SD	n	Mean	SD				
Soeters 2018, ³⁵ RCT	WOMAC – Stiffness score	63	1	1 to 2 (95% CI)	63	3	3 to 3 (95% CI)	1 (0.76)	3 (0)	<i>d</i> = 0 (0 to 0)	<0.001
Soeters 2018, ³⁵ RCT	WOMAC – Function score	63	3	2 to 4 (95% CI)	63	9	7 to 11 (95% CI)	3 (1.52)	9 (3.03)	<i>d</i> = -2.5 (-2.97 to -2.04)	<0.001
Soeters 2018, ³⁵ RCT	WOMAC – Total score	63	6	4 to 8 (95% CI)	63	14	11 to 17 (95% CI)	6 (3.03)	14 (4.55)	<i>d</i> = -2.07 (-2.5 to -1.64)	<0.001
Williamson 2007, ³⁶ RCT	Oxford Knee Score (raw score)	60	28.3	9.78	61	26.7	7.45			<i>d</i> = 0.18 (-0.17 to 0.54)	0.31
Williamson 2007, ³⁶ RCT	Pain (VAS 1-10)	60	3.86	2.59	61	3.95	2.59			<i>d</i> = -0.04 (-0.39 to 0.32)	0.85
Williamson 2007, ³⁶ RCT	WOMAC (raw score)	60	26.0	17.7	61	24.6	16.8			<i>d</i> = 0.08 (-0.27 to 0.44)	0.66
Williamson 2007, ³⁶ RCT	HADS Anxiety (raw score)	60	4.26	4.04	61	2.42	2.39			<i>d</i> = 0.56 (0.21 to 0.94)	<0.001
Williamson 2007, ³⁶ RCT	HADS Depression (raw score)	60	3.43	2.54	61	3.68	2.93			<i>d</i> = -0.11 (-0.47 to 0.25)	0.62

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). LOS=Length of stay; SD=Standard deviation; CI=Confidence interval; OR=Odds Ratio; n=sample size; CT=Controlled trial; WOMAC=Western Ontario and McMaster Universities Osteoarthritis Index; HADS=Hospital anxiety and depression scale; VAS=Visual analogue scale; ADL=Activities of daily living; SF-36=Short-form 36; THA=Total hip arthroplasty; TKA=Total knee arthroplasty; LASA PAQ=Longitudinal Ageing Study Amsterdam Physical Activity Questionnaire; HOOS= Hip disability and osteoarthritis score.

Table 10. Data for all outcomes for studies trialling Rehabilitation interventions vs Usual care, to improve recovery from lower limb arthroplasty. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study, Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
den Hertog 2012, ³⁷ RCT	LOS (days)	69	6.75		71	13.2					
den Hertog 2012, ³⁷ RCT		69	8		71	12				OR: 0.64 (0.25 to 1.69)	0.37
den Hertog 2012, ³⁷ RCT	WOMAC (raw score, Per protocol)	69	271.5 (median)	240.2 to 302.7 (95% CI)	71	345.4 (median)	312.3 to 378.6 (95% CI)	271.5 (47.3)	345.4 (50.2)	<i>d</i> = -1.52 (-1.89 to -1.14)	<0.001
den Hertog 2012, ³⁷ RCT	WOMAC (raw score, ITT cohort)	74	275.5 (median)	245.3 to 305.7 (95% CI)	73	345.7 (median)	313.2 to 378.3 (95% CI)	275.5 (45.6)	345.7 (49.3)	<i>d</i> = -1.48 (-1.85 to -1.11)	<0.001
Vesterby 2017, ³⁸ RCT	LOS (days)	36	1 (median)	1 to 5 (range)	36	2 (median)	1 to 4 (range)				
Vesterby 2017, ³⁸ RCT	Unplanned telephone calls from patient/patient (n)	36	0.92	0.6 to 0.7 (range)	36	1.5	1.1 to 1.9 (range)			OR: 0.6 (0.04 to 8.43)	0.70
Vesterby 2017, ³⁸ RCT	Unplanned extra visits to hospital/patient (n)	36	0.17	-0.01 to 0.34 (range)	36	0.31	0.04 to 0.57 (range)			OR: 0.55 (0 to 206.16)	0.84
Vesterby 2017, ³⁸ RCT	Readmissions/patient (n)	36	0.03	-0.03 to 0.08 (range)	36	0					0.86

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). LOS=Length of stay; SD=Standard deviation; CI=Confidence interval; OR=Odds Ratio; n=sample size; WOMAC=Western Ontario and McMaster Universities Osteoarthritis Index; ITT=Intention to treat

Table 11. Data for clinical outcomes for each study trialling an intervention to improve recovery after cardiac surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study, Design	Outcome (units)	Intervention			Comparator			Intervention Imputed Mean (SD)	Comparator Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
ERP vs Usual Care											
Bennett 2020, ³⁹ RCT	LOS (<24 hours)	90	41		89	25				OR: 2.14 (1.15 to 3.99)	0.02
Bennett 2020, ³⁹ RCT	LOS (25-48 hours)	90	26		89	35				OR: 0.63 (0.34 to 1.17)	0.14
Bennett 2020, ³⁹ RCT	LOS (>48 hours)	90	21		89	31				OR: 0.57 (0.3 to 1.1)	0.09
Bennett 2020, ³⁹ RCT	LOS (≤ 7 days)	90	50		90	44				OR: 1.31 (0.73 to 2.35)	0.37
Bennett 2020, ³⁹ RCT	LOS (8-12 days)	90	21		90	28				OR: 1.31 (0.73 to 2.35)	0.37
Bennett 2020, ³⁹ RCT	LOS (≥ 13 days)	90	19		90	18				OR: 1.07 (0.52 to 2.21)	0.85
Sadlonova 2022, ⁴⁰ , RCT	LOS (admission to discharge, days)	29	9.31	2.29	29	12.48	6.92			<i>d</i> = -0.62 (-1.14 to -0.09)	0.02
Sadlonova 2022, ⁴⁰ RCT	LOS ICU (days)	29	2.07	1.82	29	3.21	3.74			<i>d</i> = -0.39 (-0.91 to 0.13)	0.15
Prehabilitation vs Usual care											
Arthur 2000, ⁴¹ RCT	Time until order for discharge from ICU (h)	123	19.7 (median)	15.9 to 23.3 (IQR)	123	21.2 (median)	18.5 to 39.6 (IQR)	19.6 (5.5)	26.4 (15.8)	<i>d</i> = -0.57 (-0.83 to -0.32)	<0.001
Arthur 2000, ⁴¹ RCT	Actual time in ICU (h)	123	24.7 (median)	21.7 to 41.9 (IQR)	123	26.7 (median)	22.8 to 46.5 (IQR)	29.4 (15.1)	32.0 (17.8)	<i>d</i> = -0.16 (-0.41 to 0.09)	0.22
Arthur 2000, ⁴¹ RCT	Time spent in the hospital after surgery (days)	123	5 (median)	5 to 6 (IQR)	123	6 (median)	5 to 7 (IQR)	5.3 (0.8)	6.0 (1.5)	<i>d</i> = -0.58 (-0.84 to -0.33)	<0.001

Study, Design	Outcome (units)	Intervention			Comparator			Intervention	Comparator	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance	Imputed Mean (SD)	Imputed Mean (SD)		
Arthur 2000, ⁴¹ RCT	Total time in hospital (days)	123	6 (median)	5 to 7 (IQR)	123	7 (median)	6 to 8 (IQR)	6.0 (1.5)	7.0 (1.5)	<i>d</i> = -0.67 (-0.92 to -0.41)	< 0.001
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	LOS (days)	37	12.62	5.19	41	17.27	11.08			<i>d</i> = -2.52 (-3.12 to -1.92)	0.02
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	Readmission (n)	37	3		41	9				OR: 0.31 (0.08 to 1.26)	0.09
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	Complications (n)	37	9		41	13				OR: 0.69 (0.26 to 1.88)	0.47
Rehabilitation vs Exercise Therapy											
Van der Peijl 2004, ⁴⁴ RCT	LOS (days)	134	7 (median)	4 to 15 (IQR)	112	7 (median)	3 to 8 (IQR)				
Van der Peijl 2004, ⁴⁴ RCT	Mortality (n)	134	1		112	13				OR: 0.27 (0.03 to 2.66)	0.23
Discharge Planning vs Usual Care											
King 2008, ⁴⁵ RCT	LOS (hours)	23	26.08	7.16	23	27.44	7.15			<i>d</i> = -0.19 (-0.77 to 0.39)	0.52
King 2008, ⁴⁵ RCT	Readmission (30 days) (n)	23	2		23	3				OR: 0.63 (0.1 to 4.21)	0.64

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). OR=Odds Ratio; LOS=Length of stay; SD=Standard deviation; CI=Confidence interval; ICU=Intensive Care Unit; IQR=Interquartile range; n=sample size

Table 12. Data for patient-reported outcomes for each study trialling an intervention to improve recovery from cardiac surgery. Mean and standard deviation are presented throughout.

Study, Design	Outcome (units)	Intervention			Comparator			<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance		
ERP vs Usual Care									
Bennett 2020, ³⁹ RCT	Neurodysfunction – HADS A (n yes)	67	4	58	0				
Bennett 2020, ³⁹ RCT	Neurodysfunction – HADS D (n yes)	67	3	58	2			OR: 1.31 (0.21 to 8.14)	0.78
Bennett 2020, ³⁹ RCT	Functionality – Better (n)	74	15	66	9			OR: 1.61 (0.65 to 3.97)	0.30
Bennett 2020, ³⁹ RCT	Functionality – No different (n)	74	51	66	38			OR: 1.63 (0.82 to 3.27)	0.16
Bennett 2020, ³⁹ RCT	Functionality – Worse (n)	74	8	66	19			OR: 0.3 (0.12 to 0.74)	0.01
Bennett 2020, ³⁹ RCT	General well-being – Better (n)	74	42	66	30			OR: 1.58 (0.81 to 3.07)	0.18
Bennett 2020, ³⁹ RCT	General well-being – Same (n)	74	16	66	18			OR: 0.74 (0.34 to 1.6)	0.44
Bennett 2020, ³⁹ RCT	General well-being – Worse (n)	74	16	66	18			OR: 0.74 (0.34 to 1.6)	0.44
Bennett 2020, ³⁹ RCT	Impact of study – Better (n)	74	25	66	20			OR: 1.17 (0.58 to 2.39)	0.66
Bennett 2020, ³⁹ RCT	Impact of study – Better (n)	74	25	66	20			OR: 1.17 (0.58 to 2.39)	0.66
Bennett 2020, ³⁹ RCT	Impact of study – Worse (n)	74	1	66	0				
Sadlonova 2022, ⁴⁰ RCT	EQVas - HRQoL	29	66.4	19.3	29	58.1	19.4	<i>d</i> =0.43 (-0.09 to 0.95)	0.11
Sadlonova 2022, ⁴⁰ RCT	Self-efficacy expectations	29	3.92	0.89	29	3.44	1.09	<i>d</i> =-0.48 (-0.04 to 1.00)	0.07

Study, Design	Outcome (units)	Intervention			Comparator			<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance		
Prehabilitation vs Usual care									
Arthur 2000, ⁴¹ RCT	SF-36: Physical role subscale (Mean change from baseline)	111	9.46	34.39	109	-2.06	33.7	<i>d</i> = 0.34 (-0.07 to -0.6)	0.01
Arthur 2000, ⁴¹ RCT	SF-36: Physical functioning subscale (Mean change from baseline)	111	-1.17	18.46	109	-6.56	20.12	<i>d</i> = 0.28 (0.01 to 0.54)	0.04
Arthur 2000, ⁴¹ RCT	SF-36: General health subscale (Mean change from baseline)	111	8.22	18.2	109	4.14	18.78	<i>d</i> = 0.22 (-0.04 to 0.49)	0.10
Arthur 2000, ⁴¹ RCT	SF-36: Bodily pain subscale (Mean change from baseline)	111	3.58	22.24	109	4.11	20.54	<i>d</i> = -0.02 (-0.294 to 0.24)	0.85
Arthur 2000, ⁴¹ RCT	SF-36: Physical composite summary score (Mean change from baseline)	111	1.55	7.48	109	-1.46	7.81	<i>d</i> = 0.39 (-0.13 to 0.66)	<0.001
Arthur 2000, ⁴¹ RCT	SF-36: Vitality subscale (Mean change from baseline)	111	-0.95	18.46	109	-1.19	15.48	<i>d</i> = 0.01 (-0.25 to 0.28)	0.92
Arthur 2000, ⁴¹ RCT	SF-36: Social functioning subscale (Mean change from baseline)	111	4.5	24.7	109	0.92	24.1	<i>d</i> = 0.15 (-0.12 to 0.41)	0.28
Arthur 2000, ⁴¹ RCT	SF-36: Emotional role subscale (Mean change from baseline)	111	7.51	45.32	109	16.82	44.82	<i>d</i> = -0.21 (-0.47 to 0.06)	0.12
Arthur 2000, ⁴¹ RCT	SF-36: Mental health subscale (Mean change from baseline)	111	2.05	18.52	109	0.77	17.11	<i>d</i> = 0.07 (-0.19 to -0.34)	0.60
Arthur 2000, ⁴¹ RCT	SF-36: Mental composite summary score (Mean change from baseline)	111	1.54	10.55	109	2.93	9.15	<i>d</i> = -0.14 (-0.41 to 0.12)	0.30

Study, Design	Outcome (units)	Intervention			Comparator			<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance		
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	Pain disability index	37	12.2	5.7	41	20.8	8.4	<i>d</i> =-1.19 (-1.67 to -0.71)	<0.001
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	SF-12 (mental component)	37	56.7	3.8	41	50.6	5.5	<i>d</i> =1.30 (0.81 to 1.79)	<0.001
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	SF-12 (physical component)	37	44.8	5.6	41	40.3	13.4	<i>d</i> =0.43 (-0.02 to 0.88)	0.06
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	Fitness for work	37	25.4	8.5	41	16.0	8.4	<i>d</i> =1.12 (0.64 to 1.60)	<0.001
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	IPAQ – Physical activity levels	37	4700.6	1897.0	41	2957.6	1274.0	<i>d</i> =1.09 (0.61 to 1.57)	<0.001
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	Cardiac anxiety	37	2.3	0.28	41	2.5	0.29	<i>d</i> =-0.74 (-1.20 to -0.28)	0.002
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	HADS - Anxiety	37	3.6	2.1	41	3.2	1.3	<i>d</i> =.21 (-0.23 to 0.66)	0.31
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	HADS - Depression	37	2.6	1.5	41	3.7	1.6	<i>d</i> =-0.70 (-1.15 to -0.24)	0.002
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	IPQ-E expected illness perception questionnaire – outcome expectations	37	12.1	0.88	41	11.9	0.95	<i>d</i> =0.16 (-0.28 to 0.61)	0.34
Rief 2017, ⁴² Auer 2017, ⁴³ RCT	IPQ-E expected illness perception questionnaire – expected personal control	37	16.1	1.0	41	15.2	1.1	<i>d</i> =0.84 (0.37 to 1.30)	0.003
Rehabilitation vs Exercise Therapy									
van der Peijl 2004, ⁴⁴ RCT	Self-care scale	134	38.9	2.5	112	38.9	2.5	<i>d</i> = 0 (-0.25 to 0.25)	1.0

Study, Design	Outcome (units)	Intervention			Comparator			<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance		
van der Peijl 2004, ⁴⁴ RCT	Functional independence measure: Transfers scale	134	20.2	1.2	112	20.2	1.4	<i>d</i> = 0 (-0.25 to 0.25)	1.0
van der Peijl 2004, ⁴⁴ RCT	Functional independence measure: Locomotion scale	134	12.2	1.4	112	12.1	1.5	<i>d</i> = 0.07 (-0.18 to 0.32)	0.59
Discharge Planning vs Usual Care									
King 2008, ⁴⁵ RCT	Hospital discharge survey – overall satisfaction score	20	26.5	2.69	17	25	3.16	<i>d</i> = 0.51 (-0.12 to 1.14)	0.13
King 2008, ⁴⁵ RCT	Hospital discharge survey – overall health satisfaction	20	2.6	0.75	17	3.12	0.70	<i>d</i> = -0.72 (-1.36 to -0.08)	0.04

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs, imputed where necessary. P-values are from independent samples t-tests. IPAQ= International Physical Activity Questionnaire; SF-36=Short Form 36; n=sample size; SF-36=Short form 36

Table 13. Data for clinical outcomes for each study trialling an ERP intervention to improve recovery from upper abdominal surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study, Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Jones 2013, ⁴⁶ RCT	Postop LOS (days)	46	4 (median)	3 to 5 (IQR)	45	7 (median)	6 to 8 (IQR)	4.0 (1.5)	7.0 (1.5)	<i>d</i> = -2 (-2.51 to -1.49)	< 0.001
Jones 2013, ⁴⁶ RCT	Readmissions (n)	46	2		45	0					0.16
Jones 2013, ⁴⁶ RCT	Mortality (n)	46	1		45	1					1.0
Jones 2013, ⁴⁶ RCT	Total liver complications (n)	46	10		45	8				OR: 1.28 (0.46 to 3.62)	0.64
Jones 2013, ⁴⁶ RCT	Patients with liver complications (%)	46	15		45	11				OR: 1.43 (0.41 to 4.91)	.57
Jones 2013, ⁴⁶ RCT	Number of general complications (n)	46	4		45	20				OR: 0.12 (0.04 to 0.39)	< 0.001
Jones 2013, ⁴⁶ RCT	Patients with general complications (n)	46	3		45	12				OR: 0.2 (0.05 to 0.75)	0.01
Kapritsou 2017 ⁴⁷ RCT	LOS (days)	29	5.93	2.49	34	11.91	5.52			<i>d</i> = -1.36 (-1.91 to -0.81)	< 0.001
Kapritsou 2017, ⁴⁷ RCT	Total complications (n)	29	7		34	7				OR: 0.32 (0.11 to 0.94)	0.04

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). LOS=Length of stay; SD=Standard deviation; CI=Confidence interval; OR=Odds Ratio; C-D=Clavien-Dindo; n=sample size; IQR=Interquartile rang.

Table 14. Data for patient-reported outcomes for each study trialling an ERP intervention vs Usual care, to improve recovery from upper abdominal surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study, Design	Outcome (units)	Intervention			Comparator			Imputed Mean (SD)	Imputed Mean (SD)	<i>d</i> (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Jones 2013, ⁴⁶ RCT	Time to being medically fit for discharge (days)	46	3	3-4	45	6	6-7	3.3 (0.8)	6.3 (0.8)	<i>d</i> = -3.92 (-4.63 to -3.21)	<0.001
Jones 2013, ⁴⁶ RCT	EQ-5D (Area Under Curve)	46	37.2		45	35.6					
Kapritsou 2017, ⁴⁷ RCT	Pain (VAS 0-10)	29	3	2.2	34	2.6	1.06			<i>d</i> = 0.24 (-0.26 to 0.74)	0.35
Kapritsou 2017, ⁴⁷ RCT	Sadness (VAS 0-10)	29	4.35	2.26	34	4.16	3.32			<i>d</i> = 0.07 (-0.43 to 0.56)	0.80
Kapritsou 2017, ⁴⁷ RCT	Stress (VAS 0-10)	29	4.64	2.85	34	4.42	3.63			<i>d</i> = 0.07 (-0.43 to 0.56)	0.79
Kapritsou 2017, ⁴⁷ RCT	Optimism (VAS 0-10)	29	7.19	2.63	34	7.27	2.42			<i>d</i> = -0.03 (-0.53 to 0.46)	0.90

Standardised (Cohen's *d*) and non-standardised mean differences with 95% confidence intervals were calculated from means and SDs (imputed where necessary). P-values are from independent samples t-tests. VAS=Visual Analogue Scale; POD=Postoperative Day; n=sample size

Table 15. Data for all effectiveness and patient-reported outcomes for the one study trialling a Prehabilitation vs Usual care, intervention to improve recovery after upper abdominal surgery. Reported values are presented (mean and standard deviation (SD) unless indicated), as well as imputed means and SD where calculated.

Study, Design	Outcome (units)	Intervention			Comparator			Intervention Imputed Mean (SD)	Comparator Imputed Mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Dunne 2016, ⁴⁸ RCT	LOS (days)	19	5 (median)	4 to 6 (IQR)	15	5 (median)	4.5 to 7 (IQR)	5.0 (1.6)	5.5 (2)	<i>d</i> = -0.28 (-0.96 to 0.4)	0.42
Dunne 2016, ⁴⁸ RCT	Duration of stay in critical care (days)	19	1 (median)	1 to 2 (IQR)	15	1.5 (median)	1 to 2 (IQR)	1.3 (0.8)	1.5 (0.8)	<i>d</i> = -0.21 (-0.89 to 0.47)	0.55
Dunne 2016, ⁴⁸ RCT	Patients with complications <30 days (n)	19	8		15	7				OR: 0.83 (0.21 to 3.25)	0.79
Dunne 2016, ⁴⁸ RCT	Readmissions (n)	19	4		15	0					0.06
Dunne 2016, ⁴⁸ RCT	SF-36: Physical health subscale (raw score)	19	53.0	27.0	16	53.0	21.0			<i>d</i> = 0 (-0.67 to 0.67)	1.0
Dunne 2016, ⁴⁸ RCT	SF-36: Mental health subscale (raw score)	19	63.0	25.0	16	61.0	20.0			<i>d</i> = 0.09 (-0.58 to 0.75)	0.8
Dunne 2016, ⁴⁸ RCT	SF-36: QoL subscale (raw score)	19	59.0	21.0	16	59.0	21.0			<i>d</i> = 0 (-0.67 to 0.67)	1.0

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data); VAS=Visual Analogue Scale; POD=Postoperative Day; n=sample size; IQR=Interquartile range; SF-36=Short form 36; QoL=Quality of life

Table 16. Data for all clinical and patient reported outcomes for the one study trialling an ERP vs Usual care intervention to improve recovery from pelvic surgery. Reported values are presented (mean and standard deviation (SD) unless indicated).

Study, Design	Outcome (units)	Intervention			Comparator			<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance		
Frees 2018, ⁴⁹ RCT (pilot)	LOS (days)	10	6.1	5 – 7 (min – max)	13	7.39	5 – 11 (min-max)		
Frees 2018, ⁴⁹ RCT (pilot)	Clavien-dindo <2 (n)	10	2		13	0			
Frees 2018, ⁴⁹ RCT (pilot)	Readmission within 30 days (n)	10	1		13	0			
Frees 2018, ⁴⁹ RCT (pilot)	Pain – VAS Day of surgery	10	1.43	0 – 9 (range)	13	4.61	0 – 9 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	Pain – VAS POD 1	10	2.06	0 – 5 (range)	13	3.94	0 – 9 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	Pain – VAS POD 2	10	2.13	1 – 4 (range)	13	4.39	1 – 7 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	Pain – VAS POD 3	10	1.94	1 - 3 (range)	13	3.67	1 – 6 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	Pain – VAS POD 4	10	2.56	0 – 6 (range)	13	3.89	1 – 6 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	Pain – VAS POD 5	10	2.56	0 – 6 (range)	13	4.49	1 – 8 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	Pain – VAS POD 6	10	1.94	0 – 5.3 (range)	13	3.17	0 – 6.5 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	Pain – VAS POD 7	10	0.38	0 – 1 (range)	13	1.94	0 – 5.5 (range)		

Study, Design	Outcome (units)	Intervention			Comparator			<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance		
Frees 2018, ⁴⁹ RCT (pilot)	EORTC IN- PATSAT32 Patient satisfaction and experience	10	138	114 – 164 (range)	13	133.54	97 – 159 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	FACT-BL	10	57	15 – 82 (range)	13	53.17	35 – 83 (range)		
Frees 2018, ⁴⁹ RCT (pilot)	EPIC - Bowel	10	22.33	20 – 28 (range)	13	26.42	22 – 32 (range)		

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). OR=Odds Ratio; LOS=Length of stay; SD=Standard deviation; CI=Confidence interval; n=sample size; POD= Post-operative day; FACT-BL=The Functional Assessment of Cancer Therapy – Bladder; EPIC= Expanded Prostate Cancer; EORTC= European organisation for research and Treatment of Cancer Quality of Life Questionnaire

Table 17. Data for all outcomes for the study trialling a Prehabilitation intervention vs Rehabilitation, to improve recovery from thoracic surgery. Reported values are presented (mean and standard deviation (SD) unless indicated).

Study, Design	Outcome (units)	Intervention			Comparator			<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance		
Ferriera 2021, 50 RCT	LOS (n)	52	3.92	2.86	43	4	1.53		
Ferriera 2021, 50 RCT	30-day emergency visits (n)	52	9		43	9		OR: 0.79 (0.28 to 2.21)	0.65
Ferriera 2021, 50 RCT	Readmissions within 30 days (n)	52	4		43	6		OR: 0.51 (0.14 to 1.95)	0.32
Ferriera 2021, 50 RCT	FACT-L	52	105.6	12.3	43	101.3	16.3	<i>d</i> = 0.3 (-0.1 to 0.71)	0.15
Ferriera 2021, 50 RCT	SF-36 Physical component	52	56.6	13.7	43	48.1	14.3	<i>d</i> = 0.61 (0.19 to 1.02)	<0.001
Ferriera 2021, 50 RCT	SF-36 – Mental component	52	66.9	15.2	43	60.5	14.5	<i>d</i> = 0.43 (0.02 to 0.84)	0.04
Ferriera 2021, 50 RCT	SF-36 Total score	52	60.9	14.5	43	53.7	13.8	<i>d</i> = 0.51 (0.1 to 0.92)	0.02
Ferriera 2021, 50 RCT	CHAMPS	52	64.3	81.4	43	66.1	53.5	<i>d</i> = -0.03 (-0.43 to 0.38)	0.90
Ferriera 2021, 50 RCT	HADS – Anxiety	52	3.9	3.1	43	4.9	4.3	<i>d</i> = -0.27 (-0.68 to 0.13)	0.19
Ferriera 2021, 50 RCT	HADS – Depression	52	2.6	2.7	43	3.6	4.3	<i>d</i> = -0.28 (-0.69 to 0.12)	0.17

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data, imputed where necessary. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). OR=Odds Ratio; LOS=Length of Stay; SD=Standard deviation; CI=Confidence interval; n=sample size; FACT-L= Functional assessment of cancer therapy lung; CHAMPS= Community health activities modal program for seniors questionnaire; HADS=Hospital Anxiety and Depression Scale; SF-36=Short form 36

Table 18. Data for all outcomes from the study trialling an intervention to improve recovery for patients undergoing various tumour removal surgeries. Reported values are presented (mean and standard deviation (SD) unless indicated).

Study, Design	Outcome (units)	Intervention			Comparator			Imputed mean (SD)	Imputed mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Perioperative care programme vs Usual care											
Hempenius 2013, ⁵¹ RCT	Incidence of delirium (%)	117	9.4		129	14.3				OR: 0.62 (0.28 to 1.37)	0.24
Hempenius 2013, ⁵¹ RCT	Severity of delirium (%)	117	9		129	15				OR: 0.56 (0.25 to 1.24)	0.15
Hempenius 2013, ⁵¹ RCT	Length of hospital stay (days)	117	8 (median)	1 to 135 (range)	129	8 (median)	1 to 44 (range)				
Hempenius 2013, ⁵¹ RCT	Patients experiencing >1 complication (%)	117	33.1		129	28.6				OR: 1.24 (0.72 to 2.12)	0.45
Hempenius 2013, ⁵¹ RCT	Mortality (%)	117	7.9		129	3				OR: 2.77 (0.82 to 9.42)	0.09
Hempenius 2013, ⁵¹ RCT	Care dependency score (raw score)	112	72.29	8.92	124	73.53	9.08			OR: 0.94 (0.51 to 1.74)	0.84
Hempenius 2013, ⁵¹ RCT	Mini Mental State Examination (raw score)	87	26.68	2.97	92	26.33	3.91			OR: 1.02 (0.55 to 1.89)	0.96
Hempenius 2013, ⁵¹ RCT	SF-36 Physical function subscale (% same or better than baseline)	117	22.8		129	23.2				OR: 0.98 (0.54 to 1.77)	0.94
Hempenius 2013, ⁵¹ RCT	SF-36 Social function subscale (% same or better than baseline)	117	44.7		129	45.6				OR: 0.96 (0.58 to 1.59)	0.87

Study, Design	Outcome (units)	Intervention			Comparator			Intervention Imputed mean (SD)	Comparator Imputed mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
Hempenius 2013, ⁵¹ RCT	SF-36 Role Physical subscale (% same or better than baseline)	117	36		129	30.4				OR: 1.29 (0.76 to 2.19)	0.35
Hempenius 2013, ⁵¹ RCT	SF-36 Role Emotional subscale (% same or better than baseline)	117	48.2		129	59.2				OR: 0.64 (0.39 to 1.06)	0.08
Hempenius 2013, ⁵¹ RCT	SF-36 Mental Health subscale (% same or better than baseline)	117	62.3		129	56.8				OR: 1.26 (0.75 to 2.1)	0.38
Hempenius 2013, ⁵¹ RCT	SF-36 Vitality subscale (% same or better than baseline)	117	37.7		129	39.2				OR: 0.94 (0.56 to 1.57)	0.81
Hempenius 2013, ⁵¹ RCT	SF-36 Bodily pain subscale (% same or better than baseline)	117	50		129	32.8				OR: 2.05 (1.22 to 3.43)	0.01
Hempenius 2013, ⁵¹ RCT	SF-36 General Health subscale (% same or better than baseline)	117	58.8		129	54.4				OR: 1.2 (0.72 to 1.98)	0.49
Hempenius 2013, ⁵¹ RCT	SF-36 Health Change subscale (% same or better than baseline)	117	64.9		129	72.0				OR: 0.72 (0.42 to 1.23)	0.23
Hempenius 2013, ⁵¹ RCT	Return to pre-operative living	117	67.3		129	79.1				OR: 0.54 (0.31 to 0.97)	0.04

Study, Design	Outcome (units)	Intervention			Comparator			Intervention Imputed mean (SD)	Comparator Imputed mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
	situation (%)										
Hempenius 2013, ⁵¹ RCT	Patients with increased domestic help (%)	117	18.4		129	26.6			OR: 0.62 (0.34 to 1.14)	0.13	
Hempenius 2013, ⁵¹ RCT	Patients with increased care assistance (%)	117	57.5		129	60.0			OR: 0.9 (0.54 to 1.51)	0.70	
Hempenius 2013, ⁵¹ RCT	Patients with increased informal care (%)	111	36.3		124	30.3			OR: 1.31 (0.77 to 2.24)	0.32	
Hempenius 2013, ⁵¹ RCT	Readmissions <3 months (%)	117	22.9		129	18.3			OR: 1.33 (0.71 to 2.47)	0.37	
Booklet & Prehabilitation vs Usual care											
Schmidt 2015, ⁵² RCT	LOS (days)	326	9 (median)		329	9 (median)		7.67 (5.21)	9 (6.7)	<i>d</i> = -0.22 (-0.38 to -0.07)	<0.001
Schmidt 2015, ⁵² RCT	Patients with complications (n)	326	238		326	241			OR: 0.95 (0.67 to 1.35)	0.79	
Schmidt 2015, ⁵² RCT	Readmissions (n)	245	62		248	59			OR: 1.09 (0.72 to 1.64)	0.70	
Schmidt 2015, ⁵² RCT	EORTC QLQ-C30	227	69.27	66.45 to 72.14 (95%	216	69.79	66.84 to 72.74 (95% CI)	69.27 (4.25)	69.79 (4.4)	<i>d</i> = -0.12 (-0.31 to 0.07)	0.21

Study, Design	Outcome (units)	Intervention			Comparator			Intervention Imputed mean (SD)	Comparator Imputed mean (SD)	<i>d</i> or OR (95% CI)	p
		n	Estimate	Variance	n	Estimate	Variance				
CI)											
Schmidt 2015, ⁵² RCT	GDS – No depression (n)	191	159		195	161				OR: 1.05 (0.62 to 1.78)	0.86
Schmidt 2015, ⁵² RCT	GDS – Risk/manifest depression (n)	191	32		195	34				OR: 0.95 (0.56 to 1.62)	0.86

Standardised (Cohen's *d*) and non-standardised mean differences with 95% and confidence intervals were calculated from means and SDs for continuous data. Odds ratios and 95% confidence intervals were calculated for dichotomous data. P-values are from independent samples t-tests (for continuous data) or z-scores (for dichotomous data). OR=Odds Ratio; LOS=Length of Stay; SD=Standard deviation; CI=Confidence interval; OR=Odds Ratio; SF-36=Short Form 36; n=sample size; EORTC QLQ-C30=European organisation for research and Treatment of Cancer Quality of Life Questionnaire; GDS=Geriatric Depression Scale

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