

Supplemental Digital Content 1, Table 1. Recruitment numbers, language and institutional review board by site.

Site	Recruitment number	Language	Institutional Review Board*
Australia			
Alfred Hospital	165	English	The Alfred Hospital Office of Ethics & Research Governance
Royal Melbourne Hospital	84	English	Melbourne Health Office for Research
Freemantle Hospital	31	English	Freemantle Hospital Human Research Ethics Committee
Monash Medical Centre	63	English	Southern Health Human Research Ethics Committee
Hong Kong			
Prince of Wales Hospital	173	Cantonese	Joint Chinese University of Hong Kong – New Territories East Cluster Clinical Research Ethics Committee Shatin, New Territories, Hong Kong

*All Australian institutional review boards are located in Melbourne, Victoria, Australia.

Supplemental Digital Content 1, Table 2. A comparison of baseline demographics for those with complete (n =442) and incomplete (withdrawn or lost to follow up) (n =68) data at 6 months.

Patient Characteristics	Complete data n=442	Missing data n= 68	<i>P</i>
Age (years)	56 (14)	53 (17)	0.16
Gender			
Male / Female (Male)	266 /176 (60)	32 / 36 (47)	0.041
ASA physical status			
I	76 (17)	10 (15)	0.20
II	184 (42)	23 (34)	
III	155 (35)	33 (49)	
IV	24 (5.5)	2 (2.9)	
CSHA Clinical frailty scale*			
Median	3 [2-3.5]	3 [2-3.5]	0.25
P-POSSUM	2.1 (3.8)	1.4 (3.1)	0.15
Preoperative disability (WHODAS 2.0 score \geq 25)	93 (25)	22 (41)	0.014
Plasma albumin (g/L)	39 (5.3)	39 (6.0)	0.98
Plasma hemoglobin (g/L)	133 (19)	135 (17)	0.38
Plasma sodium (mmol/L)	140 (2.9)	139 (2.4)	0.009
Extent of surgery#			<0.001 [†]
Minor	33 (7.5)	7 (10)	
Moderate	125 (28)	33 (49)	
Major	171 (39)	21 (31)	
Major+	113 (26)	7 (10)	
Non-elective surgery	33 (7.5)	9 (13)	0.026

Mean (standard deviation), Number (%) or Median [interquartile range].

*CSHA Clinical Frailty Scale: no frailty 1.0-3.9; vulnerable 4.0-4.9; mild 5-5.9; moderate 6-6.9; and severe \geq 7.0.

Surgery of moderate severity includes appendicectomy, cholecystectomy, mastectomy, transurethral resection of prostate; major surgery includes any laparotomy, bowel resection, cholecystectomy with choledochotomy, peripheral vascular procedure or major amputation; major + surgery includes any aortic procedure, abdominoperineal resection, pancreatic or liver resection, oesophagogastrectomy.³⁶

[†]Chi-square for trend

ASA = American Society of Anesthesiologists; CSHA = Canadian Study of Health and Aging; P-POSSUM = Portsmouth Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity; WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 3. A comparison of baseline demographics for those with complete (n = 438) and incomplete (withdrawn or lost to follow up) (n = 72) data at 12 months.

Patient Characteristics	n= 438	n= 72	P
Age (years)	56 (15)	53 (16)	0.13
Gender			
Male / Female (Male)	260 / 178 (59)	38 / 34 (53)	0.29
ASA physical status			
I	75 (17)	11 (15)	0.25
II	182 (42)	25 (35)	
III	154 (35)	34 (47)	
IV	24 (5.5)	2 (2.8)	
CSHA clinical frailty scale*			
Median	3 [2-3.5]	2.8 [2-3.5]	0.21
P-POSSUM	2.1 (3.8)	1.3 (3.0)	0.03
Preoperative disability (WHODAS score \geq 25)	94 (25)	21 (38)	0.044
Plasma albumin (g/L)	39 (5.2)	38 (6.2)	0.13
Plasma hemoglobin (g/L)	133 (19)	135 (17)	0.98
Plasma sodium (mmol/L)	140 (2.9)	139 (2.4)	0.023
Extent of surgery [#]			0.003 [†]
Minor	32 (7.3)	8 (11)	
Moderate	127 (29)	31 (43)	
Major	168 (38)	24 (33)	
Major+	111 (25)	9 (13)	
Non-elective surgery	37 (8.4)	5 (7.2)	0.64

Mean (standard deviation), Number (%) or Median [interquartile range].

*CSHA Clinical Frailty Scale: no frailty 1.0-3.9; vulnerable 4.0-4.9; mild 5-5.9; moderate 6-6.9; and severe \geq 7.0.

[#] Surgery of moderate severity includes appendicectomy, cholecystectomy, mastectomy, transurethral resection of prostate; major surgery includes any laparotomy, bowel resection, cholecystectomy with choledochotomy, peripheral vascular procedure or major amputation; major + surgery includes any aortic procedure, abdominoperineal resection, pancreatic or liver resection, oesophagogastrectomy.³⁶

[†]Chi-square for trend

ASA = American Society of Anesthesiologists; CSHA = Canadian Study of Health and Aging; P-POSSUM = Portsmouth Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity; WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 4. Preoperative correlations of WHODAS with age and other health assessment scales ($P < 0.0005$ for all).

Variable	Correlation
Age ($P = 0.86$)	0.01
ASA physical status score [†]	0.22
CSHA Clinical frailty scale (Average) [†]	0.32
QoR-40 Dimension	
Comfort	-0.46
Emotions	-0.52
Physical Independence	-0.49
Patient Support	-0.24
Pain	-0.44
Total QoR-40 score	-0.60
Katz ADL	-0.56

Pearson's correlation unless otherwise stated.

[†]Spearman's Rho

ASA = American Society of Anesthesiologists; CSHA = Canadian Study of Health and Aging; Katz ADL = Katz Activities of Daily Living scale; QoR-40 = the 40-item quality of recovery score; WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 5. Day 30 correlation between WHODAS and QoR-40 stratified for extent of surgery and patient age.

	Correlation with WHODAS	<i>P</i> value
Extent of Surgery[#]		
Minor or Moderate	-0.70	
Major	-0.71	<0.0005
Major+	-0.71	
ASA physical status		
I and II	0.68	<0.0005
III	0.74	<0.0005
IV	0.64	0.011

[#] Surgery of moderate severity includes appendicectomy, cholecystectomy, mastectomy, transurethral resection of prostate; major surgery includes any laparotomy, bowel resection, cholecystectomy with choledochotomy, peripheral vascular procedure or major amputation; major + surgery includes any aortic procedure, abdominoperineal resection, pancreatic or liver resection, oesophagogastrectomy.³⁶

ASA = American Society of Anesthesiologists; QoR-40 = the 40-item quality of recovery score; WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 6. Duration of surgery, blood loss, length of hospital stay and ICU admission stratified for extent of surgery.

Extent of surgery [#]	Construct			
	Duration of surgery (min)	Blood loss (mls)	Length of hospital stay (days)	ICU admission
Minor or Moderate (n = 205)	65 [45-109]	50 [0-100]	1.9 [0.9-3.8]	2 (1.3)
Major (n = 170)	165 [102-230]	100 [20-300]	5.2 [3.9-8.0]	7 (3.6)
Major+ (n = 133)	219 [175-299]	350 [200-638]	8.1 [6.1-12]	75 (63)
	p<0.0005	p<0.0005	p<0.0005	p<0.0005

Median [interquartile range], Number (%).

[#] Surgery of moderate severity includes appendicectomy, cholecystectomy, mastectomy, transurethral resection of prostate; major surgery includes any laparotomy, bowel resection, cholecystectomy with choledochotomy, peripheral vascular procedure or major amputation; major + surgery includes any aortic procedure, abdominoperineal resection, pancreatic or liver resection, oesophagogastrectomy.³⁶

ICU = Intensive Care Unit.

Supplemental Digital Content 1, Table 7. Correlations* between WHODAS and Katz Activities of Daily Living scale, stratified for extent of surgery and age.

Extent of Surgery [#]	Correlation with WHODAS*		
	3 Month	6 Month	12 Month
Minor, or Moderate	-0.57	-0.58	-0.42 (Rho)
Major	-0.64	-0.59	-0.52
Major+	-0.66	-0.70	-0.43
ASA physical status			
I or II	-0.65	-0.66	-0.42
III	-0.57	-0.51	-0.47 (Rho)
IV	-0.60 (P=0.007)	-0.78	-0.54 (P=0.017)
Unstratified (entire cohort)	-0.61	-0.60	-0.47 (Rho)

P <0.0005 unless otherwise noted.

*Pearson's correlation coefficient used unless otherwise noted.

[#] Surgery of moderate severity includes appendectomy, cholecystectomy, mastectomy, transurethral resection of prostate; major surgery includes any laparotomy, bowel resection, cholecystectomy with choledochotomy, peripheral vascular procedure or major amputation; major + surgery includes any aortic procedure, abdominoperineal resection, pancreatic or liver resection, esophagogastrectomy.³⁶

EQ-5D = the EuroQOL EQ-5D Scale; Katz ADL = Katz Activities of Daily Living scale; WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 8. Correlation between WHODAS score and perception of surgery (*Spearman rho*).

	3 months		12 months	
	<i>rho</i>	<i>P value</i>	<i>rho</i>	<i>P value</i>
Was surgery worthwhile?	0.01	0.92	0.14	0.007
Did surgery make you feel better?	0.10	0.01	0.20	<0.0005
Did surgery improve your daily life?	0.13	0.052	0.10	0.057
Do you have trouble sleeping?	-0.39	<0.0005	-0.37	<0.0005

Perception of surgery assessed on a 5-point likert scale where: 0 = strongly agree; 1 = tend to agree; 2 = neither agree nor disagree; 3 = tend to disagree; and 4 = strongly disagree.

WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 9. Association between perception of surgery and new disability at 12 months.

	New disability*		P value
	Yes	No	
Was surgery worthwhile?	0	0	0.53
Did surgery make you feel better?	1.0	0	0.005
Did surgery improve your daily life?	2.0	0	0.005
Do you have trouble sleeping?	1.0	3.0	0.41

Median values for participants with or without new disability at 12 months.

Perception of surgery assessed on a 5-point likert scale where: 0 = strongly agree; 1 = tend to agree; 2 = neither agree nor disagree; 3 = tend to disagree; and 4 = strongly disagree.

* *New disability = a change greater than or equal to 8 in WHODAS score or a WHODAS score ≥ 25 for individuals without a baseline WHODAS score (but with Katz ADL=12, EQ-5D VAS ≥ 80 and QoR-40 score ≥ 180).*

Katz ADL = Katz Activities of Daily Living scale; QoR-40 = the 40-item quality of recovery score; WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 10. Association between day 30 complications and change in day 30 WHODAS score from baseline.

Complication	Mean change in WHODAS score from baseline	95% confidence interval	<i>P</i> value
Myocardial Infarction (n=12)	-16	-28 – -3.8	0.01
Stroke (n=2)	68	33 – 100	<0.0005
Respiratory complication (n=17)	5.6	-5.8 – 17	0.33
Abdominal collection (n=3)	-8.5	-28 – 11	0.39
Wound Infection (n=36)	6.9	0.6 – 14	0.76

WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 11. Difference in Disability-free Survival at 6 months in participants with or without a Day 30 complication.

Day 30 Complication	Disability-free survival at 6 months [§]			
	No (n = 81)	Yes (n = 334)	Relative risk	<i>P</i> value
Any complication	15 (19)	40 (12)	0.67 (0.42 – 1.09)	0.12
Readmit to ICU	1 (1)	1 (0.3)	0.39 (0.10 – 1.57)	0.28
Myocardial infarction	3 (3.8)	9 (2.7)	0.77 (0.29 – 2.10)	0.63
Stroke	2 (2.5)	0		0.38
Respiratory	4 (5)	11 (3.3)	0.72 (0.30 – 1.71)	0.48
Wound Infection	6 (7.5)	25 (7.6)	1.01 (0.48 – 2.13)	0.98

Number (%), Relative Risk (95% Confidence interval).

[§]Disability-free survival was calculated as the percentage of participants who were both alive and had a WHODAS score of less than 25% at each time point after surgery

ICU – Intensive Care Unit; WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 12. Disability-free survival and new disability at 6 months by type of surgery.

Type of surgery	Disability-free survival [§]	New disability [#]
Cardiac (n = 50)	42 (84)	4 (8.5)
Thoracic (n = 47)	36 (77)	11 (26)
Orthopaedic (n = 75)*	50 (67)	8 (13)
Urology (n = 27)	24 (89)	2 (8.0)
Ear, nose and throat (n = 13)	11 (85)	2 (15)
Plastics (n = 8)	7 (88)	1 (17)
Facio-maxillary (n = 1)	1 (100)	0
Vascular (n = 15)	15 (100)	1 (7.1)
Neurosurgery (n = 36)	21 (58)	5 (15)
General (n = 142)	126 (89)	18 (13)

Number (%)

*18 patients had hip or knee arthroplasty for which disability-free survival was 53%.

[§]Disability-free survival was calculated as the percentage of participants who were both alive and had a WHODAS score of less than 25% at each time point after surgery

[#]New disability = a change greater than or equal to 8 in WHODAS score or a WHODAS score ≥ 25 for individuals without a baseline WHODAS score (but with Katz ADL=12, EQ-5D VAS ≥ 80 and QoR-40 score ≥ 180).

Katz ADL = Katz Activities of Daily Living scale; QoR-40 = the 40-item quality of recovery score; WHODAS = World Health Organization Disability Assessment Schedule 2.0.

Supplemental Digital Content 1, Table 13. 75th centiles for number of days with disability at 30 days, 3, 6 and 12 months after surgery.

WHODAS level of disability	Number of days			
	30 days	3 months	6 months	12 months
Difficulties	30	30	20	21
Completely unable	10	2	0	0
Reduced	28	15	10	6

WHODAS = World Health Organization Disability Assessment Schedule 2.0.