



## **Supporting Information**

### **Supplementary methods and results**

**This appendix was part of the submitted manuscript and has been peer reviewed. It is posted as supplied by the authors.**

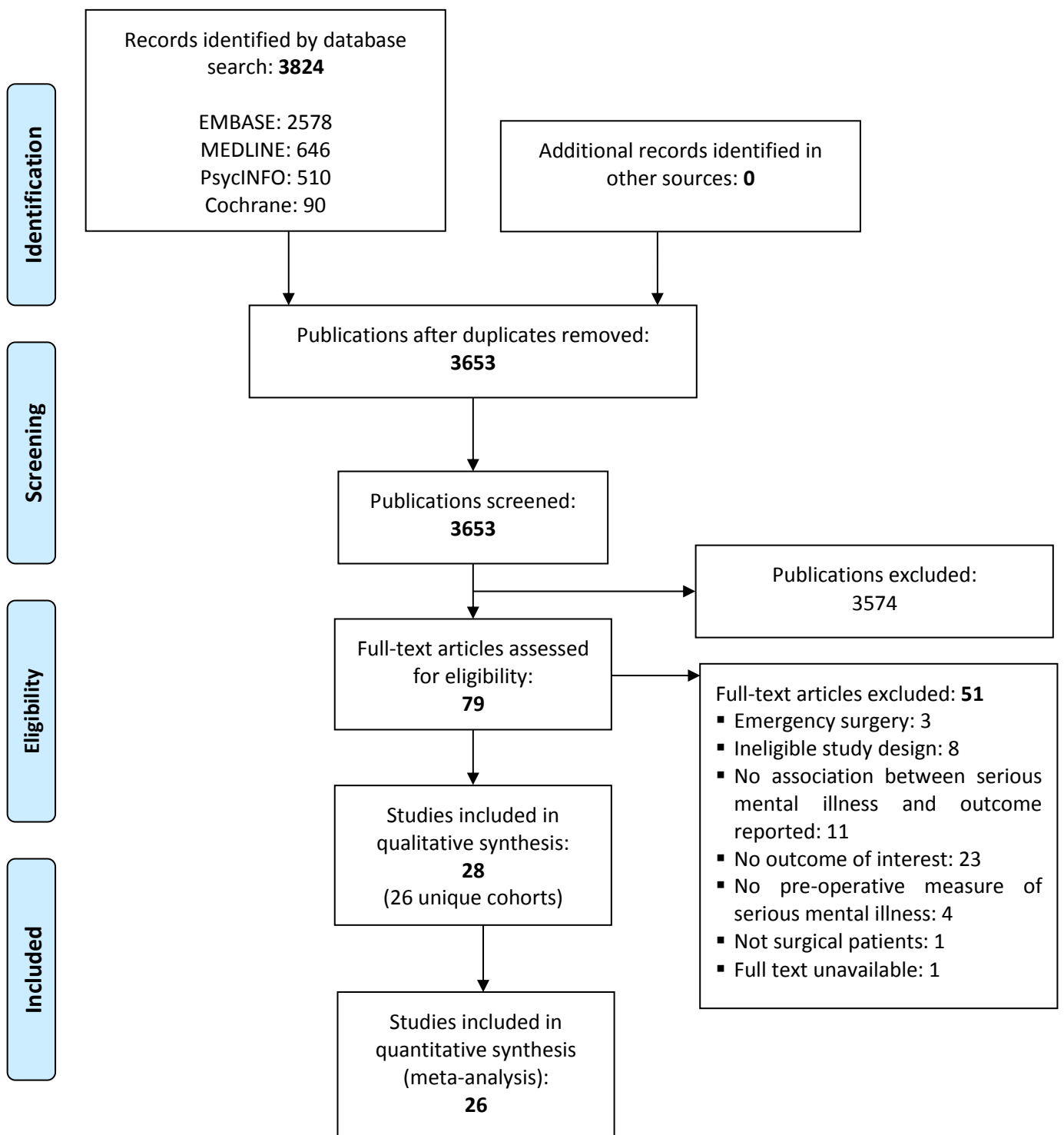
Appendix to: McBride KE, Solomon MJ, Bannon PG, et al. Surgical outcomes for people with serious mental illness are poorer than for other patients: a systematic review and meta-analysis. *Med J Aust* 2021; doi: 10.5694/mja2.51009.

**Table 1. Search strategy**

<b>EMBASE via Ovid (N=2578)</b>	
1	schizophrenia.mp. or schizophrenia/
2	psychotic disorder.mp. or psychosis/
3	bipolar disorder.mp. or bipolar disorder/
4	personality disorder.mp. or personality disorder/
5	borderline.mp. or borderline state/
6	mood disorder.mp. or mood disorder/
7	major depression/ or severe depression.mp.
8	serious mental illness.mp.
9	"Schedule for Affective Disorders and Schizophrenia"/
10	severe anxiety.mp.
11	psychotic illness.mp.
12	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13	surgery.mp. or surgery/
14	postoperative complication/
15	mortality/ or mortality.mp.
16	(length of stay or LOS or length of hospital stay).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word]
17	postoperative outcomes.mp.
18	post-operative outcome*.mp.
19	postoperative outcome*.mp.
20	surgical outcome*.mp.
21	14 or 15 or 16 or 17 or 18 or 19 or 20
22	12 and 13 and 21
23	limit 22 to human
<b>MEDLINE via Ovid (N=646)</b>	
1	SCHIZOPHRENIA/
2	Psychotic Disorders/
3	Bipolar Disorder/
4	Personality Disorders/
5	BORDERLINE PERSONALITY DISORDER/
6	Mood Disorders/
7	Depressive Disorder, Major/
8	serious mental illness.mp.
9	psychiatric illness.mp.
10	ANXIETY/ or ANXIETY DISORDERS/
11	severe mental illness.mp.

12	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13	Postoperative Complications/
14	MORTALITY/
15	(length of stay or LOS or length of hospital stay).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
16	postoperative outcomes.mp.
17	post-operative outcome*.mp.
18	surgical outcome*.mp.
19	13 or 14 or 15 or 16 or 17 or 18
20	surgery.mp. or exp General Surgery/
21	Surgical Procedures, Operative/
22	20 or 21
23	12 and 19 and 22
24	Limit 23 to human
<b>PsycINFO via Ovid (N=510)</b>	
1	exp SCHIZOPHRENIA/
2	exp Psychosis/
3	exp Bipolar Disorder/
4	exp Personality Disorders/
5	borderline personality disorder/
6	exp Affective Disorders/
7	exp Major Depression/
8	serious mental illness.mp.
9	psychiatric illness.mp.
10	exp ANXIETY DISORDERS/ or exp ANXIETY/
11	severe mental disorder.mp.
12	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13	surgery.mp. or exp SURGERY/
14	exp Postsurgical Complications/ or postoperative complication.mp.
15	mortality.mp. or exp "Death and Dying"/
16	(length of stay or LOS or length of hospital stay).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]
17	exp TREATMENT OUTCOMES/
18	(postoperative outcome\$ or post-operative outcome\$ or surgical outcome\$).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]
19	14 or 15 or 16 or 17 or 18
20	12 and 13 and 19

**Figure 1. Flow diagram of study selection**



**Table 2. Characteristics of the included studies**

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Kudoh, 2000 <sup>27</sup>	<b>Specialty:</b> Orthopaedic <b>Sample size:</b> 75 <b>Mean age (SD):</b> NR <b>Men:</b> NR	Psychiatrist (objective)	Schizophrenia (50; 67%)	Complications	Blood loss (g)
				Pain	Visual analogue scale (VAS) pain scores
Aoyanagi, 2007 <sup>19</sup>	<b>Specialty:</b> UGI/Colorectal <b>Sample size:</b> 568 <b>Mean age (SD):</b> 66.6 (11.3) <b>Men:</b> 284 (57%)	ICD-10 diagnosis codes (objective)	<b>Any mental illness</b> (86; 15%; schizophrenia; mood disorder; organic mental disorder; neurotic disorder; mental retardation; disorders due to psychoactive substance)	30-day mortality	Death within 30 days of surgery
				LOS	Days in hospital
				Complications	Superficial site infection; pneumonia; bowel obstruction; anastomotic stricture; pulmonary embolism
Szekely, 2007 <sup>38</sup>	<b>Specialty:</b> Cardiothoracic <b>Sample size:</b> 180 <b>Mean age (SD):</b> 57.9 (10.1) <b>Men:</b> 119 (66%)	Spielberger State-Trait Anxiety Inventory state and trait scores; anxiety defined as STAI>45 (subjective)	Anxiety (76; 42%)	Complications	Postoperative MI; CHF; infection; arrhythmia
				ICU stay	Duration of days in ICU
				In-hospital mortality	Death due to cardiovascular events (angina, congestive heart failure, MI, percutaneous coronary angioplasty, survived cardiac arrest, and death due to cardiac causes)
				LOS	Days in hospital
Hashimoto, 2009 <sup>25</sup>	<b>Specialty:</b> Colorectal <b>Sample size:</b> 83 <b>Mean age (SD):</b> 70.7 (2.4) <b>Men:</b> 46 (55%)	Medical records review (objective)	<b>Any mental illness</b> (27; 33%) Schizophrenia (11; 41%) Depression (7; 26%)	Complications	complications; ileus; anastomotic stricture; surgical site infection; pneumonia; anastomotic failure; blood loss (mL)
				Adverse Event	Included physical restraint and resistant behaviour
				30-day mortality	Death within 30 days of surgery
				LOS	Days in hospital

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Abrams, 2010 <sup>17</sup>	<b>Specialty:</b> Mixed <b>Sample size:</b> 35539 <b>Mean age (SD):</b> 65.0 (10.8) <b>Men:</b> 34402 (96.8%)	ICD-9 (objective)	<b>Any mental illness</b> (8922; 25.1%) Depression (5500; 15.5%) PTSD (2913; 8.2%) Anxiety (2473; 7.0%) Bipolar disorder (793; 2.2%) Psychosis (621; 1.8%)	In-hospital mortality	In hospital death
				30-day mortality	Death within 30 days of surgery
Torer, 2010 <sup>39</sup>	<b>Specialty:</b> Breast <b>Sample size:</b> 49 <b>Median age (range):</b> 51 (36–80) <b>Men:</b> 0	Hospital Anxiety and Depression Scale (HADS); anxiety defined as HADS > 11, depression as HADS depression score > 8 (subjective) Beck's Depression Inventory (BDI); depression defined as BDI > 17 (subjective)	Depression: BDI, 5/24 (21%); HADS, 20/47 (43%) Anxiety: HADS, 10/47 (21%)	Pain	Visual analogue scale (VAS) pain scores
				LOS	Days in hospital
Chaichana, 2011 <sup>21</sup>	<b>Specialty:</b> Orthopaedic <b>Sample size:</b> 67 <b>Mean age (SD):</b> 41.0 (10.0) <b>Men:</b> 42 (63%)	Zung self-rating depression scale (subjective)	Depression: 7 (10%)	LOS	Days in hospital
		Modified somatic perception questionnaire (subjective)	Somatization: 12 (18%)		
Navarro-Garcia, 2011 <sup>35</sup>	<b>Specialty:</b> Cardiothoracic <b>Sample size:</b> 100 <b>Mean age (range):</b> 65 (25–83) <b>Men:</b> 72 (72%)	Hospital Anxiety and Depression Scale (HADS) (subjective)	Anxiety: 32 (32%) Depression: 19 (19%)	In-hospital mortality	Mortality prior to hospital discharge.
				Pain	Verbal numeric rating scale (VNRS)

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Fox, 2013 <sup>24</sup>	<b>Specialty:</b> Breast <b>Sample size:</b> 40202 <b>Mean age (SD):</b> NR <b>Men:</b> 0	ICD-9 (objective)	<b>Any Mental Illness</b> (1563; 3.9%; Including: major depression, generalized anxiety disorder, adjustment disorder, panic disorder, or PTSD)	Complications	Any of the following: in-hospital mortality; mechanical wound; infectious; urinary; pulmonary; gastrointestinal; cardiovascular; and intraoperative complications
				Cost	AHRQ cost-to-charge ratio file was used to convert charges to direct cost of care
				LOS	Prolonged LOS (LOS > 3 days)
Liao, 2013 <sup>29</sup>	<b>Specialty:</b> Mixed <b>Sample size:</b> 44835 <b>Mean age (SD):</b> 47.4 (15.9) <b>Men:</b> 23515 (52.4%)	ICD-9 (objective)	Schizophrenia (8967; 20%)	Complications	Complications; stroke; postop bleeding; pneumonia; septicemia; deep wound infection; acute MI; acute renal failure; pulmonary embolism
				ICU stay	Number and percentage of patients admitted to ICU
				Cost	Mean in-hospital medical expenditure
				LOS	Days in hospital
				30-day mortality	Death within 30 days of surgery
Maeda, 2014 <sup>31</sup>	<b>Specialty:</b> Mixed <b>Sample size:</b> 5569 <b>Median age (IQR):</b> 57.0 (34.0) <b>Men:</b> 2435 (43.7%)	ICD-10 (objective)	<b>Any mental illness</b> (250; 4.5%) Schizophrenia (104, 1.9%) Mood disorder (69; 1.2%) Neurotic disorder (97; 1.7%)	Complications	Post-procedure complications
				In-hospital mortality	In-hospital death
				Cost	Total hospital cost billed at discharge, incl. physician fees, instrument costs, laboratory or imaging test costs, administration costs
				LOS	Days in hospital
Menendez, 2014 <sup>32</sup>	<b>Specialty:</b> Orthopaedic <b>Sample size:</b> 5339284 <b>Mean age (SD):</b> 54.0 (15.0) <b>Men:</b> 2691171 (50.0%)	ICD-9 (objective)	Depression (242205; 4.5%) Anxiety (134559; 2.5%) Schizophrenia (10765; 0.2%)	Complications	Blood transfusion
				Non-routine discharge	Discharge to a rehabilitation facility
				LOS	Days in hospital
				In-hospital mortality	In hospital death

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Mitchell, 2014 <sup>33</sup>	<b>Specialty:</b> Bariatric <b>Sample size:</b> 2146 <b>Median (IQR):</b> 46.0 (37 to 54) <b>Men:</b> 461 (21.5%)	Beck's Depression Inventory (BDI) (subjective)	Depression (708; 33%)	Complications	Any of the following: death; DVT or venous thromboembolism; reintervention using percutaneous, endoscopic, or operative techniques; or failure to be discharged from the hospital within 30 days of surgery
Poole, 2014 <sup>36</sup>	<b>Specialty:</b> Cardiothoracic <b>Sample size:</b> 310 <b>Mean age (SD):</b> 67.8 (9.2) <b>Men:</b> 264 (85.2%)	Beck's Depression Inventory (BDI) (subjective)	Depression (84; 30.3%)	LOS	Days in hospital
Radinovic, 2014 <sup>37</sup>	<b>Specialty:</b> Orthopaedic <b>Sample size:</b> 129 <b>Mean age (SD):</b> 76.6 (8.5) <b>Men:</b> 34 (26%)	Geriatric Depression Scale (subjective)	Depression (30; 23.2%)	30-day mortality	Death within 30 days of operation
				LOS	Days in hospital
				Complications	Hospital-acquired complications (UTI, diarrhoea, pulmonary embolism, DVT); re-intervention (cases in which further surgery and anaesthesia were needed)
Wimalawansa, 2014 <sup>42</sup>	<b>Specialty:</b> Plastics <b>Sample size:</b> 116597 <b>Mean age (SD):</b> 49.5 (16.7) <b>Men:</b> 17839 (15.3%)	ICD-9 (objective)	<b>Any mental illness</b> (4521; 3.9%; Including: anxiety disorder; multiple diagnoses; major depressive disorder; bipolar disorder)	30-day readmission	Any hospital admission or emergency department visit without subsequent admission within 30 days post-operatively.
Copeland, 2015 <sup>22</sup>	<b>Specialty:</b> Mixed <b>Sample size:</b> 321131 <b>Mean age (SD):</b> 63.7 (12.2) <b>Men:</b> 305511 (95%)	ICD-9 (objective)	Schizophrenia (7155; 2.2%) Bipolar disorder (6795; 2.1%) PTSD (23178; 7.2%) Depression (8269; 2.6%)	Complications	Myocardial infarct; thromboembolytic events; pneumonia; respiratory failure; sepsis; wound infections
				Readmission within 30-days	Readmission within 30 days of discharge
				30-day mortality	Death within 30 days of surgery



Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Floyd, 2015 <sup>23</sup>	<b>Specialty:</b> Orthopaedic <b>Sample size:</b> 256 <b>Mean age (SD):</b> 58.0 (10.7) <b>Men:</b> 129 (42.0%)	Medical records review (objective)	Anxiety (32; 8%)	LOS	Days in hospital
Ward, 2015 <sup>40</sup>	<b>Specialty:</b> Mixed <b>Sample size:</b> 1846 <b>Mean age (SD):</b> 52.7 (15.8) <b>Men:</b> 827 (44.4%)	Antidepressant use (objective)	Depression (380; 20.6%);	Complications	Return to operating room; infection (SSI, sepsis/shock, UTI, pneumonia); wound occurrence (superficial; deep; organ; space SSI; dehiscence); cardiac arrest (acute MI; CVA with deficit)
		Anxiolytic use (objective)	Anxiety (288; 15.6%)		
				LOS	Days in hospital
				30-day mortality	All-cause mortality
Wieghard, 2015 <sup>41</sup>	<b>Specialty:</b> Colorectal <b>Sample size:</b> 23890 <b>Mean age (SD):</b> 63.4 (13.1) <b>Men:</b> 14134 (59.2%)	ICD-9 (objective)	<b>Any mental illness</b> (4862; 20.3%; Including: anxiety disorders; mood disorders: schizophrenia and other psychotic disorders; substance misuse	Complications	Any post-op complications; anastomotic leak; wound infection; intra-abdominal abscess; infected seroma; wound dehiscence; UTI; pneumonia; DVT; myocardial infarction
				LOS	Days in hospital
				Non-routine discharge	Routine discharge defined as discharge to home or self-care
				Discharge destination	Discharge disposition including home/self-care, home health care or transfer/other
Adogwa, 2016 <sup>18</sup>	<b>Specialty:</b> Orthopaedic <b>Sample size:</b> 400 <b>Mean age (SD):</b> 57.3 (13.6) <b>Men:</b> 36/108 (33%)	Psychiatrist (objective)	Depression (29; 27%)	Readmission within 30-days	Unplanned readmissions within 30 days of discharge
				Complications	UTI; pneumonia; deep site infection; superficial site infection; other infection; DVT; pulmonary embolism; myocardial infarction
				LOS	Days in hospital

Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Lee, 2016 <sup>28</sup>	<b>Specialty:</b> Mixed <b>Sample size:</b> 183 <b>Mean age (SD):</b> 61.3 (2.2) <b>Men:</b> 180 (98.4%)	Self-reported/medical records review (objective)	<b>Any mental illness</b> (76; 42%; including: depression; anxiety; PTSD)	Complications	Overall complications; surgical site infection; UTI; bleeding (>4U); wound classification
				30-day mortality	Death within 30 days of surgery
				LOS	Days in hospital
				Readmission within 30 days	Readmission within 30 days of discharge
Mousavi, 2016 <sup>34</sup>	<b>Specialty:</b> Vascular <b>Sample size:</b> 21 <b>Mean age (SD):</b> 25.0 (4.8) <b>Men:</b> 3 (14%)	Self-reported/medical records review (objective)	<b>Any mental illness</b> (14; 67%; including: depression; anxiety)	Complications	Cerebral spinal fluid leak; meningitis; wound infection; stroke; other
Britteon, 2017 <sup>20</sup>	<b>Specialty:</b> Mixed <b>Sample size:</b> 176827 <b>Mean age (SD):</b> NR <b>Men:</b> NR	EQ-5D questionnaire/ICD-10 (objective)	Depression (2,842; 1.6%)	Complications	Wound; bleeding; urinary complications
Hassidim, 2017 <sup>26</sup>	<b>Specialty:</b> Upper gastrointestinal tract <b>Sample size:</b> 260 <b>Mean age (SD):</b> 52.0 (15.5) <b>Men:</b> 101 (39%)	ICD-9 (objective)	<b>Any mental illness</b> (52; 20%; including: schizophrenia; psychosis; drug dependence; Tourette syndrome; panic disorder; depressive disorder; bipolar disorder; obsessive compulsive disorder; alcohol dependence/misuse; anxiety)	Complications	Respiratory; infection; surgical wound; cardiovascular; other complications (intraoperative or postoperative unexpected outcomes, which affected hospitalization duration or led to recurrent emergency department visit within 30 days after surgery); intra-operative or post-operative complication
				LOS	Days in hospital

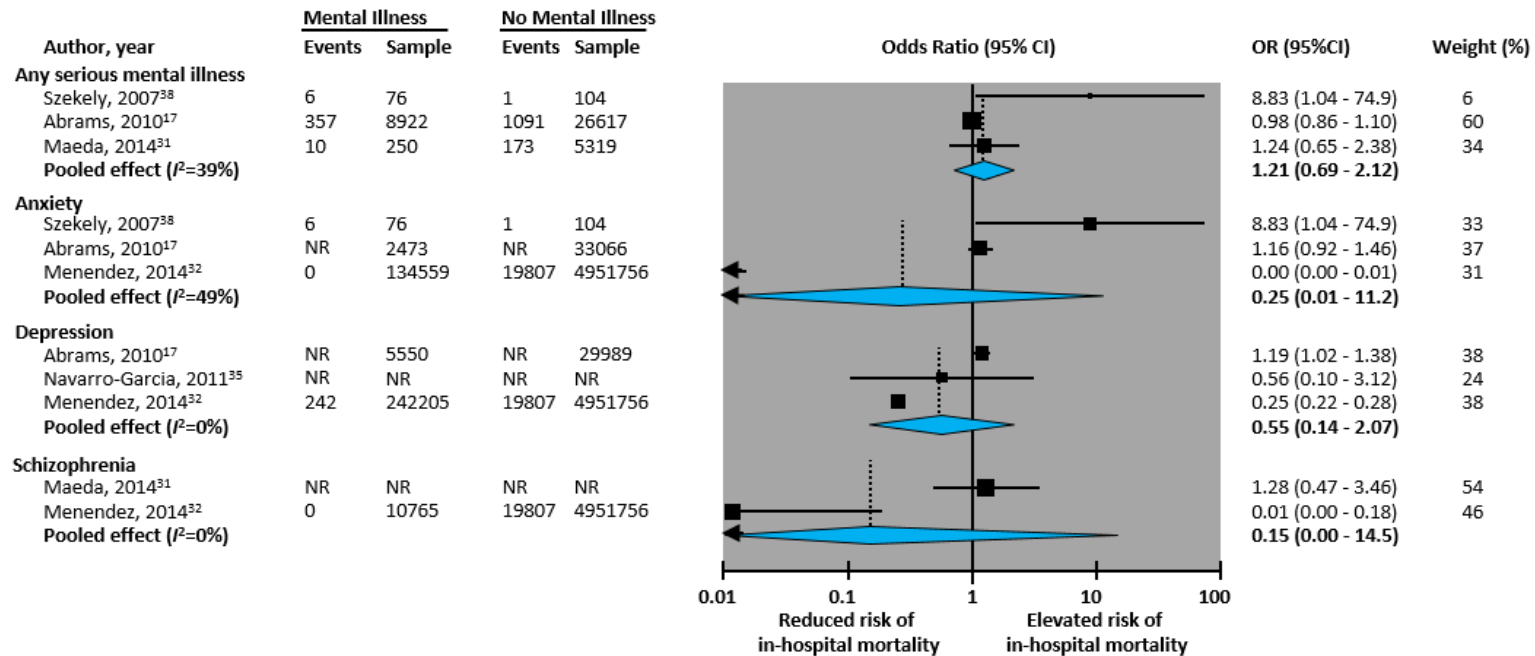
Author, year	Study population	Pre-operation mental illness		Post-operative outcome	
		Diagnostic tool (objective/subjective)	Status (proportion of sample)	Outcome	Definition
Litz, 2018 <sup>30</sup>	<b>Specialty:</b> Bariatric <b>Sample size:</b> 19259 <b>Mean age (SD):</b> 45.0 (NR) <b>Men:</b> 4334 (22.5%)	ICD-9 Diagnosis codes (Objective)	<b>Any mental illness</b> (7498; 38.9%; Including: major depressive disorder/bipolar disorder, minor affective disorder, anxiety, personality disorder, schizophrenia, organic brain disorder/Alzheimer, other psychosis, substance misuse-related mental health disorder, posttraumatic stress disorder)	Re-admission within 30 days	Re-admission within 30 days of discharge from the initial hospital stay
				LOS	Days in hospital

AHRQ = Agency for Healthcare Research and Quality; CHF = chronic heart failure; CVA = cerebrovascular accident; DVT = deep vein thrombosis; ICD = International Classification of Diseases; ICU = intensive care unit; IQR = interquartile range; LOS = length of stay; MI = myocardial infarction; NR = not reported; PTSD = post-traumatic stress disorder; SD = standard deviation; SSI = superficial site infection; UTI = urinary tract infection.

**Table 3. Risk of bias assessment using the Quality in Prognosis Studies tool**

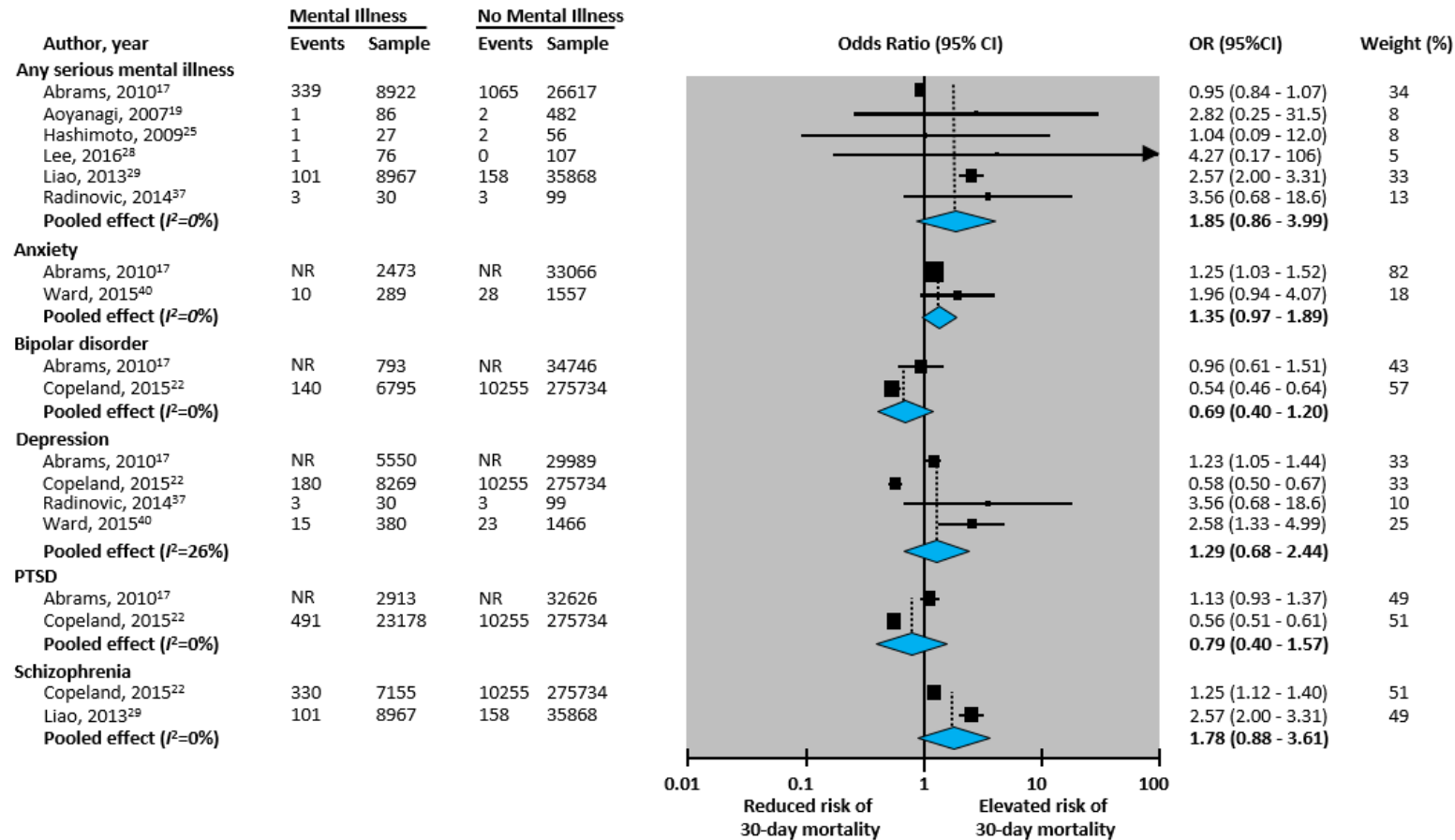
<b>Study, year</b>	<b>Study participation</b>	<b>Study attrition</b>	<b>Prognostic factor measurement</b>	<b>Outcome measurement</b>	<b>Study confounding</b>	<b>Statistical analysis and reporting</b>
Kudoh, 2000 <sup>27</sup>	Moderate	Low	Low	Low	High	High
Aoyanagi, 2007 <sup>19</sup>	High	Low	Low	Moderate	Moderate	High
Szekely, 2007 <sup>38</sup>	Low	Low	Low	Low	Low	Low
Hashimoto, 2009 <sup>25</sup>	Low	Low	Low	Low	Low	Low
Abrams, 2010 <sup>17</sup>	Moderate	Low	Low	Low	Low	Low
Torer, 2010 <sup>39</sup>	Low	High	Mod	Low	High	High
Chaichana, 2011 <sup>21</sup>	Moderate	Low	Low	Low	Low	Low
Navarro-Garcia, 2011 <sup>35</sup>	Low	Low	Low	Low	High	Moderate
Fox, 2013 <sup>24</sup>	Moderate	Low	Low	Low	Low	Low
Liao, 2013 <sup>29</sup>	Low	Low	Low	Low	Low	Low
Maeda, 2014 <sup>31</sup>	Low	Low	Low	Low	Low	Low
Menendez, 2014 <sup>32</sup>	Low	Low	Low	Low	Low	Low
Mitchell, 2014 <sup>33</sup>	Moderate	Low	Low	Low	Low	Low
Poole, 2014 <sup>36</sup>	Low	Low	Low	Low	Low	Low
Radinovic, 2014 <sup>37</sup>	Low	Low	Low	Low	Low	Low
Wimalawansa, 2014 <sup>42</sup>	Moderate	Low	Low	Low	Low	Low
Copeland, 2015 <sup>22</sup>	Moderate	Low	Low	Low	Low	Low
Floyd, 2015 <sup>23</sup>	Moderate	Low	Moderate	Moderate	Moderate	Moderate
Ward, 2015 <sup>40</sup>	Low	Low	Low	Low	Low	Low
Wieghard, 2015 <sup>41</sup>	Low	Low	Low	Low	Low	Low
Adogwa, 2016 <sup>18</sup>	High	Low	Low	Moderate	Low	Moderate
Lee, 2016 <sup>28</sup>	High	Low	Low	Low	Low	Low
Mousavi, 2016 <sup>34</sup>	Low	High	High	High	High	High
Britteon, 2017 <sup>20</sup>	Low	Low	Low	Low	Low	Moderate
Hassidim, 2017 <sup>26</sup>	Low	Low	Low	Low	Low	Moderate
Litz, 2018 <sup>30</sup>	Low	Low	Low	Low	Low	Low

Figure 2. Meta-analyses of the association between pre-operative serious mental illness diagnosis and in-hospital mortality



CI = confidence interval; NR = not reported; OR = odds ratio. OR >1 indicates greater likelihood of outcome for patients with serious mental illness diagnosis.

Figure 3. Meta-analyses of the association between pre-operative serious mental illness diagnosis and 30-day post-operative mortality



CI = confidence interval; NR = not reported; OR = odds ratio; PTSD = post-traumatic stress disorder. OR > 1 indicates greater likelihood of outcome for patients with serious mental illness diagnosis.

**Table 4. Association between pre-operative serious mental illness and post-operative outcome measures**

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
<i>Any serious mental illness v No serious mental illness</i>			
<b><i>Post-operative complications</i></b>			
Torer, 2010 <sup>39</sup>	Breast	Pain at 8 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, 16.8 (5.50 - 28.1)
Torer, 2010 <sup>39</sup>	Breast	Pain at 24 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, 21.6 (7.90 - 35.3)
Hashimoto, 2009 <sup>25</sup>	Colorectal	Ileus v No ileus	OR, 1.63 (0.34 - 7.84)
Hashimoto, 2009 <sup>25</sup>	Colorectal	Blood loss (ml)	MD, -218 (-274 to -172)
Hashimoto, 2009 <sup>25</sup>	Colorectal	Anastomotic failure v No anastomotic failure	OR, 1.04 (0.18 - 6.06)
Wieghard, 2015 <sup>41</sup>	Colorectal	Anastomotic leak v No anastomotic leak	OR, 0.91 (0.83 - 1.01)
Wieghard, 2015 <sup>41</sup>	Colorectal	Intra-abdominal abscess v No intra-abdominal abscess	OR, 1.01 (0.73 - 1.38)
Wieghard, 2015 <sup>41</sup>	Colorectal	Deep venous thrombosis v No deep venous thrombosis	OR, 1.00 (0.73 - 1.38)
Wieghard, 2015 <sup>41</sup>	Rectal	Wound dehiscence v No wound dehiscence	OR, 2.01 (1.57 - 2.57)
Hassidim, 2017 <sup>26</sup>	UGI	Pulmonary complication v No pulmonary complication	OR, 12.7 (1.29 - 124)
Mousavi, 2016 <sup>34</sup>	Vascular	Cerebral spinal fluid leak v No cerebral spinal fluid leak	OR, 1.00 (0.07 - 13.4)
Mousavi, 2016 <sup>34</sup>	Vascular	Major side effects v No major side effects	OR, 22.0 (1.86 - 261)
Mousavi, 2016 <sup>34</sup>	Vascular	Meningitis v No meningitis	OR, 3.00 (0.13 - 71.3)
Mousavi, 2016 <sup>34</sup>	Vascular	Minor side effects v No minor side effects	OR, 0.19 (0.01 - 2.62)
Mousavi, 2016 <sup>34</sup>	Vascular	Side effects v No side effects	OR, 8.00 (0.96 - 66.4)
Lee, 2016 <sup>28</sup>	Mixed	Bleeding (>4 units) v Bleeding (≤4 units)	OR, 4.27 (0.17 - 107)
Aoyanagi, 2007 <sup>19</sup>	Mixed	Bowel obstruction v No bowel obstruction	OR, 0.71 (0.24 - 2.06)
Aoyanagi, 2007 <sup>19</sup>	Mixed	Space/organ Wound infection v No Space/organ wound infection	OR, 1.12 (0.57 - 2.18)
Aoyanagi, 2007 <sup>19</sup>	Mixed	Superficial/ deep Wound infection v No Superficial/ deep wound infection	OR, 0.86 (0.19 - 3.88)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
<b>Length of stay</b>			
Litz, 2018 <sup>30</sup>	Bariatric	Length of hospital stay	Patients with serious mental illness did not have a longer LOS (P=0.92)
Wieghard, 2015 <sup>41</sup>	Plastics	Length of hospital stay	No difference in LOS (P=0.07)
Maeda, 2014 <sup>31</sup>	Mixed	Length of hospital stay	Patients with serious mental illness stayed longer in hospital (P<0.001)
<b>Discharge</b>			
Wieghard, 2015 <sup>41</sup>	Plastics	Non-routine discharge v Routine discharge	OR, 1.13 (1.06 - 1.20)
Wieghard, 2015 <sup>41</sup>	Plastics	Discharge to home health care v No discharge to home health care	OR, 0.88 (0.83 - 0.94)
Wieghard, 2015 <sup>41</sup>	Plastics	Transfer to another facility/other v No transfer to another facility/other	OR, 1.00 (0.91 - 1.01)
<b>Adverse event</b>			
Hashimoto, 2009 <sup>25</sup>	Colorectal	Physical restraint v No physical restraint	OR, 5.60 (1.87 - 16.8)
Hashimoto, 2009 <sup>25</sup>	Colorectal	Resistant behaviour v No resistant behaviour	OR, 11.0 (3.35 - 36.1)
<b>Anxiety v No anxiety</b>			
<b>Mortality</b>			
Navarro-Garcia, 2011 <sup>35</sup>	Cardiothoracic	In-hospital mortality v No in-hospital mortality	Anxiety was not associated with in-hospital mortality (p=0.06)
<b>Post-operative complications</b>			
Torer, 2010 <sup>39</sup>	Breast	Pain at 8 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, 18.0 (5.90 - 30.1)
Torer, 2010 <sup>39</sup>	Breast	Pain at 48 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, 0.80 (-0.10 to 1.70)
Szekely, 2007 <sup>38</sup>	Cardiothoracic	Arrhythmia v No Arrhythmia	OR, 0.53 (0.24 - 1.17)
Szekely, 2007 <sup>38</sup>	Cardiothoracic	Cardiopulmonary complication v No Cardiopulmonary complication	OR, 1.00 (0.46 - 2.33)
Navarro-Garcia, 2011 <sup>35</sup>	Cardiothoracic	Pain at 4 hours postoperative (scoring: 0 to 10, 10=worst pain)	MD, 2.00 (0.90 - 3.10)
Navarro-Garcia, 2011 <sup>35</sup>	Cardiothoracic	Pain at 12 hours postoperative (scoring: 0 to 10, 10=worst pain)	MD, 1.00 (-0.30 to 2.30)



Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
Navarro-Garcia, 2011 <sup>35</sup>	Cardiothoracic	Pain at discharge from Intensive care unit (scoring: 0 to 10, 10=worst pain)	MD, 1.90 (0.60 - 3.20)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Anemia v No anemia	OR, 0.70 (0.69 - 0.72)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Acute renal failure v No acute renal failure	OR, 0.33 (0.28 - 0.40)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Blood transfusion v No blood transfusion	OR, 2.58 (2.53 - 2.64)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Complication v No complication	OR, 1.00 (0.98 - 1.02)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Deep venous thrombosis v No deep venous thrombosis	OR, 1.25 (1.16 - 1.35)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Intubation/mechanical ventilation v No intubation/mechanical ventilation	OR, 0.17 (0.14 - 0.20)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Pneumonia v No Pneumonia	OR, 0.10 (0.08 - 0.12)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Pulmonary embolism v No Pulmonary embolism	OR, 3.01 (2.72 - 3.33)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Pulmonary insufficiency v No pulmonary insufficiency	OR, 0.30 (0.28 - 0.33)
Ward, 2015 <sup>40</sup>	Mixed	Return to operating room v No return to operating room	OR, 12.2 (5.86 - 25.2)
Ward, 2015 <sup>40</sup>	Mixed	Major complication v No major complication	OR, 1.86 (1.38 - 2.52)
<b>Length of stay</b>			
Szekely, 2007 <sup>38</sup>	Cardiothoracic	Length of Intensive care unit stay (days)	No difference in stay (P=0.52)
Floyd, 2015 <sup>23</sup>	Orthopaedic	Length of hospital stay (days)	Patients with anxiety stayed in hospital 1.8 days longer (P=0.003)
<b>Discharge</b>			
Menendez, 2014 <sup>32</sup>	Orthopaedic	Non-routine discharge v Routine discharge	OR, 1.20 (1.20 - 1.20)
<b>Depression v No depression</b>			
<b>Post-operative complications</b>			
Torer, 2010 <sup>39</sup>	Breast	Pain at 8 hours post-operative (scoring: 0 to 100, 100=worst pain) <sup>a</sup>	MD, 36.1 (15.5 - 56.7)
Torer, 2010 <sup>39</sup>	Breast	Pain at 8 hours post-operative (scoring: 0 to 100, 100=worst pain) <sup>b</sup>	MD, 13.8 (3.50 - 24.1)
Navarro-Garcia, 2011 <sup>35</sup>	Cardiothoracic	Pain at 4 hours post-operative (scoring: 0 to 100, 100=worst pain)	MD, 12.0 (-4.00 to 28.0)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
Navarro-Garcia, 2011 <sup>35</sup>	Cardiothoracic	Pain at 12 hours post-operative (scoring: 0 to 100, 100=worst pain)	MD, 3.00 (-13.0 to 19.0)
Navarro-Garcia, 2011 <sup>35</sup>	Cardiothoracic	Pain at 48 hours post-operative (scoring: 0 to 100, 100=worst pain)	MD, 2.00 (-11.0 to 15.0)
Navarro-Garcia, 2011 <sup>35</sup>	Cardiothoracic	Pain at discharge from intensive care unit (scoring: 0 to 100, 100=worst pain)	MD, 2.00 (-16.0 to 20.0)
Hashimoto, 2009 <sup>25</sup>	Colorectal	Wound infection v No wound infection	OR, 2.05 (0.41 - 10.3)
Adogwa, 2016 <sup>18</sup>	Orthopaedic	Other infection v No other infection	OR, 1.89 (0.41 - 8.74)
Adogwa, 2016 <sup>18</sup>	Orthopaedic	Deep wound infection v No deep wound infection	OR, 0.72 (0.04 - 12.9)
Adogwa, 2016 <sup>18</sup>	Orthopaedic	Superficial wound infection v No superficial wound infection	OR, 1.13 (0.06 - 20.9)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Anemia v No anemia	OR, 0.65 (0.64 - 0.67)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Acute renal failure v No acute renal failure	OR, 2.01 (1.90 - 2.12)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Blood transfusion v No blood transfusion	OR, 2.75 (2.71 - 2.79)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Pulmonary insufficiency v No pulmonary insufficiency	OR, 0.38 (0.36 - 0.40)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Intubation/mechanical ventilation v No intubation/mechanical ventilation	OR, 0.67 (0.62 - 0.71)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Deep venous thrombosis v No deep venous thrombosis	OR, 0.75 (0.70 - 0.81)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Pulmonary embolism v No Pulmonary embolism	OR, 6.00 (5.69 - 6.39)
Radinovic, 2014 <sup>37</sup>	Orthopaedic	Reintervention v No reintervention	OR, 0.64 (0.03 - 13.7)
Ward, 2015 <sup>40</sup>	Mixed	Cardiopulmonary complication v No Cardiopulmonary complication	OR, 5.90 (2.41 - 14.6)
Ward, 2015 <sup>40</sup>	Mixed	Infection v No infection	OR, 1.62 (1.16 - 2.26)
Ward, 2015 <sup>40</sup>	Mixed	Return to operating room v No return to operating room	OR, 1.13 (0.67 - 1.92)
Ward, 2015 <sup>40</sup>	Mixed	Major complication v No major complication	OR, 1.28 (0.96 - 1.72)
<b>Discharge</b>			
Menendez, 2014 <sup>32</sup>	Orthopaedic	Non-routine discharge v Routine discharge	OR, 1.40 (1.30 - 1.40)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
<b>Schizophrenia v No schizophrenia</b>			
<b>Post-operative complications</b>			
Hashimoto, 2009 <sup>25</sup>	Colorectal	Wound infection v No wound infection	OR, 3.28 (0.87 - 12.4)
Hashimoto, 2009 <sup>25</sup>	Colorectal	Ileus v No ileus	OR, 4.88 (0.92 - 25.9)
Kudoh, 2000 <sup>27</sup>	Orthopaedics	Pain at 2 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, -10.5 (-18.0 to -3.00)
Kudoh, 2000 <sup>27</sup>	Orthopaedics	Pain at 5 hours postoperative (scoring: 0 to 100, 100=worst pain)	MD, -14.0 (-21.0 to -6.00)
Kudoh, 2000 <sup>27</sup>	Orthopaedics	Pain at 24 hours postoperative (scoring: 0 to 100, 100=worst pain)	No difference between groups
Kudoh, 2000 <sup>27</sup>	Orthopaedics	Pain at 5 days postoperative (scoring: 0 to 100, 100=worst pain)	No difference between groups
Kudoh, 2000 <sup>27</sup>	Orthopaedic	Blood loss (g)	MD, 12.5 (9.00 - 16.0)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Anemia v No anemia	OR, 0.11 (0.09 - 0.14)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Blood transfusion v No blood transfusion	OR, 2.17 (2.01 - 2.34)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Deep venous thrombosis v No deep venous thrombosis	OR, 8.76 (7.89 - 9.74)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Intubation/mechanical ventilation v No intubation/mechanical ventilation	OR, 0.01 (0.00 - 0.12)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Pulmonary insufficiency v No pulmonary insufficiency	OR, 2.51 (2.25 - 2.79)
Menendez, 2014 <sup>32</sup>	Orthopaedic	Wound complication v No wound complication	OR, 8.64 (8.16 - 9.14)
Copeland, 2015 <sup>22</sup>	Mixed	30-day readmission v No 30-day readmission	OR, 1.40 (1.31 - 1.49)
Liao, 2013 <sup>29</sup>	Mixed	Septicemia v No septicemia	OR, 2.79 (2.05 - 3.80)
Liao, 2013 <sup>29</sup>	Mixed	Bleeding v No bleeding	OR, 1.35 (1.11 - 1.63)
Liao, 2013 <sup>29</sup>	Mixed	Deep wound infection v No deep wound infection	OR, 1.21 (0.78 - 1.88)
Liao, 2013 <sup>29</sup>	Mixed	Stroke v No stroke	OR, 1.42 (1.22 - 1.65)
Liao, 2013 <sup>29</sup>	Mixed	Intensive care Unit visit v No intensive care unit visit	OR, 1.65 (1.54 - 1.76)
<b>Discharge</b>			
Menendez, 2014 <sup>32</sup>	Orthopaedic	Non-routine discharge v Routine discharge	OR, 4.30 (4.00 - 4.60)

Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
<b>Cost</b>			
Maeda, 2014 <sup>31</sup>	Mixed	Total cost	Total cost was significantly higher for those with schizophrenia (P<0.001)
<b>Bipolar disorder v No bipolar disorder</b>			
<b>Mortality</b>			
Abrams, 2010 <sup>17</sup>	Mixed	In-hospital mortality v No in-hospital mortality	OR, 0.79 (0.51 - 1.23)
<b>Post-operative complications</b>			
Copeland, 2015 <sup>22</sup>	Mixed	Complication v No complication	OR, 0.93 (0.85 - 1.02)
<b>Re-admission</b>			
Copeland, 2015 <sup>22</sup>	Mixed	30-day readmission v No 30-day readmission	OR, 1.14 (1.06 - 1.22)
<b>PTSD v No PTSD</b>			
<b>Mortality</b>			
Abrams, 2010 <sup>17</sup>	Mixed	In-hospital mortality v No in-hospital mortality	OR, 0.99 (0.80 - 1.23)
<b>Post-operative complications</b>			
Copeland, 2015 <sup>22</sup>	Mixed	Complication v No complication	OR, 0.88 (0.84 - 0.93)
<b>Re-admission</b>			
Copeland, 2015 <sup>22</sup>	Mixed	30-day readmission v No 30-day readmission	OR, 0.91 (0.87 - 0.95)
<b>Psychosis v No psychosis</b>			
<b>Mortality</b>			
Abrams, 2010 <sup>17</sup>	Mixed	In-hospital mortality v No in-hospital mortality	OR, 1.45 (0.95 - 2.21)
Abrams, 2010 <sup>17</sup>	Mixed	30-day mortality v No 30-day mortality	OR, 1.12 (0.68 - 1.84)

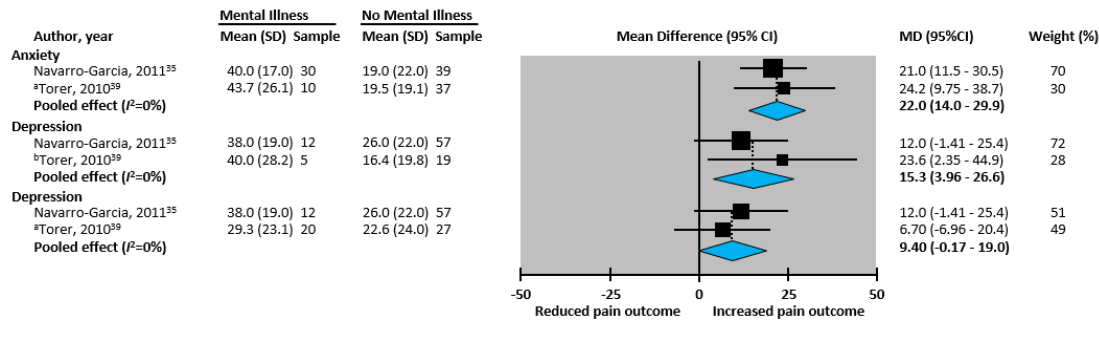
Author, year	Surgical specialty	Post-operative outcomes threshold	Outcome (95% CI)
<b>Neurotic disorders v No neurotic disorder</b>			
<b>Mortality</b>			
Maeda, 2014 <sup>31</sup>	Mixed	In-hospital mortality v No in-hospital mortality	OR, 0.74 (0.22 - 2.47)
<b>Post-operative complications</b>			
Maeda, 2014 <sup>31</sup>	Mixed	Complication v No complication	OR, 0.15 (0.02 - 1.07)
<b>Cost</b>			
Maeda, 2014 <sup>31</sup>	Mixed	Total cost	Total cost was significantly lower for those with neurotic disorders (P=0.014)
<b>Mood disorders v No mood disorder</b>			
<b>Mortality</b>			
Maeda, 2014 <sup>31</sup>	Mixed	In-hospital mortality v No in-hospital mortality	OR, 1.21 (0.35 - 4.17)
<b>Post-operative complications</b>			
Maeda, 2014 <sup>31</sup>	Mixed	Complication v No complication	OR, 0.81 (0.24 - 2.67)
<b>Cost</b>			
Maeda, 2014 <sup>31</sup>	Mixed	Total cost	Total cost was significantly higher for those with mood disorders (P=0.015)

CI = confidence interval; MD = mean difference; OR = odds ratio; PTSD = post-traumatic stress disorder.

a Depression defined as Beck's Depression Inventory (BDI) score > 17.

b Depression defined as Hospital Anxiety and Depression Scale (HADS) score > 8.

**Figure 4. Meta-analyses of the association between pre-operative serious mental illness diagnosis and post-operative day 1 pain scores.**



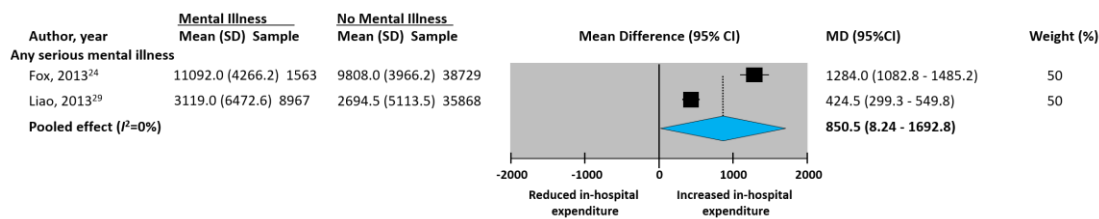
CI = confidence interval; MD = mean difference; SD=standard deviation.

Pain score ranges from 0 to 100 (100 = worst pain). MD > 0 indicates poorer outcome for patients with serious mental illness diagnosis.

a Hospital Anxiety and Depression Scale (HADS): scores range from 0 to 21; anxiety defined as scores > 11, depression as scores > 8.

b Beck's Depression Inventory (BDI): scores range from 0 to 63; depression was defined as scores >17.

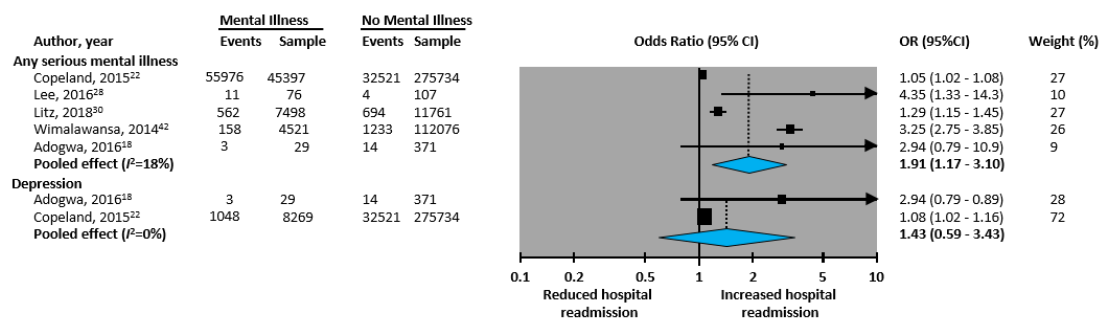
**Figure 5. Meta-analyses of the association between pre-operative serious mental illness diagnosis and in-hospital medical expenditure in US dollars.**



CI = confidence interval; MD = mean difference; SD=standard deviation.

MD > 0 indicates higher in-hospital expenditure for patients with serious mental illness diagnosis.

**Figure 6. Meta-analyses of the association between pre-operative serious mental illness diagnosis and hospital re-admission**



CI = confidence interval; OR = odds ratio.

OR > 1 indicates greater likelihood of outcome for patients with serious mental illness diagnosis.

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